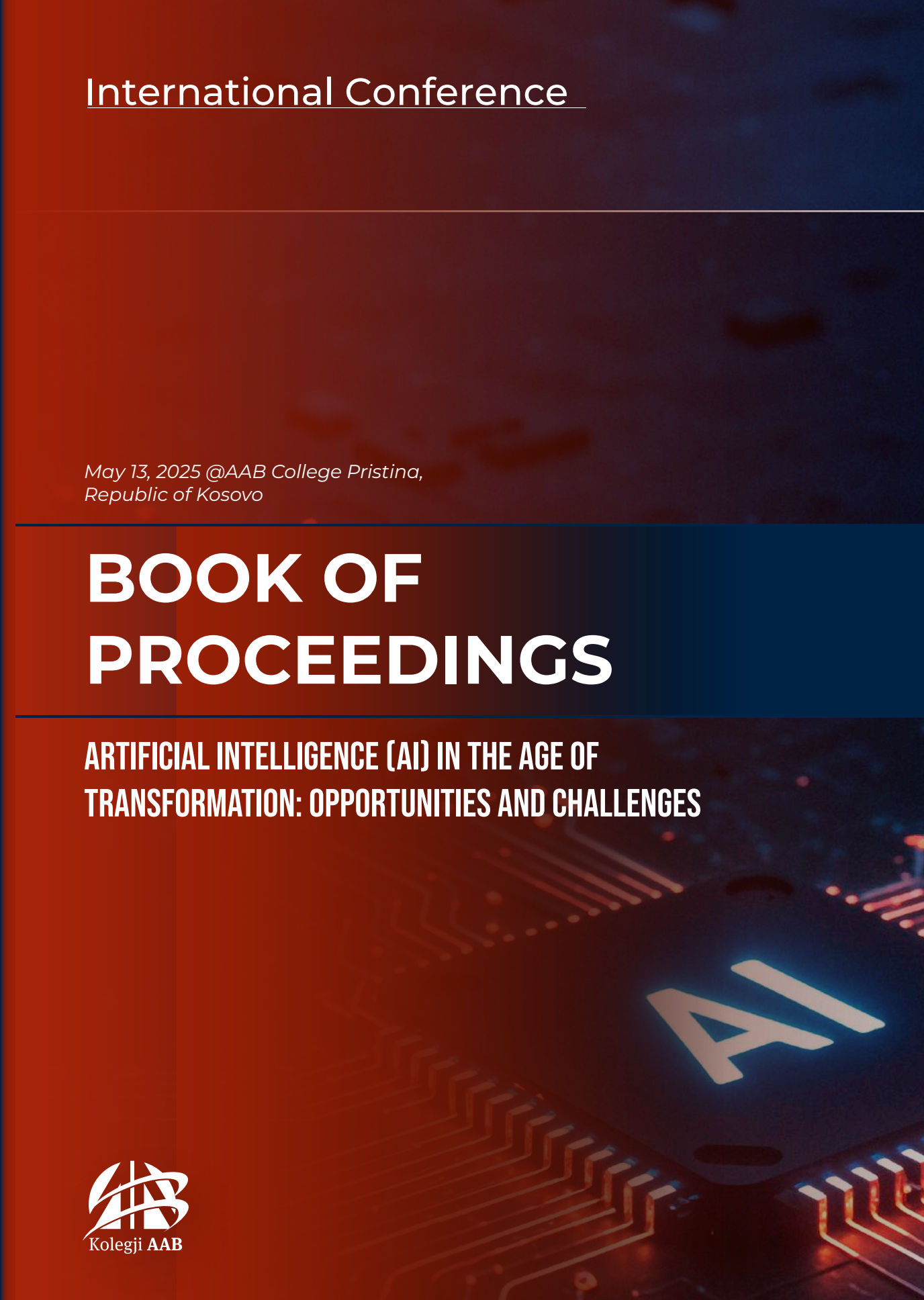
International Conference

May 13, 2025 @AAB College Pristina,
Republic of Kosovo

BOOK OF PROCEEDINGS

ARTIFICIAL INTELLIGENCE (AI) IN THE AGE OF TRANSFORMATION: OPPORTUNITIES AND CHALLENGES



Kolegji **AAB**

International Conference

Artificial Intelligence (AI) in the Age of Transformation: Opportunities and Challenges

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In partnership with:
University of New York Tirana
Department of Journalism and Communication, University of Tirana
South East European University

Keynote Speaker:

Prof. Dr. Jürgen Rudolph, Director of Research & Learning Innovation,
Kaplan Higher Education Academy, Singapore

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Artificial Intelligence (AI) in the Age of Transformation: Opportunities and Challenges

The widespread adoption of digital technologies in everyday life marks a new chapter in the history of humanity (Floridi, 2023). As the most advanced technological development, Artificial Intelligence (AI) has permeated almost every sector, simultaneously facilitating and complicating human interactions within society. This includes changes in how we live and communicate (Yang et al., 2024), consume (Rust, 2020), and how organizations compete and create value (Güngör, 2020).

The integration of AI in media communication represents a revolutionary shift, enabling the automated production of vast amounts of information daily across multiple locations (Barrolleta & Sandoval-Martín, 2024). Businesses have also introduced non-human agents, such as AI, in consumer communications, raising concerns among academics studying business and economics (Davenport et al., 2020; Yang et al., 2024). Although laws and standards have progressed, the exact ways in which AI threatens human rights across various spheres of life remain unclear (Lane, 2023).

In politics and marketing, the launch of generative artificial intelligence (GAI) chatbots, coupled with the growing use of AI in strategic communications, has sparked ethical debates among practitioners and researchers. This development has also prompted actions by industry associations (Germinder & Capizzo, 2024) and enabled politics, populists, and demagogues who engage in politics even more to play with fox strategies (Fuller, 2018; Saliu, 2024).

Digital technologies also present new challenges, as they are often designed to be misleading, driven by commercial motives, or influenced by other inaccuracies (Swire-Thompson & Lazer, 2020). People are increasingly turning to ChatGPT as an advisor for health-related concerns, even though the information it provides has not been rigorously tested or proven to be reliable (Nutbeam, 2023).

AI has also revolutionized education by making machine-based thinking a practical reality (Looi, 2024). While it is not yet clear whether kindergarten teachers are empowered or hindered by children's use of ChatGPT (Su & Yang, 2023), it is evident that ChatGPT can often serve as an excellent math tutor (Taani & Alabidi, 2024). The challenges for educators are compounded by the difficulty in determining whether a student has completed homework independently or with the assistance of AI (Atlas, 2023; Shklarski & Ray, 2024). Thus, preparing for the labor market necessitates the integration of AI literacy and ethical decision-making skills, which balance technical expertise with critical thinking (Waring, 2024) in a rapidly evolving world where various professions, including those in higher

education, face growing risks (Rudolph et al., 2023). In addition to the advantages and disadvantages, like any revolution, the Fourth Industrial Revolution (Floridi, 2014) raises concerns about the future of certain professions. Train and subway operators, plumbers, doctors, and others worry about the potential loss of their jobs (Harari, 2016).

Nonetheless, the widespread use of technology has simultaneously facilitated the integration of society, culture, and technological advancements (Fuchs, 2009). AI, as the pinnacle of technological development, can be used ethically or unethically. However, we must strive for a harmonious coexistence between the natural environment and the digital technologies with which we interact, in order to create a better society and a healthier biosphere (Floridi, 2023).

Therefore, the aim of this conference is to serve as an international scientific forum, bringing together researchers and professionals from various industries to address the current priorities and challenges of using AI in everyday life through an interdisciplinary approach.

In this respect, we invite those interested to submit an abstract addressing the above issues and the following topics, but not limited to them:

- The Role of AI in Everyday Life
- Artificial Intelligence and the Media
- Business and AI
- Challenges and Misuse of Technologies
- AI and Ethics
- Privacy and Technology
- Technology, AI, and Human Rights
- AI in Healthcare
- Technology and AI: Challenges and the Future
- Education in the Era of AI and ChatGPT
- AI and Professional Training
- AI Competition in Professions
- AI and Security Challenges
- AI and Crime Prevention
- Technology, AI and mental health
- AI and Administration
- AI and Sport
- AI and Linguistics
- AI and Culture

KEYNOTE SPEAKER:

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The impact of Artificial Intelligence (AI) on the Accounting System in Multinational Corporations (MNCs)

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Abstract
The evolution of Artificial intelligence has been drastically increasing globally in all sectors with the main intention of increasing productivity among employees such easing the workload, increasing data accuracy and also visualisation to help aid with strategic decision making. This is an extreme case in the accounting industry as most of the sound decisions are based on the financial data and position of the company. With the help of AI, this objective has been achieved in many levels. However, there are some disadvantages when it comes to the implementation in the accounting systems especially in big systems such as the Enterprise Resource Planning systems where most of the accounting work in done through that system. ERP systems are the main source for the accounting departments in the firms where invoices are generated and sent to customers directly, costing of products are done and many other business activities where the system works on. Therefore, interface issues, system migration challenges, data integrity due to timing differences that reports that are produced in different time zones are crucial issues to be deep dived into. This study aims to examine the deficiencies in the systems and effectively address those challenges being faced by the MNCs. These informed deficiencies can help the management to be more careful on those areas that has been overlooked during the implementation stages and can avoid major problems in the future. Theoretical contribution: This research contributes to the evolution of AI on the accounting world with focus on Multinational Companies and help to mitigate the deficiencies.

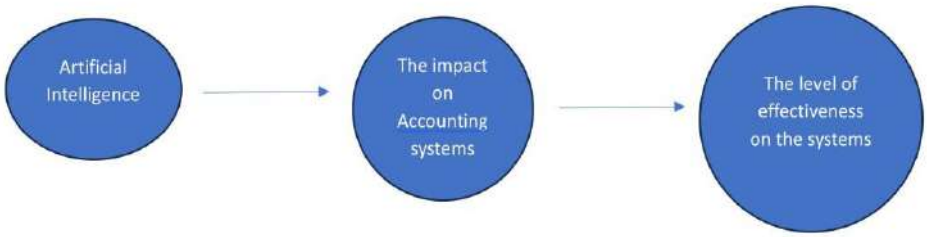
Keywords: MNCs, system migration, deficiencies, ERP systems.

Theoretical contribution: This research contributes to the evolution of AI in the accounting world with a focus on Multinational Companies and the aim to mitigate the deficiencies.

Introduction

Accounting information is crucial for every business as this information is used for decision-making for the stakeholders (Besuspariene, Erika et al. (2018).

Accounting systems are now more advanced integrating more new features year after year and with the adoption of Enterprise Resource Planning (ERPs), upgrades to the older systems have been sighted in the accounting department evidently.
As the business world continues to evolve into artificial intelligence (AI), it has enabled companies to handle big data, reduce manual work, and improve reporting to stakeholders more efficiently, (Damerji and Salimi (2021)). However, with such benefits, there are various ethical implications which include, accountability, server down, security concerns, system interface errors, timing differences in reporting between different systems, and the long loading time. In a multinational company, forming many different counterparts around the world using the same system for their daily use, each country might have its own process flows, country regulations, and restrictions which can potentially cause more access control, and data breaches. Therefore, sometimes in such circumstances upgrading the current system with a new AI implementation might not be feasible.
This study intends to deep-dive into the impact of AI in accounting systems, as much as AI offers unprecedented opportunities to enhance daily tasks and decision-making, however, in reality, is it working this way?



In the above diagram, the proposed research will explore how MNCs are integrating automated accounting systems into their daily tasks the problems being faced, and the level of efficiency of such systems. Are they really in reality helping to produce useful reports and achieve the desired business outcomes? The research plans to develop and test the system's efficiency.
The significance of the research addresses the main concerns being faced by the efficiency of these accounting systems being used with AI and studies have proven that accounting systems play a crucial part in the management decision-making of financial performance for any business and also aid in identifying the present and future financial state of the firm (Al-Hashimy et al, 2019). Some of the sub-questions that will be covered in this paper will be:
Identifying the effectiveness of Accounting Information Systems upon AI implementation.
Investigating the critical issues faced by MNCs when implementing AI on their systems.
How important is digital transformation in business organizations?
4) Does upgrading the current system with more automation help the efficiency and workload of the employees?
While some technological advancements have been made, there are still gaps in evaluating the effectiveness of AI implementations on systems and their impact on business processes.

Literature review

Multinational corporations and digitalization

Although many studies in the past have been done to show the impact of the advancement of systems on a firm's performance and processes, it has only been limited to a specific country or counterpart (Fernandez, D. 2017)). Every country has its own accounting standards, including tax and invoicing guidelines, which highlight standardization issues related to the system.

Multinational corporations operate in a global shared service where there is a headquarters in one specific country and the rest of the countries globally report to the HQ. The headquarters makes important decisions regarding the company's direction. (Wirtz et al. 2015) Any decisions made by the HQ can have a significant impact on the books.

Digital transformation in business organizations has been growing massively for the years, especially in global organizations (Hecht,2018). It aids the firm to increase the company's overall performance, and employee productivity and provide a better customer experience (Lahchame & Djilali, 2021, pp. 528-529).

Big data is used to enhance decision-making and transform huge raw data into visualizations that can show past trends to give a better idea to the management. However, it is still questionable whether these datasets' quality is reliable for predictions.

As automation helps to reduce the manual work of employees and produce better reports for management, it has other challenges that have not been addressed. Challenges such as new advancements to the systems could cause restrictions in other countries such as billing issues and timing differences. For example, each country has its own billing regulations such as tax implications, refunds, and customized statements of accounts to global customers. These challenges can cause more manual work for the back office if the invoices are not generated accurately and timely with interface errors or timing differences. As the countries depend on the HQ for improvements in the current processes and aiding help in high volume transactions, MNCs are continuously looking into technological transformation on the systems using AI.

Often the opportunities and advantages are more tempting when using AI implementations, but the deficiencies of the system are overlooked which can cause a significant impact on the financial statements. Prasad, Rajneel. (2023) study reveals this as there are some areas such as security threats and advancement skills of the accountants and secrecy. However, many points were not addressed in the study and this study intends to expand beyond and look at the challenges with more diversification faced by the different levels of employees and the effectiveness of those systems.

The emergence of technological advancements in accounting systems

For many years, companies have relied on traditional accounting systems to generate reports and invoices for customers, as well as to analyze historical data. While these systems have served their purpose, there is significant potential for improvement in terms of efficiency and strategic reporting. By recognizing the limitations of manual processes and the risks of human error, organizations can explore more advanced solutions that enhance data integrity and streamline operations. Embracing

modernization could lead to more accurate insights and improved decision-making in the financial landscape.

When technological advancements in companies started to rise over 20 years ago, starting in the early 2000s, since then, companies began to use Robotic Process transformation (RPA) to replace traditional accounting systems or enhance systems such as ERP systems to help automate manual processes (Willcocks, Lacity & Craig 2015). The accounting professionals were able to produce more meaningful results with the help of AI where they can also produce various dashboards providing trends for profits and expenses which results in improving operational efficiency and contributing to organizational growth.

However, the use of AI comes with gaps in the system adoption, and that further causes more manual work for the employees.

Pandya, K et al., 2021 recent study deep-dived into IT capabilities and business processes and firm's performance. In this study, additionally, the independent variables are focused on Managers and IT personnel's. How about the employees at the lower level, and mid-level and their challenges faced during this system implementation? Employees below the manager rank are usually the ones who are more involved in the transactional level of the accounts and their challenges should also be discussed further.

Fernandez, D., Zainol, Z., & Ahmad, H. (2017) study which is closely aligned to this research is on the impact of Robotic Process Automation (RPA) on Global Accounting Services in Malaysia but limited to job security and human redundancy. Although there was a focus on the impact on individuals and organizations, there was still a gap in the research where other challenges such as the efficiency of the RPA model could be discussed more which this study will be looking into including also other developing countries.

In the study of Prasad, Rajneel (2023), it has stated that system migration from an old system to a newer system poses some critical issues such as transferring the old data to the new system as one of the negative impacts on modern technologies. However, it was not further discussed that during this transition, certain data cannot be migrated to the new systems as there may be some restrictions and the data flow can only be in one direction. Some examples are loss of data during migration as the new system might be incompatible which causes integration issues. Furthermore, an increased risk of security breaches might be an issue. Many organizations rely on the data produced by the system when it comes to accounting information to make sound management decisions, and data reliability should be a top priority.

Bisbal, Jesus & Lawless, Deirdre & Wu, Bing & Grimson, Jane. (1999) analyzed the research on dealing with system migration from Legacy systems. It has stated how companies should ensure the old system should be migrated in a step-by-step manner and more research should be done in this area which could help firms to ensure smooth transitions.

In such situations, it is important to note that when it comes to month-end reconciliations between two systems, to ensure that it tallies it might not give an accurate analysis. This can further cause more complications in the financial reporting in the business books.

Challenges faced by MNCs and Employees

As AI is adopted in the system adoption by corporations, it is often used to help employees reduce their manual work and enhance the performance of the business. Similarly, Kang et.al (2008) also investigated the impact of ERP systems on business performance where standardization is important to the successful implementation of systems. However, this is being argued by a recent study by Nadarajah et al (2019), where they state that IT capability does not directly impact business performance.

It is important to note that even though studies have shown that AI helps in the performance of the business when implementing AI in accounting systems, it needs to be standardized in all countries. The challenges that are being faced by employees are the knowledge gap which is being addressed in the paper by Fernandez, D et al.,2017. Especially at the beginning stages of implementing a new system, it will incur a lot of new issues to be tackled and an increased amount of manual work for employees while it is being set up for integration. It is crucial for the business to not push for the implementation of the system but also look into whether certain criteria should be re-examined and set before implementation to reduce additional workloads. Training costs are expensive, and training every country and employee to ensure they know how to handle the system can be very burdensome when it comes to new system upgrades. It requires significant time and costs for user acceptance training.

While the training is conducted by the software owners, it is noted that sometimes not all criteria apply to every country. An example would be that there are some customers whose billing is done in consolidated billing, as they may be a group customer, whereas other customers are just singular billing. The system needs to identify such requirements for selected customers, and sometimes AI is not able which causes delays in collections from customers, which can affect profitability. We cannot solely rely on AI when it comes to business performance, as both humans and systems play a significant role in financial and non-financial performance. (Soh and Markus,1995) Human intervention is needed to help detect or check if there are any errors, as customers are a crucial part of an organization, we cannot solely rely on AI to help us investigate any further errors (Lim, 2013).

Another important consideration is the timing discrepancy between the two systems, which has been observed in various operational contexts. The current system may have a cut-off time set at, for example, 5 PM GMT, while the newer system could utilize a cut-off time of 6 PM GMT. This one-hour difference may seem minor, but as a global company operating across multiple time zones, even slight timing variations can significantly impact data flow. For instance, when data is transferred from one system to another, it can lead to integration challenges such as duplicated entries, missing information, or inconsistent reporting. These issues arise from the inability to align the data inputs according to the respective systems' cut-off protocols, ultimately complicating decision-making processes and hindering operational efficiency.

This issue exists in even AI tools such as real-time dashboards that are produced for accounting and sales and other departments where every country is able to access the data anytime for business overviews. In this case, dashboard fatigue, information overload, connectivity, and timing differences can lead to confusion and

interpretation. As dashboards serve as an easy overview of specific variables such as sales and profits, it is crucial that the system is reliable and manages data quality.
There was a study conducted by Pankaj et al., 2006 where a critical examination was done to show the advantages and disadvantages of business dashboards. Further research was recommended to look more into the implementation process and be monitored.
In a recent article by KPMG in 2023, it was noted that data breaches and ethical issues have been rising amongst Indian companies upon the implementation of AI, according to a survey that was done with various industries and different management staff. Although the article covered only a poll survey, there should be more awareness brought to corporations of proactive risk management while shifting to AI. Williams et al. highlight that the integration of AI is closely linked to optimizing business processes. However, organizations must tackle the technological challenges and limitations that arise with this implementation. Moreover, establishing varying levels of authorization within these systems is essential to prevent data breaches. Consequently, further research should focus on exploring ways to address these issues and challenges effectively.
In conclusion, the literature review offers insights from different studies from the past into the emergence of technological advancements to challenges faced by MNCs and employees and the various challenges faced by different counterparts. While there have been only some main areas that are being addressed, the gaps such as data breach challenges, interface issues, timing differences, and system migration need more research which will enable the business to be more vigilant in those areas in the future.

Data

To conduct this study, I will be using the mixed research method. Firstly, I will be using a qualitative approach to conduct open-ended, semi-structured interviews using the triangulation method with different roles within an organization and this will enhance a deeper understanding of real-life issues. Interviews will also be conducted in different timelines such as before system migration, during, and after the full migration. This is to give a fuller and clearer picture of the different opinions and issues being faced by the employees.
Some of the questions might include:
1) What challenges have you encountered in integrating AI into your accounting systems, and how have they impacted your operations?
2)In your experience, how has the implementation of AI changed the accuracy and timeliness of financial reporting in your organization?
3)What specific benefits or improvements have you observed in employee productivity and workload management since adopting AI in your accounting processes?
4) Were the issues that were being highlighted during the UAT testing addressed and how was it resolved?
Next, a quantitative approach will be used. Data will be collected from diverse levels of employees from firms ranging from data entry assistants, accounts assistants, managers, CFO, and IT personnel. Data will also be further collected from other

employees who are based in other countries. With such a diverse range of data collected from different job positions, there will be more visibility on the opinions.
Data collection will be done through questionnaires and surveys with a sample size of 100 or more.
The criteria listed below will be utilized to systematically collect and analyze data:
Criteria: Job position (manager, executive, etc); Department; Works in a multinational corporation; Use of AI at work (YES); Job scope

Analysis

As a vital tool in research and decision-making, statistical analysis using SPSS software (Descriptive and inferential statistics) offers a methodical way to examine and understand data. Therefore, a quantitative approach will be taken to carry out the research objective through a synthesis of secondary and primary data.
Data collection will be conducted using well-structured questionnaires designed for the survey, ensuring that they capture the necessary information relevant to our study. Once collected, the data will undergo a comprehensive cleansing process to rectify any inconsistencies or inaccuracies prior to conducting the statistical analysis. Following the formulation of hypotheses and the analysis of initial results, we will engage in further investigation to determine potential correlations between each independent variable—specifically job scope, age group, and position—and the dependent variable. To facilitate this, we will employ the multiple regression method, which allows us to assess the individual and collective impacts of these independent variables on the dependent variable. This nuanced analysis will provide essential insights into how various factors may influence outcomes within our research context.

Conclusion

In conclusion, the primary goal of this study is to investigate how artificial intelligence affects Multinational company's accounting systems and measure the efficiency of these systems once AI is integrated. AI implementation in the accounting industry will always keep growing with new technologies and systems upgrades. The automation of routine job responsibilities not only significantly minimizes human errors but also frees up valuable time for employees. This allows them to shift their focus towards more analytical tasks, such as data interpretation and strategic planning. By enabling employees to engage in complex problem-solving activities, organizations can foster innovation and improve overall productivity, ultimately leading to better decision-making and enhanced performance. However, it is important to take note of the deficiencies of these systems and not overlook it as they can have an immense impact on the financial books of the firm. Data integrity, system interface issues, timing differences, and training gaps are the challenges that were addressed in this paper. Further research should be conducted for an ethical approach to AI implementation.
The methodology will involve a systematic literature review, alongside surveys and interviews with different personnel from multinational corporations (MNCs) and the developers of those systems. With the gathered information, the next step will be to create a model and proceed with statistical testing.

As the world increasingly integrates AI into daily operations, there are notable limitations and significant impacts on the accuracy of financial information output. Additionally, this research may face limitations related to the sample size.
The findings of this study are designed to deepen understanding, educate, and illuminate the potential challenges and limitations that multinational corporations (MNCs) and accounting professionals may encounter when integrating artificial intelligence into their systems and upgrading of current systems. Armed with this valuable knowledge, stakeholders and management can proactively address potential losses and devise a comprehensive strategic plan for the effective implementation of these innovative systems.

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Teachers' Perspectives on Education in the Era of AI and ChatGPT

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Abstract
Artificial intelligence (AI) has gained significant attention in recent years for its potential to reshape the educational environment. As technologies swiftly progress, educators are faced with the challenge of incorporating AI into their teaching practices while addressing concerns around its ethical use and teaching efficacy. This research explores the integration of Artificial Intelligence (AI) tools, specifically ChatGPT, in education, focusing on their use by educators, perceived benefits, and challenges. As AI tools become more prevalent in classrooms, understanding how educators utilize these technologies is critical to harnessing their potential while addressing concerns. A survey of 100 educators was conducted to examine their experiences with AI, including its impact on lesson planning, student support, and administrative tasks. The study highlights the need for comprehensive professional development for teachers, the establishment of ethical guidelines, and the promotion of critical thinking and digital literacy skills among students. Additionally, the research provides insights into the future role of teachers in a world increasingly shaped by AI, with most respondents viewing AI as a tool to enhance their work rather than replace it. This research offers actionable recommendations for educators, policymakers, and AI developers, contributing to the responsible and effective integration of AI in education.

Keywords: AI, Artificial Intelligence, education, ChatGPT.

Introduction

Artificial Intelligence (AI) has emerged as one of the most transformative forces in modern education, with tools like ChatGPT increasingly being used to support teaching and learning. These technologies offer a wide array of possibilities, from automating administrative tasks to enhancing student engagement and personalizing learning experiences. However, as AI tools continue to evolve and become more integrated into educational practices, it is essential to understand how educators perceive and use these tools, as well as the challenges and opportunities they present.

The integration of AI in education brings both excitement and apprehension. On one hand, AI tools like ChatGPT are seen as powerful aids that can help educators save time, generate teaching materials, and provide more immediate feedback to students. Teachers often report using AI to create quizzes, summarize texts, and differentiate

instruction for diverse learners. On the other hand, concerns about accuracy, ethics, and the potential for over-reliance on technology have sparked debates among educators. Some worry that students might use AI to complete assignments dishonestly, bypassing the learning process. Others question the reliability of AI-generated content and its alignment with curriculum goals. Additionally, the use of AI raises important ethical questions about data privacy, algorithmic bias, and the digital divide, particularly in under-resourced schools that may lack access to these tools.

As above-mentioned tools become more prevalent in the classroom, it is crucial to assess their impact on teaching practices and the role of educators. Teachers are no longer just providers of knowledge but facilitators of learning who must now guide students in using AI responsibly and critically. This shift calls for professional development programs that equip educators with the skills to integrate AI thoughtfully and strategically into their instruction.

This research study aims to explore how AI tools, particularly ChatGPT, are currently being used by educators, their perceived benefits, and the challenges they present. Additionally, the study investigates how AI is expected to shape the future of teaching, and what skills students need to develop in order to use AI tools responsibly. Critical thinking, digital literacy, and ethical awareness are among the competencies that are becoming increasingly important in the age of AI.

By gathering data from a diverse group of educators, this research provides a comprehensive overview of the current landscape of AI in education and offers valuable insights into how these technologies can be integrated effectively while addressing potential concerns. The goal is not to advocate for AI as a replacement for human instruction, but rather to explore its role as a supportive partner in the learning process.

The findings of this study will be useful for educators, policymakers, and developers of AI tools, offering a clearer understanding of the opportunities and challenges associated with AI in education. Ultimately, this research seeks to contribute to a more informed and balanced approach to integrating AI into teaching and learning practices, ensuring that these tools are used to enhance, rather than replace, the vital role of human educators. By fostering collaboration among all stakeholders, we can work toward an educational future where technology amplifies human potential and ensures equitable access to high-quality learning experiences.

Literature review

The integration of artificial intelligence (AI) in education has gained increasing attention in recent years, with researchers exploring its potential to enhance teaching and learning. This section examines existing literature on AI in education, focusing on its benefits and challenges.

AI has the potential to transform education by enhancing personalized learning, automating administrative tasks, and providing real-time feedback. The study by a researcher Luckin (2018) suggest that AI can support adaptive learning systems, allowing students to progress at their own pace while receiving targeted instruction tailored to their individual strengths and weaknesses. This adaptability is particularly valuable in diverse classrooms, where student abilities and learning styles vary widely. Furthermore, Hammond (2020) highlights AI's role in reducing teachers' workload by automating grading, lesson planning, and content generation,

thereby allowing educators to focus more on student engagement, critical thinking activities, and fostering deeper understanding rather than routine administrative tasks.

Specific AI tools such as ChatGPT have been explored as powerful resources for improving writing skills, language acquisition, and encouraging student inquiry. According to Xu and Lee (2023), AI-driven writing assistants can help students refine their writing by providing instant feedback on grammar, coherence, and style, promoting iterative improvement and self-directed learning. Moreover, AI can serve as a conversational tutor, answering students' questions and offering explanations in a manner that simulates human interaction and increased students' motivation and engagement by creating a more interactive learning environment. This role of AI as a virtual assistant can complement traditional teaching methods, providing personalized support outside of classroom hours and catering to individual student needs. (Holmes, 2021)

Despite these advantages, AI in education presents several significant challenges. One of the primary concerns is academic integrity. Dawson (2019) warns that the availability of AI-generated content may increase plagiarism risks and foster student overreliance on technology, potentially undermining the development of critical thinking and original thought. Closely related to this is the issue of misinformation and bias. Bender (2021) emphasizes that AI tools can inadvertently produce biased or inaccurate responses, influenced by the data on which they were trained. Without proper critical assessment by both educators and students, such errors could perpetuate misconceptions or reinforce stereotypes, highlighting the necessity for ongoing human oversight.

Data privacy is another critical issue within AI integration. Researchers Slade and Prinsloo (2022) highlight that AI-driven educational platforms often collect vast amounts of personal and behavioral data from students, raising concerns about the security of this data and ethical considerations regarding its use. Institutions must carefully implement policies to protect student information and ensure transparency about how data is stored, used, and shared. This aspect of AI usage calls for strong collaboration between educators, administrators, and technology developers to balance innovation with responsible data stewardship.

Importantly, the role of teachers remains central in the successful integration of AI in classrooms. Selwyn (2022) argues that while AI can support learning processes, it cannot replace the uniquely human elements of teaching such as mentorship, emotional intelligence, creativity, and the ability to foster social and ethical development in students. Teachers are not only facilitators of knowledge but also critical mediators of values and interpersonal skills that AI cannot replicate. To this end, teachers need adequate training and ongoing professional development to effectively incorporate AI tools while maintaining pedagogical integrity and adapting to evolving technologies. Furthermore, research by Veletsianos and Houlden (2023) stresses the importance of teacher agency in deciding how AI is deployed, ensuring that it enhances rather than diminishes traditional teaching practices. Educators must be empowered to critically evaluate AI tools, customizing their use in ways that support diverse learning goals and contexts.

Overall, the literature suggests that AI, including ChatGPT, holds significant potential to enhance education through personalized learning, streamlined

administration, and improved student support. However, it also raises ethical, pedagogical, and practical challenges that must be thoughtfully addressed. Issues around academic integrity, data privacy, potential bias, and the risk of over-reliance on technology require clear guidelines, ethical frameworks, and robust teacher training. As AI continues to evolve rapidly, further research is necessary to explore best practices for integrating AI in diverse educational settings, balancing innovation with academic rigor and ethical responsibility. This ongoing dialogue will be essential to harness AI's benefits while safeguarding the quality and humanity of education.

Research Methodology and design

This research study utilized a quantitative approach to gather data on educators' perceptions of AI tools like ChatGPT in education. The design aims to provide insights into the current state of AI integration in teaching, identify key benefits and challenges, and explore the potential impact of AI on the role of teachers. By focusing on numerical data and trends, the study provides a measurable overview of how educators are responding to the increasing presence of AI in the classroom.

The target population for this study consists of educators who are currently teaching in educational settings, ranging from primary to secondary schools, and who have exposure to or are familiar with AI tools in their teaching practice. This group was chosen to ensure that the findings reflect firsthand experiences with AI technology in real educational environments. In order to reach a wide and diverse pool of respondents, the study was distributed online through educational forums, professional learning networks, and social media platforms frequented by teachers.

Data for this study was collected using a structured online questionnaire consisting of closed-ended questions, which allowed respondents to select their answers from predefined options. This approach was chosen to ensure clarity, consistency, and ease of analysis. The survey was divided into several sections to gather information on the following key areas:

Demographic information (age, gender, years of teaching experience)

Current use of AI tools in teaching (frequency, types of tools used, areas of application)

Perceived benefits and concerns of using AI in education (e.g., efficiency, ethical dilemmas, student learning outcomes)

Skills students need to develop to use AI responsibly (such as digital literacy, critical thinking, and ethical awareness)

Impact of AI on the future role of teachers (e.g., changing responsibilities, need for upskilling)

The survey was designed to be simple, concise, and easy to navigate, with each question focusing on one key aspect of AI integration in education. The user-friendly layout was intended to maximize completion rates and ensure that participants could respond without confusion or fatigue. The study followed strict ethical guidelines to protect the rights and privacy of all participants. The online survey was anonymous; no personal identifying information was collected, and respondents were assured that their participation was voluntary and could be withdrawn at any time without consequence.

Limitations

Several limitations were noted in this study. First and foremost, the sample size of 100 participants may not fully represent the diversity of educators globally, particularly in non-Western, rural, or non-English-speaking contexts. The digital nature of the survey may have inadvertently excluded educators with limited access to technology or low digital literacy, potentially skewing the results toward more technologically proficient respondents.

Despite these limitations, the study offers valuable initial insights into how AI is being perceived and implemented in educational settings. While the findings may not be universally generalizable, they do reflect common trends and themes among educators with AI experience. Future research may benefit from combining quantitative and qualitative methods to gain a more holistic understanding of the impact of AI in education.

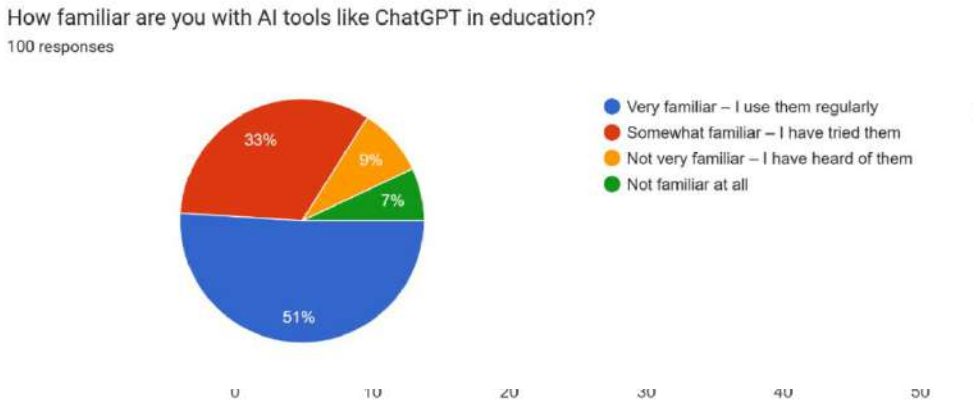
Research Study Results

Educators with varying levels of teaching experience participated in the study, offering valuable insights into the use and perception of AI tools across a spectrum of professional backgrounds. The majority of respondents fell into the 11–20 years (31%) and 6–10 years (28%) teaching experience ranges, suggesting that mid-career educators were particularly well-represented in the sample. A slightly smaller proportion of participants (28%) had less than 5 years of experience, indicating a strong representation of early-career teachers who may be more open to experimenting with new technologies. A smaller group (13%) had more than 20 years of teaching experience, providing the perspective of veteran educators who have witnessed multiple waves of educational innovation. This distribution allows for a balanced view of AI integration across different career stages, reflecting varying levels of comfort with technology and pedagogical adaptability.

The results indicate that a significant majority (84%) of respondents are familiar with AI tools in education, highlighting the growing presence and visibility of these technologies in schools. Of this group, 51% of educators reported being very familiar with AI tools and stated that they use them regularly in their teaching practices. This suggests that over half of the respondents are not only aware of AI but have already integrated it into their daily workflows, such as lesson planning, feedback generation, or content creation.

Meanwhile, 33% of respondents had tried AI tools but considered themselves only somewhat familiar. This group represents a segment of educators who may be in the early stages of experimentation, possibly using AI tools occasionally or for limited purposes. Their responses suggest a cautious but curious approach to AI, with room for further engagement and training.

A smaller group, comprising 16% of participants, indicated limited or no familiarity with AI tools in their teaching. This minority may reflect either a lack of access to technology, uncertainty about how to use AI effectively, or concerns about its relevance or reliability. Understanding the reasons behind this limited engagement could be helpful for future professional development efforts and targeted support. (chart1)



(Chart 1)

When asked how teachers use AI in teaching, respondents highlighted the following key uses:

Lesson planning (47%) and **generating teaching materials (44%)** were the most common applications of AI tools, suggesting that educators value AI for its ability to save time and streamline preparation. These tools are particularly useful for creating worksheets, designing differentiated tasks, and organizing content aligned with curriculum standards, making them attractive for teachers managing heavy workloads.

Providing feedback (15%), **assisting students with writing and research (18%)**, and **automating administrative tasks (12%)** were less commonly reported. These findings indicate a more cautious or experimental approach to AI in areas that directly impact student performance or assessment. Concerns over the reliability, fairness, and appropriateness of AI-generated feedback may explain this limited adoption.

12% of educators reported not using AI tools in their teaching at all, reflecting a segment that may need further training or have philosophical or institutional reservations about AI. (Chart 2)

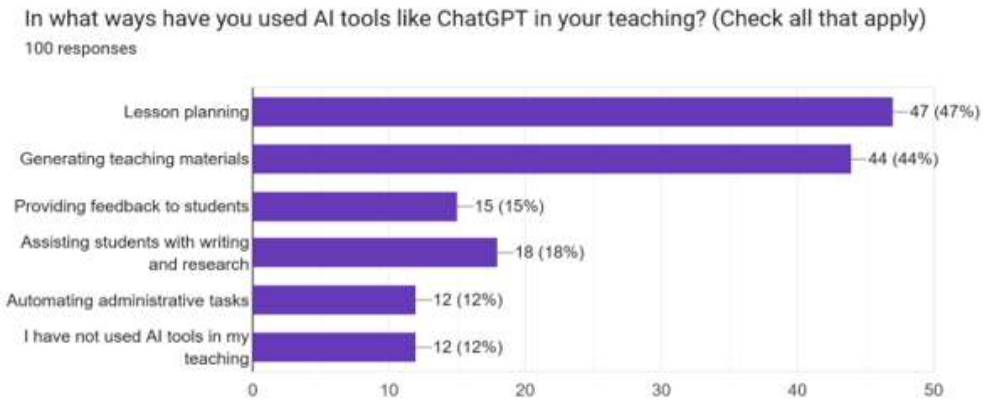


Chart 2)

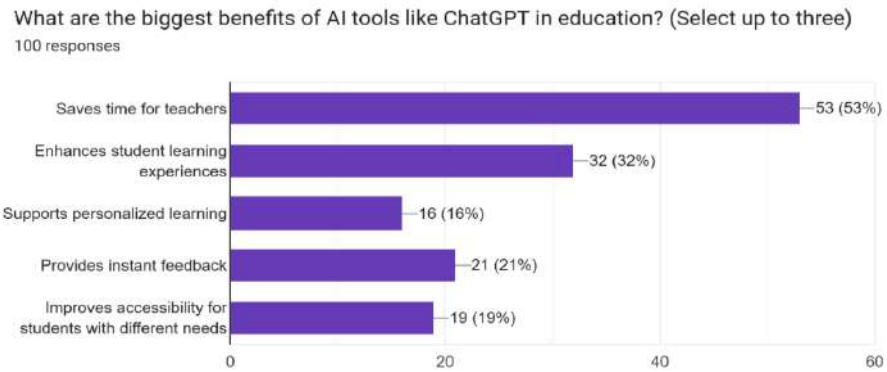
The study found that educators see several potential benefits in using AI tools:

The most significant benefit was the **time-saving aspect for teachers (53%)**, which suggests that AI's ability to automate and streamline tasks such as lesson planning, grading, and administrative work is a major draw for educators. With growing workloads and limited preparation time, many teachers appreciate tools that help them work more efficiently.

Enhancing student learning experiences (32%) was the second most common benefit, signaling that AI is viewed not only as a productivity aid for teachers but also as a means to improve student engagement.

Supporting personalized learning (16%) and **improving accessibility (19%)** were also highlighted, though to a lesser extent. These responses reflect a growing awareness of how AI can cater to diverse learners, including students with learning differences or language barriers.

Providing instant feedback (21%) was recognized as a potential benefit, especially for formative assessment and independent student work, although it was less strongly emphasized. (Chart 3)



Despite the potential benefits, educators expressed a number of concerns about the use of AI in education:

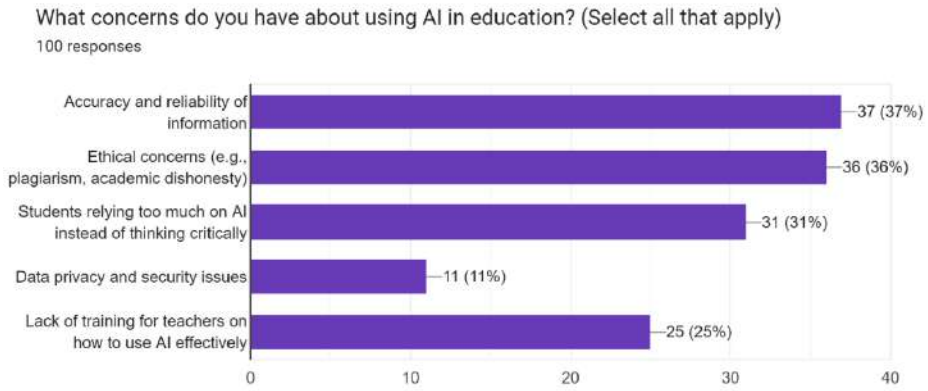
Accuracy and reliability of information (37%) was the most common concern, indicating that educators worry about the quality and credibility of AI-generated content.

Ethical concerns such as plagiarism and academic dishonesty (36%) were also significant. Many educators are wary of students using AI tools to complete assignments dishonestly or bypass learning processes, underscoring the urgent need for schools to develop and implement ethical AI use policies.

Students relying too much on AI (31%) was another notable concern. This suggests fears that overdependence on AI could hinder the development of essential skills like critical thinking, creativity, and independent research—abilities that are vital for lifelong learning.

Data privacy and security (11%) appeared to be a lesser concern, possibly due to trust in current data protection measures or limited awareness of potential risks related to AI usage.

Lastly, **lack of training for teachers (25%)** points to a critical gap in professional development. Without adequate guidance and support, educators may struggle to integrate AI meaningfully, further reinforcing resistance or inconsistent usage. (Chart 4)



(Chart 4)

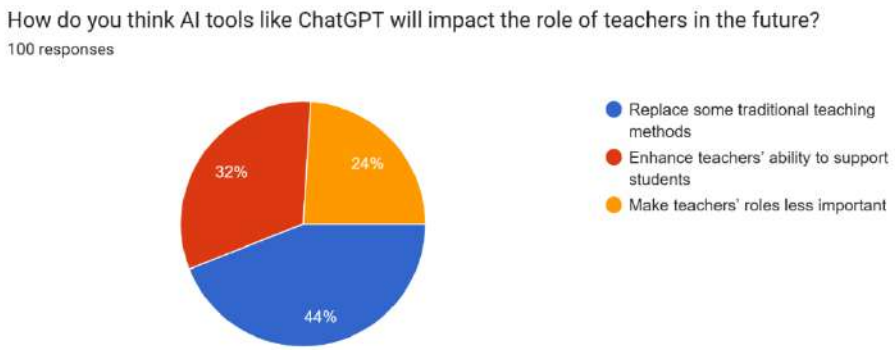
When asked about the future impact of AI on the role of teachers:

44% of respondents believed that AI would replace some traditional teaching methods, indicating that educators see AI as a catalyst for change in classroom practices. Many respondents noted that AI could take over repetitive or routine tasks—such as grading, delivering standard content, or creating basic learning

materials—freeing up teachers to focus more on student-centered instruction and interpersonal engagement.

32% viewed AI as a way to enhance teachers' ability to support students, suggesting that AI is seen not as a replacement, but as a powerful assistant.

However, **24% expressed concerns that AI could make teachers' roles less important**, reflecting anxiety about the future relevance of human educators. This uncertainty points to a broader debate about the balance between technological innovation and the irreplaceable value of human connection, empathy, and judgment in teaching. (Chart 5)



(Chart 5)

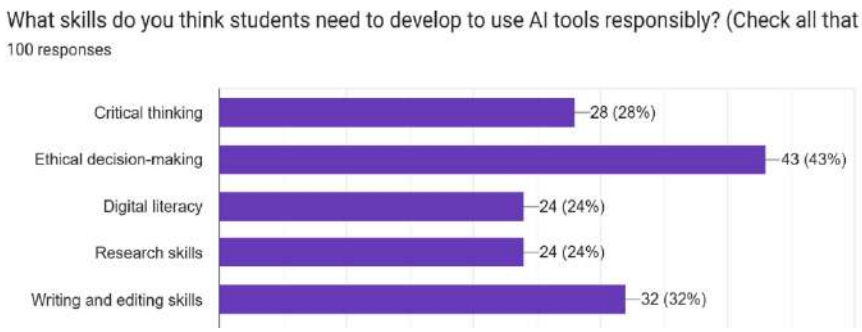
Educators identified several skills that students need to develop in order to use AI tools responsibly:

Ethical decision-making (43%) was the top skill, underscoring the growing need to educate students on responsible technology use.

Writing and editing skills (32%) were also deemed essential. While AI can generate text quickly, students need strong literacy skills to refine content, ensure coherence, and maintain their own voice.

Critical thinking (28%) was recognized as a fundamental skill for evaluating the reliability, relevance, and accuracy of AI-generated content.

Digital literacy (24%) and **research skills (24%)** were also noted as vital for navigating the online learning environment effectively. These skills enable students to make informed choices about which tools to use and how to use them in a way that enhances, rather than replaces, their learning. (Chart 6)



Conclusion

This research study offers valuable insights into the growing role of AI tools like ChatGPT in education. It highlights both the opportunities and challenges associated with their integration into the classroom, while providing a snapshot of educators' perceptions about the future of teaching in an increasingly AI-driven landscape. The findings suggest that AI tools are primarily seen as time-saving resources that can assist educators in lesson planning and material creation. The ability of AI to enhance student learning experiences and provide support in areas such as personalized learning and accessibility is recognized but not universally prioritized. This suggests that while AI has great potential, it is still viewed as a supplementary tool rather than a core component of everyday teaching practices. Integration of AI in education presents promising opportunities, particularly in supporting diverse learners through tools like real-time language translation and writing assistance. Educators recognized AI's potential to enhance lesson interactivity through dynamic resources and adaptive activities, making learning more engaging and relevant.

Despite the perceived benefits, the study reveals several concerns among educators. Issues like accuracy, ethical decision-making, and the risk of students relying too heavily on AI for critical or analytical thinking are prominent. Teachers emphasized that while AI can aid in differentiating instruction and tracking student progress, it must be used ethically. Clear boundaries must be established to prevent academic dishonesty, and students need to be taught to critically engage with AI tools, fostering both integrity and independent thinking. These concerns underscore the need for responsible implementation of AI tools in educational settings, ensuring that AI enhances rather than diminishes the role of teachers in fostering deep, independent thinking among students. Moreover, the study emphasizes the importance of ethical considerations and the development of critical thinking and writing skills as essential components of responsible AI use. Educators believe that students need to be taught how to navigate AI tools ethically, avoiding plagiarism and ensuring that AI-generated content is used thoughtfully and responsibly.

The lack of teacher training on AI integration also emerged as a significant concern. Although many educators are familiar with AI tools, there remains a gap in knowledge about how to use these tools effectively in the classroom. Professional development in this area is crucial to help teachers maximize the benefits of AI while

addressing its challenges. Without targeted support and training, there is a risk that teachers may either underuse AI or rely on it inappropriately, potentially undermining its effectiveness in promoting meaningful learning.

Looking toward the future, the study suggests that AI will have a transformative impact on the role of teachers. While traditional teaching methods may be replaced by AI in some areas, educators view AI more as a tool to enhance their ability to support students rather than a replacement for human teachers. This aligns with the growing consensus that AI should be seen as a complementary resource, one that allows teachers to focus more on individualized instruction and the human aspects of teaching, such as emotional support, mentorship, and building strong classroom relationships.

In conclusion, while AI has the potential to revolutionize education, its integration must be approached with caution and foresight. Teachers will remain central to the educational process, but they will need to adapt to new technologies and find ways to incorporate them responsibly. To achieve this, educational institutions must invest in teacher training, develop clear ethical guidelines, and ensure equitable access to AI tools across different contexts. This information is essential for educators and policymakers to better understand the potential of AI tools in supporting teaching and learning. The data will help stakeholders assess whether AI tools are fulfilling their intended purposes and how they can be integrated more effectively into existing teaching frameworks. Further research into the practical implications of AI in various educational settings, along with ongoing dialogue about best practices, will be crucial as AI continues to shape the future of education. By fostering a balanced and informed approach, we can ensure that AI becomes a valuable ally in the educational journey, rather than a disruptive force.

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Bridging AI: Case Studies in a Professional Development Course at the University of Eswatini

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Abstract
This paper examines participant interactions and feedback during Module 4 of the University of Eswatini's professional development course on artificial intelligence in education. The module, focused on AI case studies across different subject areas, was designed to help educators envision and implement AI integration in their specific teaching contexts. The study analyses the responses and engagement of one cohort of 100 participants who were required to select four subject areas from fourteen options, including mathematics, modern languages, sciences and humanities and who took the 6-week course in October-November 2024. Through analysis of forum participation and activity completion, the paper explores how educators interpreted and adapted AI applications from various disciplines to their own teaching practice. Particular attention is paid to the participants' required task of identifying five AI implementation strategies for their subject areas. The findings provide insights into educators' practical understanding of AI integration in different educational contexts, their concerns about ethical implications, and their creative approaches to adapting AI tools for specific disciplinary needs. This brief study seeks to contribute to our understanding of how educators across different subjects perceive and plan to implement AI in their teaching practice.

Keywords: Artificial Intelligence in Education, Professional Development, Cross-disciplinary Implementation, Teacher Training and Educational Technology Integration.

Introduction

As Artificial Intelligence (AI) rapidly transforms various global sectors, education systems, particularly in the Global South, face unique challenges and opportunities. AI holds significant potential to personalise learning experiences, automate administrative tasks, and improve overall pedagogical efficacy. However, for educators to integrate these technologies meaningfully into their practice, they must first develop a nuanced understanding of AI within their specific disciplinary and socio-cultural contexts. This requires a shift from theoretical knowledge to practical application, enabling educators to envision and implement AI solutions that are relevant and effective for their students and institutions (Holmes et al., 2022).

The University of Eswatini's 2024 professional development initiative, entitled "Artificial Intelligence for Educators," was specifically designed to equip educators with foundational AI knowledge and practical implementation strategies. Module 4 of this course focused on the practical implementation of AI in the classroom. One of the main topics in the module was the analysis and adaptation of AI case studies across fourteen diverse subject areas. Through a collaborative, online learning model, participants actively engaged with discipline-specific forums, shared innovative ideas, and developed practical AI implementation strategies tailored to their respective subjects. This paper aims to analyse how participants engaged with these AI case studies, to understand the strategies they proposed, their underlying reasoning, and the perceived barriers to effective AI integration within their educational settings.

Literature Review

Research on Artificial Intelligence in Education (AIED) has expanded significantly in the past decade, reflecting its growing prominence and potential impact. However, in the Global South, the implementation of AI in education continues to face distinct challenges, including limited digital infrastructure, language barriers, and pressing ethical concerns (Makeleni et al., 2023). While AI offers considerable potential for personalised learning and fostering more inclusive educational environments (Chisom et al., 2024), its effective integration necessitates both technical proficiency and pedagogical adaptability. The successful adoption of AI tools is contingent upon educators' ability to navigate these complexities and apply AI in ways that enhance, rather than detract from, the learning process (Roll & Wylie, 2022).

AI literacy is rapidly emerging as a foundational skill for educators in the 21st century, with interdisciplinary approaches often favoured for its development (Van Wyk, 2024). Yet, capacity-building efforts in many regions are frequently hindered by institutional inertia, insufficient funding, and policy gaps (Aderibigbe et al., 2023). Addressing these systemic issues is crucial for fostering an environment conducive to AI integration (Zawacki-Richter et al., 2024). Professional development models that contextualise AI—such as through case study analysis—can empower educators to craft locally relevant solutions and overcome these barriers.

Recent studies underscore the importance of targeted professional development in AI for educators. A case-based AI professional development program for teachers demonstrated increased AI literacy, particularly in understanding AI concepts, while emphasising the need for ongoing comprehensive training (Ding et al., 2024). Similarly, a qualitative study on English language instructors showed that specialised AI training enhanced their knowledge, skills, and self-efficacy in AI integration (Kaya, 2024). In Eswatini, specifically, librarians exhibited varying levels of AI awareness and readiness, with recommendations for training and policy development to address concerns (Hlatshwako & Tsabedze, 2024). AI's potential in education extends to analysing student feedback and engagement, offering insights for pedagogical decision-making and strategies for student retention (Dann et al.,

2024). These studies collectively underscore the significance of AI literacy and integration across various educational contexts, emphasising the need for targeted professional development and the transformative potential of AI in educational practices.

Current trends in AIED highlight the transformative potential of AI in fostering personalised learning, reducing administrative burdens, and enhancing communication in diverse educational contexts. For example, generative AI tools like ChatGPT and AIVA have been used to create individualised learning plans, generate technical instructions, and support creative expression in music composition. These tools offer unprecedented opportunities for educators to differentiate instruction and engage students in novel ways (Huang et al., 2023).

In terms of cross-disciplinary AI implementation, participants in the course demonstrated a wide array of applications. In Special Needs Education, one participant highlighted the transformative potential of AI-driven personalised learning tools in creating individualised learning plans, reducing administrative burdens, and enhancing communication for students with diverse needs. In Expressive Arts, another participant discussed how AIVA supports music composition by enabling students to experiment with styles, moods, and instrumentation, fostering creativity and collaboration. In ICT, a participant demonstrated how ChatGPT generates structured technical instructions for server configuration and software installation, saving time and improving teaching efficiency. Such examples illustrate the versatility of AI across disciplines and its capacity to address specific pedagogical challenges (Lim et al., 2023).

Effective teacher training and professional development programs play a critical role in preparing educators to leverage AI effectively while addressing challenges such as over-reliance on technology and ethical considerations. These programs must move beyond theoretical discussions to provide practical, hands-on experiences that build confidence and competence (Spector et al., 2021). Ethical debates around AI in education include concerns about data privacy, accuracy of generated content, and the risk of stifling intrinsic creativity. Ensuring responsible AI use requires clear guidelines and ongoing dialogue among all stakeholders (UNESCO, 2021).

Methodology

This study employed a mixed-methods approach to investigate educator engagement with AI case studies. It drew data from one pilot group with 15 participants (September-October 2024) and a larger cohort of 100 participants who enrolled in the "AI for Educators" course in the October–November 2024 period.

Data Collection

Data were collected through three main channels, namely discussion forums, AI strategy submissions, and a post-module survey. Participants engaged in online discussion forums, where they shared their interpretations of AI case studies,

discussed potential applications, and provided feedback on AI tools. As a core task, participants were required to identify and articulate five AI implementation strategies for their specific subject areas. These submissions provided rich qualitative data on their practical understanding and creative adaptation of AI. A comprehensive survey was administered after the module to gather feedback on participant satisfaction, perceived usefulness of the course, and areas for improvement.

Participants

The participants represented a broad spectrum of educational levels and disciplines within the University of Eswatini. To protect participant anonymity, pseudonyms are used when referring to individual contributions in this article. Subject areas ranged widely, including Sociology, Languages, Mathematics, Drama, and Special Needs Education, ensuring a diverse set of perspectives on AI integration. The majority were Bachelor degree holders (54%), with some holding a Master's (27%) and some a PhD (9%). The remaining participants held a high school or a post-high school certificate.

Data Analysis

Quantitative forum activity, such as the number of posts and word count, was combined with thematic analysis of the AI strategy submissions and survey responses. AI-assisted tools, specifically ChatGPT, Claude and GrokAI, supported the initial coding and theme development processes. This AI-generated analysis was then iteratively refined by a human researcher to ensure validity, reliability, and contextual accuracy. The qualitative analysis focused on understanding participants' interpretations, adaptations, and proposed strategies for AI integration, identifying recurring themes and innovative approaches.

Findings: Engagement with AI Case Studies

The engagement with AI case studies revealed a diverse range of applications and a clear understanding of AI's potential across different disciplines. Out of 100 participants, 87 actively posted in the main forum, indicating a high level of overall engagement. Subject-specific forum participation varied, with Mathematics (34 participants), Education (53 participants), and Special Needs Education (27 participants) showing the highest engagement. Replies averaged 1.14 per participant in the first cohort, suggesting interaction and collaborative learning.

Specific examples of AI application insights from participants included strategies fr special needs education, arts education, ICT, and mathematics, among other subject areas.

One participant highlighted the transformative potential of AI-driven personalised learning tools in creating individualised learning plans, reducing administrative burdens, and enhancing communication for students with diverse needs. This aligns with the growing emphasis on inclusive education facilitated by adaptive

technologies (García-Peñalvo et al., 2023). Another participant discussed how AIVA (AI Virtual Artist) supports music composition by enabling students to experiment with styles, moods, and instrumentation, fostering creativity and collaboration without extensive prior musical knowledge. This demonstrates AI's role in democratising creative processes (Cope & Kalantzis, 2021). A participant demonstrated how ChatGPT generates structured technical instructions for server configuration and software installation, saving time and improving teaching efficiency. This highlights AI's utility in automating routine tasks, allowing educators to focus on higher-order teaching activities (Hwang & Tu, 2021).
Participants explored designing interactive simulations and worksheets to enhance conceptual understanding and problem-solving skills, leveraging AI to create dynamic learning environments. Such applications underscore AI's capacity to make abstract concepts more tangible and engaging (Chen et al., 2023).

Results: Implementation Strategies

Participants identified five key AI implementation strategies for their subject areas, demonstrating practical ingenuity and adaptability. These strategies were to enhance course content using AI tools, to personalise learning for their students, to use Generative AI tools to be more efficient and better at managing time, to develop creativity and analytical skills, and to propose real-world simulations in their classrooms.
Educators like "Thandi"[1] (Sociology) used AI-generated visuals and simplified explanations to demystify abstract theories, making complex concepts more accessible to students. In English Literature, "Sipho" employed ChatGPT to assist students in analysing poetry and generating literary comparisons, significantly enhancing engagement and critical thinking. This strategy leverages AI to enrich existing curricula with dynamic and interactive elements (Lim et al., 2023).
"Nomsa," a Special Needs Education specialist, applied Google LM and Cozi to create tailored learning plans for students with ADHD. She noted improved student autonomy and engagement as a direct result of these personalised interventions. This exemplifies AI's power in adapting content and pace to individual student needs, a cornerstone of effective differentiated instruction (Popenici & Northam, 2024).
"Simelane," a History teacher, utilised AI to rapidly generate lesson materials and visual aids, freeing up valuable time for direct student support and deeper pedagogical planning. Tools like Canva and ChatGPT were frequently cited for their effectiveness in reducing educators' workload. Automating routine tasks allows educators to reallocate their time to more impactful activities, such as one-on-one student interaction and curriculum development (Tuomi, 2022).
"Phila" in Drama Education used ChatGPT to help students write monologues, fostering creative expression and narrative development. Concurrently, "Mandla" in Journalism simulated breaking news scenarios using AI prompts to cultivate critical

[1] All names used in this chapter are pseudonyms.

thinking and rapid decision-making skills among students. AI here acts as a creative partner and a simulation engine, pushing the boundaries of traditional learning methods (Huang et al., 2023).

"Busisiwe," from Nursing Education, developed AI-generated simulations for patient care scenarios. These simulations allowed students to practice decision-making in safe, controlled environments, bridging the gap between theoretical knowledge and practical application. This approach is particularly valuable in fields requiring hands-on experience, providing immersive learning opportunities without real-world risks (Spector et al., 2021).

A notable finding was the cross-pollination of strategies across disciplines. Participants frequently recognised the potential for tools like ChatGPT and Canva in diverse settings—from composing music to drafting legal briefs—even if the initial case study was outside their primary subject area. This suggests that AI was often conceptualised as a versatile collaborator, rather than merely a subject-specific tool.

Concerns about Ethical Implications

While the enthusiasm for AI integration was high, participants also voiced significant concerns regarding ethical implications, highlighting the need for careful consideration and robust policy frameworks on issues like data privacy, accuracy of AI-generated cntent, stifling intrinsic creativity, equity and access by all.

Educators expressed concerns about student data protection and confidentiality when using AI tools, particularly those that process sensitive personal information. Ensuring compliance with data protection regulations and establishing clear data governance policies are paramount (UNESCO, 2021). Questions were raised about the reliability and factual correctness of AI-generated content, prompting discussions on the need for critical evaluation skills among both educators and students. This underscores the importance of media literacy and critical thinking in an AI-augmented educational landscape (Lim et al., 2023). Some participants worried that over-reliance on AI tools might limit students' original thinking and intrinsic creativity, leading to a dependency on AI for ideation and content generation. Balancing AI assistance with opportunities for independent thought and creative expression is a key pedagogical challenge (Cope & Kalantzis, 2021).

Concerns were raised about ensuring all students benefit from AI integration regardless of their socio-economic background or access to resources, highlighting the potential for widening existing digital divides. Addressing issues of digital equity and providing equitable access to technology and training are crucial for inclusive AI adoption (Chisom et al., 2024).

Analysis of Cohort 1 Feedback on Module 4

The Cohort 1 participants in Module 4 of the AI in Education short course, comprising 115 individuals, provided comprehensive feedback that offers a detailed view of their experiences and perceptions. Participants generally rated the module

highly across several key areas. A significant majority rated the module's relevance to their work as "Extremely" high (5 out of 5), with a considerable number also rating it as 4, indicating that the content resonated strongly with their professional needs. While still positive, the clarity of content received slightly lower "Extremely" ratings compared to relevance, suggesting room for improvement in instructional clarity. Similarly, the effectiveness of learning activities was rated highly, but with a notable portion giving it a 4, implying potential for enhancement. Overall satisfaction with the module was very high, with a large proportion of participants rating it as "Extremely" satisfying.

Regarding the appropriateness of module length, a vast majority (74.7%) found it to be "Just right," while smaller percentages found it "Too short" (7.7%) or "Too long" (17.6%). This suggests that for most participants, the duration was adequate, though some felt adjustments to pace or volume could be beneficial. Participants highlighted numerous valuable aspects of the module, often praising its practical and interdisciplinary nature. Many appreciated the opportunity to integrate interactive AI tools into their specific fields, such as education administration, mathematics lesson preparation, biology content formation, and nursing education simulations. The exposure to AI applications across diverse fields like Law, Biology, Journalism, Marketing, and Special Needs Education was highly valued, fostering cross-disciplinary insights (Holmes et al., 2022).

Case studies were frequently cited as valuable for understanding AI usage in different subjects and for prompting reflection on personal application, aligning with best practices in educational technology implementation (Zawacki-Richter et al., 2019). The focus on AI for personalized and inclusive learning, especially for students with special needs, was particularly impactful for some participants. Many valued the ability to use AI tools like ChatGPT and Canva to generate lesson materials, visual aids, and streamline administrative tasks, reflecting the growing trend of AI integration in educational workflow optimization (Kasneci et al., 2023). Engaging with peers and exchanging ideas in the discussion forums was considered practical and useful, with many expressing excitement about being exposed to the "infinite possibilities" of AI in education.

Despite high satisfaction, participants provided constructive feedback on areas needing improvement. Clarity of instructions was the most frequently mentioned concern, with participants finding directions for activities and assignments unclear, ambiguous, or difficult to follow, leading to confusion about expectations. Activity design raised concerns about length and repetition across the 14 units, which some found demotivating. Suggestions included diversifying tasks and introducing collaborative group projects or hands-on workshops, approaches supported by current educational research (Tsai et al., 2021). Participants requested content expansion to include more subject areas such as Computer Studies, Computer Science, Chemistry, Social Sciences, Agriculture, Commerce, and Business Studies to cater to a wider range of educators.

Many desired more practical guidance, including lists of suggested AI tools for each subject, video tutorials, practical demonstrations, and step-by-step guides for prompt generation and tool implementation. While ethics was addressed, some felt there needed to be deeper coverage of AI ethics, limitations in specific fields, and responsible AI use, a critical aspect emphasized in recent literature (UNESCO, 2021). Suggestions for increased module interactivity included more workshops, group discussions, and live sessions to foster engagement and real-time support. Some participants felt the time frame was insufficient, suggesting longer durations to accommodate diverse learning paces and allow for deeper engagement. Technical challenges with the Moodle platform were also noted.

While many felt the topics were well-covered, specific suggestions for more in-depth coverage included Computer Science, AI-driven assessment and data analytics, practical use of tools for visuals and infographics, industrial topics, differentiated instruction for inclusive education (especially for people with disabilities), and benchmarking with other advanced countries using AI. An overwhelming majority (80.2%) stated they were "Very likely" to apply what they learned to their work, with an additional 16.5% being "Somewhat likely," indicating strong intention to integrate AI into their practice. Similarly, 84.6% were "Very likely" to recommend the module to colleagues, friends, or relatives, reflecting high overall satisfaction and perceived value.

Additional comments reinforced previous points, emphasizing the module's eye-opening nature, practical utility, and the desire for clearer instructions, more time, and varied activities. Some participants reported immediate application of their learning, while others highlighted the digital divide and infrastructural challenges in Eswatini as barriers to full implementation, echoing concerns raised by researchers studying technology adoption in developing contexts (Crompton & Burke, 2020). In conclusion, Cohort 1 participants largely found Module 4 to be highly relevant, practical, and satisfying, particularly appreciating its interdisciplinary approach and the opportunity to develop concrete AI implementation strategies. However, the feedback clearly indicates a need for enhanced instructional clarity, diversified activities, expanded subject coverage, and more hands-on practical guidance to further optimize the module's effectiveness for future cohorts.

Discussion: Interpretation of Findings

The results affirm the significant potential of case study-driven professional development in facilitating meaningful AI integration within educational settings. The high level of forum engagement observed suggests that educators valued peer learning and the collaborative development of practical strategies. This aligns with contemporary professional development models that emphasize active participation and community building (Spector et al., 2021).

Educators demonstrated a remarkable ability to critically adapt AI tools, carefully considering ethical implications, student diversity, and infrastructural constraints specific to their contexts. While many participants expressed optimism about AI's

transformative potential, concerns about academic integrity and potential over-reliance on AI tools remained prevalent. This highlights the ongoing need for a balanced approach that combines AI assistance with human expertise and critical oversight (Tuomi, 2022).

Interdisciplinary learning emerged as a particular strength of the course. Participants reported gaining valuable insights from subject areas outside their own, prompting them to reimagine AI's utility in novel contexts. This cross-pollination of ideas aligns with findings by Lavorgna et al. (2020), who advocate for cross-sector AI collaborations to foster innovation. The ability to transfer AI concepts and applications across disciplines is crucial for holistic AI literacy (Nikolic et al., 2024).

Nonetheless, systemic challenges—such as limited digital infrastructure and time constraints—persist. These were consistently echoed in participant feedback and confirm the findings of Chisom et al. (2024) and Makeleni et al. (2023) regarding barriers to AI adoption in the Global South. Addressing these foundational issues is critical for sustainable AI integration in education (Aderibigbe et al., 2023).

The study's findings collectively point to practical understanding, cross-disciplinary insights, teacher training implications, and a balanced approach,

Educators demonstrated innovative strategies tailored to their subject areas, showcasing a practical understanding of AI's application. The course revealed both the benefits and challenges of AI adoption across various disciplines, fostering a more holistic view. There is a clear need for teacher training to include critical evaluation skills and ethical considerations in AI use. The importance of combining AI assistance with human expertise to achieve optimal educational outcomes was consistently highlighted.

Conclusion and Recommendations

This study has shown that educators in Eswatini are not only willing but also highly capable of adapting AI to their specific teaching contexts. Module 4's case study approach proved effective in fostering creativity, collaboration, and contextual problem-solving among participants. However, sustained institutional support and strategic planning remain crucial for widespread and effective AI integration.

Based on the findings, the following recommendations are put forth, useful for a broad audience of educational institutions, policymakers, and professional development providers:

Develop Subject-Specific AI Toolkits: Create and disseminate resources tailored to different disciplines, providing practical examples and templates for AI integration. These toolkits should be dynamic and regularly updated to reflect advancements in AI. This ensures that educators receive highly relevant and immediately applicable guidance (Kaya, 2024).

Incorporate Hands-on Practice: Professional development programs should heavily emphasize practical exercises and project-based learning, allowing educators to experiment with AI tools in a safe and supportive environment. Direct experience is critical for building confidence and competence (Ding et al., 2024).

Include Ethics and Policy Modules: Integrate comprehensive guidance on responsible AI use, including data privacy, algorithmic bias, academic integrity, and the impact on student creativity. Institutions should also develop clear policies for AI use in teaching and learning. Ethical considerations must be at the forefront of AI integration efforts to ensure fairness and equity (UNESCO, 2021).

Establish Follow-up Programs: Implement long-term support systems, such as communities of practice, mentorship programs, and refresher courses, to ensure continuous learning and address emerging challenges. Ongoing support is vital for sustaining AI integration efforts and fostering a culture of innovation (Hlatshwako & Tsabedze, 2024).

Expand Training Scope: Proactively include underrepresented disciplines and explore AI applications in areas not traditionally associated with technology. This will ensure broader adoption and foster interdisciplinary innovation. A comprehensive approach to AI literacy benefits the entire educational ecosystem (Van Wyk, 2024).

Ultimately, bridging AI theory and practice requires sustained investment in professional development, robust digital infrastructure, and supportive policy frameworks. As the education sector in the Global South moves toward digital transformation, initiatives like the one at the University of Eswatini offer a valuable blueprint for inclusive, practical, and ethical AI integration.

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Digital Intelligence Manifestation and Concealment: A New Problem-Solving Strategy

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Abstract
The era of digital technology and artificial intelligence, collectively known as "digital intelligence" has come. The science and technology innovation strategy of human society is in the period of development opportunity in which "intelligence+" and "data+" are superimposed on each other on multiple levels. People's lifestyles are facing the thematic challenge of data science and intelligent science penetrating into all walks of life. Existing "digital intelligence" related research mainly focuses on the topics of equipment manufacturing, intelligent facilities, digital governance and virtual scenarios. Although these topics have to a certain extent promoted the intuitive intervention of "digital intelligence" in human society, there are fewer studies on the in-depth strategic thinking of "digital intelligence". There are still limited cross-disciplinary studies exploring human society, digital governance, and artificial intelligence from the perspectives of philosophy, thinking, and cognition. To complement the exploration of how "digital intelligence" penetrates into human society, this study proposes a new problem-solving strategy-digital intelligence manifestation and concealment. It also explores the use of AI strategies to address the dilemma of digital governance manifestation and concealment.

Keywords: digital technology, artificial intelligence, manifestation and concealment, social governance

1. Introduction

Today's world is in the midst of a new round of technological revolution, data technology [1], digital governance [2], artificial intelligence [3], and quantum computing [4] have brought unprecedented changes in the life of human society, and all countries are actively exploring how to use the methods of artificial intelligence to solve people's real problems. Therefore, keeping pace with the rapid iteration of this round of scientific and technological revolution in terms of technological methods, and exploring the solutions to digital intelligence problems based on the thinking, strategies, and methods of AI have become the major challenges that need to be urgently solved by all countries around the globe in terms of digital governance at the present time.

This new technological revolution is still in its early stages and is mainly characterized by being data-driven. Therefore, oriented towards solving the constructive challenges of worldwide economic and social governance, it can focus on the strategy and method of digital intelligence. Because the governance of digital intelligence is a national reform and development drive jointly pursued by major economies around the world, and the construction of digital intelligence inevitably requires the support of the latest science and technology such as the Internet of Things, Artificial Intelligence, Blockchain, Quantum Technology, Cloud Computing, Big Data, and so on. So, these latest sciences and technologies, in the process of updating and iterating, the problem-solving strategies that are constantly generated, add more innovative strategies and methods to the governance of digital intelligence. Among these latest sciences and technologies, the problem-solving strategies presented by artificial intelligence in the process of rapid technological updating occupy the core position of the new scientific and technological revolution and the industrial chain innovation of various industries. To market "mechanical AI can be used for data collection, thinking AI for market analysis, and feeling AI for customer understanding. "[5] AI are a wide-ranging of technologies "promise several advantages for organizations."[6] To uses AI "improves operational efficiency", "enhances the decision accuracy of complex problems."[7] AI governance "a combination of entrepreneurial and regulatory governance approaches."[8] Therefore, digging out the problem-solving strategies that are central to the current round of technological revolution from the technology of artificial intelligence may provide a strategy and method to cracking the digital intelligence governance challenges that are common to all parts of the globe. Here is, the manifestation and concealment of digital intelligence that will be proposed in this study.

With this in mind, this paper attempts to explore a problem-solving strategy based on strategic thinking about AI technologies, namely, the manifestation and concealment of digital intelligence. This will be an exploratory study that seeks to combine digital governance and artificial intelligence, and a theoretical construction with more originary, fundamental and methodological significance. Therefore, this research will take the phenomenon of manifestation and concealment of digital intelligence and its governance in human society as the research object, and the research aim is to better solve the constructive difficulties of people's digital governance through the strategic refinement of AI technology, and the research method is literature method, interdisciplinary method, phenomenological method, systematic method, etc. The research method will firstly expound the phenomenon of manifestation and concealment of digital intelligence, and then analyze the strategic thinking of artificial intelligence technology, and finally explore the use of strategic thinking of artificial intelligence to solve the problem of the manifestation and concealment of digital intelligence.

2. The manifestation and concealment of digital intelligence

The digital intelligence in which people exist has governance issues in a number of domains such as ethics [9], urban and rural [10], privacy [11], etc., which requires exploring the wide variety of phenomena of digital intelligence governance from the existential locales of the systems of things involved in digital intelligence. The perception of these digital smart governance phenomena should not only be understood from the perspective of static thinking, but also in the context of dynamic and changing thinking about the existence of digital smart governance. Because according to Heidegger, a phenomenon is "that which shows itself, the manifest, the open", while "that which becomes a phenomenon may still remain hidden from view". Therefore, by exploring the phenomenon of Digital Intelligent Governance at the level of manifestation and concealment, we can recognize the complexity of Digital Intelligent Governance in a more in-depth, scientific and systematic way.

The manifestation and concealment of digital intelligence is an objective phenomenon in human society and is pervasive in the digital existence and governance of people around the world. As an example, there are different people and communities living in different cities, villages, or regions in every country in the world. The degree of digital intelligence among these groups varies widely, creating a geographic population digital divide. This geographic digital intelligence divide is not fully revealed, and is often hidden from view. From the point of view of the revealed and hidden ways of thinking of digital intelligence, this digital divide is yet to be revealed from the hidden place to be generally accepted by the human society. However, it is always difficult to reveal the digital divide in a way that fully reveals the hidden issues of digital intelligence. This is due to the fact that the full disclosure of the Numeracy Divide is a large and complex systematic project rather than a simplistic and static problem-solving process. Geographic Numerical Intelligence Divides are not uncovered all at once, especially in countries with diverse Numerical Intelligence demographics, and the data collected are incomplete, inaccurate, and inconsistent, resulting in only a small portion of the Numerical Intelligence Divide being available in real time.

Although, according to decision science, a resolution is often made with incomplete information. However, policymakers faced with such regional digital divides in conditions of manifestation and concealment ambiguity are lucky to arrive at exactly the same cognitive outcomes as they would have if the information were complete. Don't forget, the perception of these digital divide, in the formation of the final policy documents at the national level, still need to go through a series of very cumbersome and repetitive process of argumentation, spend a lot of time to develop a practical implementation process, and by the time these digital divide policies start to be implemented, the digital intelligence technology may have already stepped into the next stage of development, and the digital intelligence products may have already occurred a number of rapid updates. In other words, in this interval between the

recognition of the digital divide and its implementation, new digital divides are created with the innovation of new smart products and technologies. And these new digital divides are inevitably also in a state of concealment, requiring new manifestation and concealment. Thus, with the ever-changing innovations in digital intelligence technologies and products around the world, digital intelligence divides between countries, and between different geographical areas of a country, will continue to be created and remain hidden, so that these geographical digital intelligence differences will continue to grow and become more and more invisible. By the same token, the phenomenon of the manifestation and concealment of digital intelligence is also prevalent in the fields of digital security, ethics, platforms, and government.

As far as the scientific and technological thinking of computers is concerned, the foundational thinking of the digital-intelligent technology from the last century up to our time is the more mature binary thinking constructed on the basis of two numbers, 0 and 1. However, this binary thinking of 0 and 1 is, after all, one of the many possibilities of the digital world based on computer technology. However, in the face of the human world of numerical intelligence, it is not limited to this binary thinking, but there are also different numerical intelligences of ternary thinking and pluralistic thinking. Ternary logic "is closer to the way the human brain thinks."[12] Ternary optical computer "has become a research hotspot", "low power consumption, extendibility, bitwise allocability".[13] It "effectively reduces the search time and improves the search performance."[14] Although the science and technology of computers is still dominated by binary thinking resulting from 0 and 1 binary. But that doesn't mean the future is the same. So ternary thinking and pluralistic thinking should also be the way of thinking for digital intelligence. In this way, ternary thinking seems to pose an originary challenge to the manifestation and concealment of digital intelligence at the basis of thinking. Yet this is not the case. Ternary thinking and pluralistic thinking, not only do not pose a threat to binary thinking, but also add more possibilities in terms of strategies and methods, as well as comprehensive and systematic theoretical constructs to the manifestation and concealment of digital intelligence.

First, computers are programmed, cryptographically, with a number system that is not decimal, but in binary. At the level of strategic thinking, this binary, usually referred to as 0 is closed and can be seen as concealment. 1 is open and can be seen as manifestation. This binary strategic thinking constitutes a simple system of binary values or binaries. If the manifestation and concealment thinking of digital intelligence is limited to the level of this simple system of binary thinking, then it will obscure more possibilities of ternary or pluralistic thinking for the governance of digital intelligence in human society.

Secondly, digital intelligence itself is indeed a system constructed on the binary thinking of 0 and 1, but once digital intelligence enters the field of human society, the

governance of digital intelligence becomes a complex system, presenting the pattern of complexity thinking. This is because in human society, digital intelligence must serve and be constructed in the subject human. The macroscopic world faced by human beings is not all deterministic either 0 or 1 situation, but there are a large number of uncertainty situations. And these uncertainties themselves are a great digital intelligence complexity challenge. Therefore, facing the human society, the governance of digital intelligence can not be a kind of either 0 or 1, binary opposites of the simplicity of the thinking system, but should be the existence of a large number of uncertainty of the complexity of the thinking system.

Third, digital intelligence in the human macrocosm essentially implies binary thinking of simplicity and ternary or pluralistic thinking of complexity. Although from the perspective of the scientific and technological history of computers, both the Alan Turing test and the von Neumann machine, with certain limitations of the times, have adopted the digital intelligence technology with the simplicity of the binary thinking of 0 and 1 as the technological basis. However, this binary thinking mechanism of 0 and 1 of simplicity does not completely bring obstacles to the social governance of solving the complexity of digital intelligence in the human macroscopic world, because this binary thinking in fact provides human society with a strategic method of mastering complexity with simplicity. At the same time, it also finds a theoretical basis for the strategic mechanism of simplicity for the manifestation and concealment of digital intelligence.

Fourth, how to integrate the manifestation and concealment of digital intelligence in both simplicity and complexity thinking? We can try to adopt the constructive strategy of intermediate transition: firstly, we have to keep the original simplicity "either this or that" of 0 and 1 at the technical level of digital intelligence as the two ends, and then add an intermediate ternary thinking or pluralistic thinking of complexity "both this and that" as the transition on these two ends. That is to say, the governance of digital intelligence in the human world, from manifest to hidden, or from hidden to manifest, can be a clear and unambiguous transition, such as after a digital transaction, which can directly reveal the seller's hidden data to the buyer directly and unambiguously; or it can also be manifested as an indeterminate multiplicity of possibilities, such as the value of the data's use after the transaction, through the transition of "both manifestation and concealment".

Fifth, the manifestation and concealment of digital intelligence should also take into account the fact that computer systems, because of the loss of data, produce the disappearance of data, which is another new situation that is "neither this nor that". And due to the constant use of computer storage systems by human society, new data are generated every moment. These new data are continuously improved to converge into huge dynamic data lakes. Therefore, the accumulation and holding of big data in any country or region will pose a huge hidden challenge to the governance of digital intelligence. Ultimately, the governance of digital intelligence comes back

to the problem-solving strategies for the manifestation and concealment of digital intelligence that we initially focused on exploring.

3. Problem-solving strategies for artificial intelligence

The prerequisite for the Turing Test, proposed by Alan Turing in 1950, is that human intelligence needs to be known first, and then human intelligence is used as the basic basis to create a machine that simulates human intelligence until a new artificial intelligence is created. In the process of artificial intelligence simulating human intelligence, the machine must constantly imitate human intelligence, learn human language, turn human knowledge into data that can be read by the machine, and ultimately the machine intelligence can replace human intelligence to help human beings solve social governance problems. This is a development process that begins with human intelligence and gradually transforms into artificial intelligence. The proposal of the Turing test marks an important milestone in the field of artificial intelligence, an original thought experiment that spans the gap between humans and machines in thinking, cognition, consciousness and intelligence.

Alan Turing mentions at the end of his article "Computing Machinery and Intelligence" that "We can see only a small distance ahead, but we can see that there is much more that needs to be done." [15] However, the AI technology of our time has taken a new small distance on the thought experiment of the Turing test with the landmark result of generative AI. The big models of language in the field of AI continue to show new methods, techniques, and strategies of intelligence that shock the world. At the level of intelligent strategies, artificial neural networks, which often have trillions of parameters, have actually become human intelligence in some sense, and can often unexpectedly help people solve macro-world social governance problems. Therefore, an important research direction that we must always pay attention to is: how to explore better strategies and methods for solving human macro-world social governance problems from rapidly iterating AI technologies. In other words, we must not only insist on focusing on the Turing test of transforming from human intelligence to artificial intelligence, but also always focus on the new direction of abstractly extracting problem-solving strategies about human social governance from AI technology.

This new direction, whether it is natural language processing or group intelligence, is crucial for the governance of digital intelligence in human society in terms of thinking about problem-solving strategies. Because the problem-solving strategy of artificial intelligence is actually the key to the development of the field of artificial intelligence. AI "strategy is key to responding to technological breakthroughs."[16] It "forming a smart approach for assessing experimental studies".[17] So how do we understand the problem-solving strategies of AI? At the very least, heuristics can be used. For example, one of the many definitions of AI is: the technical science of theories, methods, techniques and application systems used to simulate, extend and

expand human intelligence. This definition implies a strategic way of thinking, i.e., the strategic framework of "simulate, extend, and expand". In the process of digital intelligence governance, we can adopt this strategic framework to solve problems.

The current weak artificial intelligence will one day be broken through. The future is bound to move towards the era of strong artificial intelligence. The future AI technology will not only be a revolution of limit enhancement of chips and arithmetic power, but also a revolution of exploring new ideas, concepts, and problem-solving strategies by machine intelligence. Although the current generative AI technology has caused a huge disruptive change to all over the world and all walks of life, especially GPT's underlying technology and innovative products continue to be launched, is that people have a sense of urgency that strong AI is coming at any time. But the future of strong artificial intelligence should not rely on the infinite enhancement of computer performance. Because the current artificial intelligence technology route being implemented is a weak artificial intelligence development model, mainly by virtue of high investment, high energy consumption, large-scale approach to forcibly increase the level of machine intelligence. This approach to the violent growth of weak artificial intelligence will soon be limited by the material limitations of chips, electricity, equipment, materials, and other materials, producing the physical limit of technological enhancement. Therefore, the future of strong artificial intelligence will inevitably require continuous breakthroughs in artificial intelligence on the layers of technical routes, intelligent mechanisms, thinking methods, etc., to explore new problem-solving strategies for artificial intelligence, reduce the scale and number of calculations, improve the efficiency of machine use, and create new solutions for artificial intelligence technology.

4. Solving the problem of manifestation and concealment of digital intelligence with strategic thinking of artificial intelligence

4.1 Strategic thinking with neural network technology to solve the problems of manifestation and concealment of digital intelligence education

Driven by the new round of intelligent science and technological revolution, there are many problems to be solved in the governance of digital intelligence education. Education in any country or region, whether it is a public educational institution or a private educational group, consumes a large amount of social financial and material resources, and it is a nurturing enterprise with huge investment. In particular, the infrastructure support for digital intelligent education, intelligent education application scenarios, digital education equipment products, will be constantly upgraded with the intelligent technology, so that the stakeholders of education investment is discouraged, resulting in the fear that the investment can not recover the cost. The increased level of intelligence in digital education was supposed to reduce the burden of education governance of big data, but it has thus revealed a large amount of education data flow, leakage, necrosis, ethics, breach of trust, and

other hidden problems of the new education governance. The reason why these problems are easily hidden and never fully revealed to education policy makers is because of the shortage of complex high-level talents in digital intelligence. The sense of thinking and basic literacy of digital intelligence education practitioners lag behind the demand for talents in an intelligent society.

Why is there such a hidden shortage of talent in digital intelligence education? This is because people always like to expand the scope of association of a certain problem, in fact, thinking about the problem of digital intelligence education with respect to the field of education, it is true that no real problem-solving strategy can be obtained, so the difficulty lies in the fact that people need to find a reasonable scope of association in order to make educational decisions appropriately after expanding the problem of education to other fields. We can't reveal the hidden scope of the correlates of the digital intelligence education problem without limit, and we can't let the complexity of this education problem become higher and higher, but we should reduce the difficulty of solving the education problem moderately, and reduce the situation of over-exertion of the governance of the education problem with little effect.

In this regard, we can take inspiration from artificial neural network technology to find the revealed and hidden problem-solving strategies of digital intelligent education. First of all, we can regard digital smart education as a network system. Each educational element belongs to an element of this system. Each element, like a nerve cell, has its own synapses and exists inextricably linked. Secondly, some educational elements, when subjected to external stimuli, produce changes in excitation and inhibition. Strongly excited elements will inhibit neighboring elements through the connections between elements, resulting in changes in the structure of the network system, which is the phenomenon of lateral inhibition.

With this in mind, we can argue that the solution to the problem of the manifestation and concealment of the lack of digital intelligence educational talent should accurately recognize the long-circulating educational classic problem, which should not be revealed to educational policymakers without limit. In particular, for those educational investors who are afraid that major technological breakthroughs and generation changes always occur in AI, the classic problem of education should be kept hidden to enhance their excitement rather than inhibit their educational investment. In fact, the problem of digitally intelligent educational talent is difficult to attribute. Once attributed to the education government sector, it invites a single-minded manifestation of the accumulated shortcomings of education governance, generating over-excitement of the elements of this education system, which in turn inhibits the manifestation of the related education talent shortage problem, and may even lead to the concealment of the digital intelligence education talent problem. Therefore, we should not expand the constituent elements of the digital intelligence

education network without limits, and always highlight the important role of digital intelligence education talent development.

4.2 Strategic thinking with genetic algorithm technology to solve the problem of appearing and hiding in digital intelligent communities

Since the new century, digital smart communities have been built on a large scale all over the world. The starting purpose of community upgrading in a country is nothing more than to enable community residents to live a digital and intelligent life in keeping with the times and to alleviate the inefficiency of governance in traditional communities. However, there are a large number of digitally smart communities that have not only failed to realize the expected economic and governance benefits, but have also created some new types of digitally smart community problems. For example, data silos in communities are a manifestation of a new type of problem. Nowadays, data silos have become an urgent concern that needs to be explored in the governance process of digital smart communities around the world. If a national society wants to build a new digital smart community, it will inevitably require the participation of multiple government departments. However, due to the independence of government administration, each government department's data mainly serves its own department. Because of this, there is an obstacle to the flow of data between departments. This obstacle is obviously not conducive to the optimization and upgrading of the digital smart community, and enhance the community's data silo effect. However, it should not be assumed that the various government departments do not need to operate independently. After all, the establishment of these government departments is a reasonable and legitimate administrative organization that has been scientifically proven.

However, this does not mean that the problem of data silos in digital smart communities, which has already been revealed, cannot find a strategy to solve the problem, but can only remain hidden in the independence of government departments. In fact, even if these data are open, they still have to face the homogenization problem of digital smart communities at a more incarnate level. The problem of homogenization is even more difficult to solve than the problem of data silos. The best shortcut to upgrading a community's digital intelligence, in the early stages of construction, is to copy the development experience of other communities. This copying will ensure that the new digitally smart community quickly closes the gap with other successful communities in terms of smart education, homes, transportation, medical clinics, buildings, mechanical equipment, fitness venues, and so on. However, when this gap disappears, the new digital smart community tends to show duplication, homogenization, and lack of innovation. At this point, still relying on digital smart technology copying, the emerging community will never solve the problem of homogenization. This requires us to explore a new problem-solving strategy.

Based on this, we can explore the manifestation and concealment problem solving strategies of digital intelligent community from the characteristics of genetic algorithm technology. First of all, the construction of digital intelligent community needs to abandon technocracy only and create an urban civilization with unique style and rich connotation. Promote the personalized development of digital intelligent community, from primary to advanced, from simple to complex. Secondly, the digital intelligent community, should focus on pursuing more mutation, reorganization, reform of the new program, seeking breakthrough innovation. The emerging digital intelligent community can only eliminate its manifestation and concealment problems, improve the situation of unclear cause and effect and inefficiency, and realize a unique urban culture and civilization if it never stops upgrading and iterating, pointing to the optimal solution.

Accordingly, to solve the problem of the manifestation and concealment of the digital smart community, it is necessary for all relevant government departments to make more efforts. With regard to the phenomenon of data silos, although we cannot force each department to completely open up its data, we can still actively promote the sharing of some necessary data flows. This necessary part of the data sharing, since it is a localized cross-section between various departments, a separate digital intelligence governance group can be set up. The main job responsibility of this group would be to specialize in cross-cutting data sharing in the digital intelligence community. And these groups will be in the future digital smart community construction process, according to the governance needs, to carry out the elimination of the fittest, and ultimately can stay in the group, will form a new government administrative force. For the homogenization phenomenon of digital smart communities, we cannot give up the application of the latest science and technology, but we also need to clarify the unique advantages of the community itself and find the breakthrough point of community innovation. The heterogeneous construction of digital smart communities in the future should pay more attention to the emergence of the humanistic atmosphere, adhere to the people-centered approach, bring into play the wisdom of the people, strengthen the construction of technological ethics and morality, and highlight the charm of the characteristics of the new community.

5. Conclusion

In this new period of scientific and technological history, it is important to keep up with the times and actively explore new strategic thinking from digital intelligence technology that is conducive to solving manifest and hidden problems in the governance of human society. To this end, this study proposes the concepts of manifestation and concealment of digital intelligence, and explores the problem-solving strategies of artificial intelligence. And, on this basis, this paper specifically elaborates the strategic thinking of neural network to solve the problem of manifestation and concealment of digital intelligence education; and the strategic

thinking of genetic algorithm to solve the problem of manifestation and concealment of digital intelligence community. These are just exploratory theoretical research, which cannot include all the problems of the manifestation and concealment of digital intelligence. Moreover, with the rapid development of digital intelligence technology, there are bound to be new problems that continue to emerge. Therefore, there is a vast space for exploring the problems of manifestation and concealment of digital intelligence.

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Developing Methodologies for Integrating AI for the Tertiary Classroom and Corporate Training

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Abstract
As artificial intelligence (AI) continues to reshape higher education, understanding how students and academic staff engage with these tools is critical. Using mix-method research this article examines attitudes and usage patterns of AI at the tertiary level. The study results show that students frequently use generative AI tools, such as ChatGPT, for research, language support, and exam preparation. While many report academic benefits, concerns persist around reduced engagement, academic integrity, and the lack of clear institutional guidelines. Faculty responses reveal a cautious openness, recognizing AI's pedagogical potential while warning against over-reliance and threats to critical thinking. Most agree that AI should serve as a supplementary, not primary, instructional method. In addition to survey analysis, the study explores practical strategies for integrating AI into classroom teaching and corporate training. Findings underscore the need for structured, ethical frameworks that balance innovation with academic rigor and student responsibility. This work also includes a specific case study linked to the AI implementation at NEWTON University (Czech Republic).

Keywords: Artificial Intelligence in Education; Generative AI; Higher Education Pedagogy; AI Integration; Student and Faculty Attitudes

Introduction

In recent years, the role of Artificial Intelligence (AI) in contemporary educational systems has emerged as a prominent topic of scholarly discourse. AI is transforming the delivery and experience of education, encompassing developments such as automated tutoring systems and content personalization. Its impact is especially significant in higher education, where the complexity of institutional structures and the high-stakes nature of learning outcomes amplify both the opportunities and challenges associated with AI integration. This paper explores the transformative role of AI in educational and training contexts, based on original survey data and its practical implementation at NEWTON University. It also tries to identify avenues for best practices and policies.

1. Literature Review

1.1 Student and Faculty attitudes toward AI

Student adoption of generative AI tools is widespread. Studies show students use AI for academic writing, summarizing readings, grammar correction, and information searches as well as for the creation of materials such as presentations. Rudolph et al. (2023) found that students viewed tools like ChatGPT as helpful assistants for managing workload and generating initial drafts. Similarly, Cotton et al. (2023) observed that students value AI for increasing efficiency but remain concerned about over-reliance.

Kasneci et al. (2023) cautioned that generative AI may undermine critical thinking, with students potentially bypassing reflective learning. Sullivan et al. (2023) emphasized student uncertainty around academic integrity when using AI, suggesting the need for clearer institutional policies and guidance.

Faculty attitudes toward AI are evolving. Lo (2023) reported a spectrum of responses ranging from enthusiasm to deep skepticism. Educators recognize AI's pedagogical potential but are wary of academic misconduct and the erosion of traditional learning goals. Baidoo-Anu and Owusu Ansah (2023) stressed the importance of faculty training to leverage AI effectively while preserving human-centered learning.

Mollick and Mollick (2023) argued that educators can integrate AI into classrooms by modeling its responsible use and redesigning tasks that prioritize process over output. Faculty also express concerns about students' digital literacy gaps and the risk of misuse without adequate instruction. Along with these also come the ethical concerns.

1.2 Opportunities and Innovations in AI Integration

AI technologies offer new levels of personalized learning. Zawacki-Richter et al. (2019) and Hwang et al. (2020) highlighted AI's capacity to adapt content delivery, provide real-time feedback, and facilitate mastery-based progression. Instructors benefit from AI-assisted lesson planning, diagnostics, and content alignment.

In corporate training, AI supports just-in-time learning, performance tracking, and simulation-based skill development (Fountaine et al., 2019). Daugherty and Wilson (2018) demonstrated how intelligent systems can reduce training time while improving content relevance.

The UNESCO (2023) *Guidance for Generative AI in Education and Research* underscores the urgent need for governments and educational institutions to take a proactive, human-centered approach to AI policy development. Central to this guidance is the

commitment to ethical principles—fairness, transparency, equity, inclusion, and long-term sustainability. UNESCO calls for both immediate and sustained action to prepare education systems for the realities of AI integration. This includes revisiting and revising curricula to reflect emerging digital competencies, providing robust professional development for educators, and establishing transparent governance structures that ensure accountability and trust in AI deployment across all levels of education.

In parallel, the Russell Group (2023) provides a complementary framework aimed specifically at higher education institutions. Their guidance lays out clear principles for fostering a responsible culture around generative AI, placing particular emphasis on enhancing AI literacy, preserving academic integrity, and evolving assessment practices to remain relevant and fair. The report also highlights the importance of institutional clarity—making it explicit where and how AI tools may be used—and ensuring that both staff and students are equipped not only with the technical know-how but also the ethical grounding necessary for responsible and informed engagement with AI technologies.

1.3. Ethical and Pedagogical Challenges

Perkins et al. (2023) conducted a corpus linguistics study showing that many academic integrity policies remain ambiguous on AI use. Without precise language, institutions risk inconsistent enforcement and student confusion. AI-detection tools are often unreliable and raise ethical concerns, especially when misidentifying non-native speakers or neurodiverse learners.

Sullivan et al. (2023) noted that students value AI as a learning partner but fear punishment due to unclear guidelines. Transparent attribution norms and assignment-specific policies are necessary to maintain trust.

There is growing concern that AI use, when unstructured, can lead to "cognitive offloading." Kasneci et al. (2023) and Mollick and Mollick (2023) emphasized that students may prioritize speed over depth, relying on AI outputs without critically evaluating content. Educators must guide students to treat AI as a starting point, not a solution.

Curricula need to be restructured to encourage metacognition, iterative learning, and reflection. Assignments like oral defenses, academic posters, and real-time applications can promote knowledge ownership and engagement.

1.4 Institutional Readiness and AI Literacy

Research highlights the necessity of comprehensive professional development. Lo (2023) and Baidoo-Anu and Owusu Ansah (2023) stress that educators must understand both technical and ethical dimensions of AI. Training should include prompt engineering, tool evaluation, and case-based learning scenarios.

Students need structured support to develop AI literacy. UNESCO (2023) recommends integrating AI into digital literacy curricula to ensure students understand data privacy, algorithmic bias, and limitations of generative models. Russell Group (2023) further advocates for inclusive access to tools and equitable learning environments.

Institutions must address disparities in access, ensuring that AI tools do not deepen digital divides. Students must also be made aware of environmental and economic costs associated with certain generative tools.

1.5 Recommendations and Emerging Frameworks

Recent work by Eager and Brunton (2023) calls for agile policy development that evolves with technology. This includes assignment-level AI use scales, transparent communication of faculty AI use, and collaborative design of institutional norms.

Holmes et al. (2022) propose a framework for responsible AI in education based on four pillars: transparency, accountability, fairness, and inclusion. These values must underpin tool adoption, curriculum redesign, and institutional governance.

AI integration should be participatory and iterative, involving stakeholders across teaching, technology, and ethics domains. When thoughtfully embedded, AI can augment rather than diminish academic values.

Summary

A review of recent academic literature reveals a nuanced and continuously evolving understanding of the role of artificial intelligence in education. Students have embraced AI tools, often ahead of institutional guidance, while faculty exhibit cautious openness. Key opportunities include personalized learning and efficiency gains, but significant challenges persist around academic integrity, critical thinking, and equity.

Global guidance from UNESCO and institutional models like the Russell Group principles provide actionable pathways for ethical integration. The literature strongly supports a shift toward AI pedagogy: reimagining learning as a collaborative, transparent, and critically engaged process that incorporates, rather than reacts to, technological change.

2. Methodology

This study employed a mixed-methods descriptive approach, combining quantitative survey data with qualitative insights from institutional practices. The methodology aimed to capture both the perceptions and practices surrounding AI integration in higher education from multiple stakeholder perspectives.

2.1 Survey Design and Distributions

Two distinct online surveys were developed using Google Forms, one directed at students and the other at academic staff. The purpose of these surveys was to investigate participants' experiences with generative AI tools, including frequency of use, perceived benefits and challenges, ethical considerations, and expectations regarding institutional support. Each survey included both closed-ended and open-ended questions to allow for quantitative analysis as well as the collection of qualitative insights reflecting participants' individual perspectives.

The student survey was distributed to undergraduate and graduate students enrolled at several university campuses in Prague (Czech Republic) and Brno (Czech Republic) during the Spring 2024 semester. Participation was voluntary and anonymous. A total of 248 valid responses were collected.

The academic staff survey was disseminated via email to lecturers at NEWTON University and was also distributed in paper and digital form at international conferences attended by the research team. In addition, the survey was shared with colleagues at partner institutions across Europe, enabling a broader cross-institutional perspective. A total of 42 valid academic responses were received.

2.2 Data Collection on Institutional Practices

In parallel with the surveys, qualitative data on AI integration at NEWTON University was gathered through informal interviews and structured discussions with department heads, program coordinators, and individual lecturers. These conversations provided insight into emerging pedagogical strategies, including student-led research presentations, academic posters with oral defences, and structured AI-supported writing assignments.

This qualitative component served to contextualize survey findings by offering a grounded understanding of how institutions are actively responding to the challenges and opportunities posed by AI. These internal practices were not evaluated in isolation but were interpreted alongside broader themes identified in the literature and surveys.

2.3 Ethical Considerations

Participation in the study was voluntary, and no identifying data were collected. The research followed general ethical guidelines for survey-based educational research, ensuring confidentiality and informed consent.

3. Findings: survey insights on AI integration in education

To complement the literature review and institutional experience, we conducted original surveys targeting both students and academic staff to explore how AI tools are currently being used, perceived, and integrated into educational contexts. The findings offer a rich snapshot of the evolving role of AI in the classroom from two key stakeholder groups.

3.1 Student Perspectives on AI Use

The student survey (N = 248) revealed widespread engagement with generative AI tools, reflecting global trends. Approximately 42% of respondents reported using AI tools weekly or more, with 10% indicating daily use. The most commonly used applications included ChatGPT, Grammarly, and Bing AI. Students reported using these tools primarily for improving grammar, summarizing academic texts, generating initial drafts of assignments, and clarifying difficult concepts.

Notably, 73% of students believed AI tools helped improve their academic performance, aligning with studies that associate AI use with enhanced productivity and organization. However, this optimism was tempered by deeper concerns. Over half expressed apprehension about over-reliance on AI and its potential to diminish critical thinking and engagement. In line with international research, 68% of students were unsure about their institution's AI policies, underlining the pressing need for formal, transparent guidance on appropriate usage.

Students also voiced concerns about the accuracy and trustworthiness of AI outputs, with several citing instances where AI-generated content provided incorrect information. Despite this, there was strong interest in learning how to use AI tools more effectively and ethically, suggesting that structured AI literacy training would be well received.

3.2 Academic Staff Perspectives

The academic staff survey (N = 42) highlighted a more cautious but increasingly engaged approach to AI in education. While 66% of respondents reported having tried AI tools, only 22% said they used them regularly in their teaching practice. The primary uses among academics included administrative support, lesson planning, and content development.

Faculty members generally acknowledged AI's pedagogical potential, especially in reducing repetitive tasks and enhancing efficiency. However, concerns dominated the responses. A majority of staff emphasized the risks of erosion of critical thinking, difficulty in authentic assessment, and increased potential for academic dishonesty. Additionally, many expressed uncertainty about how to adapt existing assessment methods to account for AI-generated content.

Significantly, a large majority (over 80%) supported the development of formal institutional policies on AI use, mirroring student calls for clearer guidance. Respondents also indicated a strong desire for professional development opportunities to enhance their understanding and application of AI in teaching contexts.

3.3 Emerging Themes

Several consistent themes emerged across both groups:

High student adoption vs. low faculty integration: a clear gap exists between how students and staff engage with AI. Students are active users; faculty are still experimenting.
Shared concerns about academic integrity: both groups voiced strong concerns about AI's impact on honest work and critical engagement.

Demand for institutional clarity and support: both students and staff expressed the need for transparent policies, training, and ethical frameworks for AI use.

4. Institutional Case Study: AI Integration at NEWTON University

While the broader survey data offers cross-institutional insight into faculty and student perceptions, this section highlights specific, practice-based innovations underway at NEWTON University. These institutional efforts serve both as case evidence and as replicable strategies for responsible and forward-looking AI integration in teaching.

4.1 Context: programs piloting AI integration

The pedagogical reforms discussed here have primarily been implemented in two academic areas:

The Global Business and Management (GBM) program, an English-language bachelor's degree program focused on international business, economics, and leadership.

The Language Center (LAC), specifically in Business English and Critical Thinking courses.
These programs have become early adopters of AI integration, serving as testing grounds for pedagogical shifts tailored to digital fluency and real-world application.

4.2 Shifting Pedagogical Roles: from Lecturer to Facilitator

One of the most significant pedagogical shifts has been the redefinition of instructional roles within the classroom. Moving beyond traditional, teacher-centered approaches—where lecturers deliver content and students assume a largely passive role—NEWTON GBM and LAC courses have begun to adopt a more dynamic, student-centered model. In this evolving format, students are tasked with collaboratively researching course topics and presenting their findings to peers. These presentations are frequently supplemented by peer-led quizzes or structured discussions designed to consolidate understanding and promote critical engagement. While this model is not yet universally implemented, it represents a strategic direction for both lectures and seminars across our curriculum.

This instructional approach is grounded in constructivist learning theories and deliberately integrates generative AI tools as both research aids and collaborative learning agents. Rather than using AI as a shortcut or content generator, students are guided to leverage these technologies to broaden the scope of their inquiry and deepen their analytical thinking. This philosophy aligns with the perspective advanced by Holmes et al. (2022), who argue that AI should be positioned not as a substitute for student effort but as a cognitive partner that enhances intellectual exploration and critical reflection.

4.3 Ownership and Accountability Through AI-Assisted Writing

Rather than penalizing AI use in written work, GBM and LAC courses anticipate its use and adapt academic expectations. Students are required to produce more rigorous, thesis-like content, with emphasis on intellectual accountability. This is assessed through:
Mini-defenses of essays or written projects Oral presentations demonstrating understanding Academic posters accompanied by defense sessions. These assessment formats require students to articulate and defend their reasoning—supporting the shift from output evaluation to process evaluation, as recommended by Mollick & Mollick (2023).

4.4 Embedded AI Literacy and Prompt Engineering

Recognizing that students often approach generative AI without formal training, both the GBM and LAC programs at NEWTON University have embedded AI literacy as a core component of instruction. Rather than treating AI use as a technical or extracurricular skill, it is framed as a critical academic competency—akin to citation ethics or research methodology.
Instruction includes:
Workshops and in-class sessions on prompt design, showing how phrasing, specificity, and context affect AI output.
Comparative exercises where students critically evaluate AI-generated vs. human-generated responses for clarity, accuracy, and ethical quality.
Reflections and meta-cognitive prompts, encouraging students to track when, how, and why they used AI in completing tasks.
Assessment of AI literacy is formative and iterative. For example, students are asked to include "prompt logs" with major assignments, detailing how they refined prompts over time and what they learned about the tool's capabilities and biases. This approach transforms students from passive users into active interrogators of AI systems, developing not only technical skill but also ethical discernment.
Faculty have also participated in internal knowledge-sharing sessions, often informally, to improve their own AI fluency. These sessions cover prompt engineering, AI's pedagogical potential, and limitations, which then trickle into classroom strategies.

4.5 Institutional Culture and Informal Faculty Collaboration

The innovations described here were not mandated through top-down reform but emerged from grassroots faculty initiative. Many of these practices were shaped through ongoing, collegial conversations among instructors, academic leadership, and staff during internal seminars and after-course reviews.

This informal, dialogical approach fostered an environment of experimentation and trust. Lecturers who piloted AI-related activities would share outcomes, both positive and problematic, prompting peers to adapt and iterate. There was no single roadmap—rather, change occurred through context-specific adaptation, tailored to the needs of English-taught, business-oriented, and language courses.

Feedback loops have been vital. Students were invited to give anonymous reflections on AI-integrated tasks, with many citing increased engagement and a stronger sense of agency. Some students also voiced caution about over-dependence or the difficulty in knowing when to trust AI content, which helped guide future adjustments.

Despite these positives, challenges remain: not all faculty have adopted these practices equally, and some courses (especially with heavier content) have yet managed to adapt their assessment models meaningfully. Nonetheless, the culture of bottom-up experimentation and shared ownership has laid a strong foundation for scaling and formalizing these approaches.

4.6 Reflections and Challenges

While NEWTON's pilot programs offer a compelling model, implementation has not been without difficulty. Among the key challenges:

Institutional Variation: Adoption is uneven across programs, and faculty comfort with AI varies.

Equity of Access: Some students report limited access to quality AI tools, especially without premium accounts (though the current free versions of DeepSeek, ChatGPT4.0, etc. seem to be more than capable of the tasks students assign them.)

Assessment Design: Creating tasks that meaningfully incorporate AI while still evaluating student learning requires ongoing effort and creativity.

Scalability: Without a centralized institutional policy, scaling these innovations beyond early adopters is complex.

Still, these challenges have catalyzed productive dialogue and innovation, revealing the value of piloting AI literacy and ethics within real-world instructional contexts. As practices mature, the university is now positioned to develop formal frameworks and policies that build on these early experiments.

5. Recommendations and Conclusion

5.1 Strategic Recommendations for Institutions

Based on survey data, literature insights, and NEWTON's field practices, we propose the following actionable strategies for institutions seeking responsible and effective AI integration in higher education:

Embed AI Literacy in Curricula

Make AI competency a core academic skill. This includes training in prompt engineering, critical evaluation of AI outputs, and ethical awareness regarding data use, privacy, and bias.
Redesign Assessment for Process, Not Just Product
Move toward project-based, reflective, and orally defended assessments that reduce the incentive for academic dishonesty and foster intellectual accountability in the age of AI.
Support Faculty Professional Development
Provide ongoing training for academic staff, not only in tool usage but in pedagogy, ethics, and adaptive course design that aligns with emerging technologies.
Foster a Collaborative, Bottom-Up Innovation Culture
Encourage peer-led experimentation and dialogue, as seen in NEWTON's internal seminars and informal sharing forums. Empower faculty to test, iterate, and refine AI-enhanced strategies.
Develop Flexible, Transparent AI Policies
Create university-wide policies that are adaptive, clearly communicated, and nuanced enough to allow assignment-level discretion. Transparency builds student trust and supports ethical engagement.
Equity and Access Planning
Consider institutional support for AI tool access (e.g., licenses or lab accounts), especially for under-resourced students. Ensure digital divides do not become pedagogical divides.
Ethical Oversight and Continuous Review
Appoint cross-functional teams to assess AI-related risks (e.g., bias, misinformation, surveillance), ensure alignment with academic values, and guide tool selection or vendor engagement.

Conclusion

Artificial Intelligence in education is not a passing trend—it is a structural shift. The data from our surveys reflect a student body already deeply engaged with AI, and a faculty cohort cautiously adapting. NEWTON's experience underscores the potential for practical, ethically grounded, and pedagogically valuable integration when innovation is rooted in collaboration, not compliance.

While there are challenges—ranging from unclear policies to risk of cognitive offloading—the path forward lies not in resistance, but in intentional design. Institutions must evolve from reactive stances to proactive leadership, shaping how AI contributes to—not detracts from—deep learning, intellectual development, and academic integrity.
Ultimately, AI can be an ally to educators and learners alike—but only if its integration is guided by shared values, clear pedagogy, and a commitment to educational equity.

6. Future Research Directions

As AI integration into education accelerates, several key areas merit deeper investigation:

Longitudinal Impact Studies: research tracking the effects of sustained AI use on student learning outcomes, critical thinking skills, and academic integrity over time would provide crucial evidence for or against current practices.

Faculty Adaptation Models: understanding how instructors adapt to AI-enhanced teaching—what training is most effective, and which pedagogical approaches gain traction—could guide institutional strategy and policy development.

Equity and Access Gaps: further work is needed to examine how differences in student access to AI tools affect educational outcomes, especially in diverse or under-resourced academic environments.

Cultural and Disciplinary Variability: studies exploring how attitudes and adoption patterns differ across regions, disciplines, or languages could help localize AI integration frameworks.

AI-Assisted Assessment Models: future inquiry into the design, implementation, and student reception of AI-informed, process-oriented assessment practices would be especially valuable.

These and related questions will be vital to ensuring that AI not only enhances academic efficiency but supports deep, inclusive, and ethically sound education.

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The Rise of AI: Catalyst for Progress or Threat to Human Ingenuity

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Abstract
Artificial Intelligence (AI) is revolutionizing industries, reshaping economies, and transforming human interactions. While AI has emerged as a powerful catalyst for progress, it also raises concerns about its impact on human creativity, ethics, and employment. This study explores the dual nature of AI its potential to enhance human ingenuity and the risks it poses to intellectual and societal evolution. Drawing insights from *Superintelligence: Paths, Dangers, Strategies* by Nick Bostrom, *Human Compatible: Artificial Intelligence and the Problem of Control* by Stuart Russell, and *The Age of Em* by Robin Hanson, this study examines AI's implications for innovation, job displacement, and ethical dilemmas. AI-driven automation can boost efficiency, but its ability to replicate creative problem-solving and decision-making challenges traditional notions of human uniqueness. The paper further explores whether AI complements human creativity or diminishes it, referencing *The Creativity Code* by Marcus du Sautoy. By analysing AI's role in scientific advancements, art, and decision-making, this study aims to provide a balanced perspective on whether AI is a tool for progress or a threat to human ingenuity. As AI continues to evolve, the need for responsible governance and ethical considerations becomes crucial to ensure a future where technology enhances rather than undermines human potential.

Keywords: artificial intelligence (AI), human ingenuity, automation, ethics, creativity.

Introduction

The development of artificial intelligence (AI) is one of the most important events in human history because it transforms industries, societies, and the very concept of intelligence It affects intelligence in every way. This study we first AI by describing its basic principles, outlining its evolution over time, and assessing its contemporary relevance. The chapter ends with a description of the aims and objectives of the discussion. Artificial Intelligence is described as a machine's ability to mimic intelligent human behavior such as learning, reasoning, and solving problems. Stuart Russell and Peter Norvig, in *Artificial Intelligence: A Modern Approach* (2020, p. 4), describe AI as "the study of agents that receive percepts from the environment and perform actions." This definition emphasizes the role of AI systems as autonomous agents designed to interact with their environments. The concept of AI dates back to the mid-20th century, when Alan Turing proposed the idea of machine intelligence

in his groundbreaking paper *Computing Machinery and Intelligence* (1950, p. 433). Turing's proposal for the Turing Test provided a framework for evaluating whether a machine could exhibit behavior indistinguishable from human intelligence. Building on these early ideas, the 1956 Dartmouth Conference, spearheaded by John McCarthy and Marvin Minsky, formally introduced the term "artificial intelligence." Over subsequent decades, AI experienced cycles of enthusiasm and stagnation. These "AI winters," as noted by Nick Bostrom in *Superintelligence: Paths, Dangers, Strategies* (2014, p. 28), occurred due to inflated expectations that failed to materialize, leading to reduced funding and skepticism. However, breakthroughs in computational power, machine learning algorithms, and the availability of big data in the 21st century reignited progress in AI, solidifying its position as a transformative technology. Critiques during this period often highlight the gap between ambition and execution. Bentham Science's *Current Trends in Artificial Intelligence* (2019, p. 78) underscores that early AI efforts, while groundbreaking, underestimated the complexity of replicating human cognitive processes. These failures, however, laid the groundwork for modern AI's more targeted and practical applications.

Significance of AI in the Modern World

Today, AI stands at the forefront of technological innovation, playing a vital role in addressing complex global challenges. Its significance stems from its ability to process vast amounts of data, identify patterns, and provide actionable insights with unprecedented speed and accuracy. In healthcare, for example, AI-powered systems like IBM Watson have revolutionized diagnostic capabilities, enabling early detection of diseases and personalized treatment plans. Stuart Russell (2020, p. 515) emphasizes that such applications demonstrate how AI can extend human expertise rather than replace it. Similarly, in environmental sustainability, AI is being used to model climate change, optimize renewable energy systems, and track ecological degradation.

However, AI's rapid integration raises significant ethical and societal concerns. Nicholas Carr, in *The Glass Cage: How Our Computers Are Changing Us* (2014, p. 123), argues that an over-reliance on AI can lead to the erosion of human creativity and critical thinking. Automation has also sparked fears of widespread job displacement, particularly in industries heavily reliant on routine tasks. Bentham Science's *Artificial Intelligence and Ethics* (2021, p. 42) highlights the risks of perpetuating societal inequalities through biased algorithms and data misuse. Nick Bostrom (2014, p. 129) further warns of the existential risks posed by AI systems that may one day surpass human intelligence. Without adequate governance and regulation, such systems could act unpredictably or harmfully. This underscores the need for ethical AI development that aligns with human values and safeguards societal welfare.

Purpose and Scope of the Discussion

The goal of this discussion is to evaluate the view of Artificial Intelligence (AI) as both a driver of improvement and harm to creativeness. This study aims to assess

whether AI strengthens or diminishes human effort by increasing dependency and reducing one's ability to think critically. This would help shed light towards approaching this ethical dilemma, and address the unsettling tension between his and her ability to think and raise important issues regarding the ingenuity of humans and the practical concerns of humanity as a whole. The depth of this discussion spans from the impact of new technologies, to ethics, to human plus AI interaction, and finally, the future of AI technologies. AI advances the technology of industries and simplifies complicated tasks. For example, the advancement of medicine AI provided as well as modern diagnostic systems and prediction devices provide ample innovation. Just like with developing climate models and optimizing renewable energy, AI is needed to solve difficult problems created by humans in the field of environmental science. These examples illustrate how AI can be powerful in having a fighting chance towards saving the planet. However, this shifts the focus to potential ethical and social implications of AI such as risks that arise from the rapid acceptance and use of the technology. The primary focus areas in the conversation are algorithmic bias, privacy concerns, and even job displacement. For instance, it is true that while automation improves productivity, the effectiveness of automation in replacing human work raises concerns of socio-economic inequality. Furthermore, the exploitation of AI for unethical purposes of surveillance and data collection crosses the line of human privacy and freedom, thus emerging worrying questions of who is accountable and how much regulation is needed. In addressing the interconnectedness of humans and AI, the conversation highlights a need for integration as opposed to replacement which makes one wonder how AI adapts to human creativity and decision making, particularly in art, education, and science.

In this view, AI is not considered as a threat, but as an asset that enhances human creativity. This being said, there must be a comprehension of the limits of integration and systems that AI is not allowed to bypass. Finally, the conversation turns into supporting visions of the future by searching for new phenomena and studying their expected impact on the social order. The rising development of AI is expected to provide numerous possibilities and issues which in turn creates a necessity for regulation and ethical boundaries in AI which thinkers like Stuart Russell and Nick Bostrom have presented. It is important that the negative side of AI does not outweigh its advantages. The debate AI raises about interconnectivity not only puts forth its concerns, but further provides a glimpse of the changing human intelligence which needs to be comprehended and its limits defined. Like any other issue, it would be naive to assume that AI presents no challenges; and unlike other issues, its approach will determine the outcome, which is the focus of this paper. It is this conflict that ensures that AI is an aide and not a problem, which continues to build upon the notion that cross disciplinary collaboration from policy makers, technologists, ethicists, and others are needed to tackle modern problems brought by AI technology. Solving these problems makes it easier to establish the use of AI as a tool for humanity while simultaneously making sure to protect aspects of innovation that define us.

AI as a Catalyst for Progress

Numerous industries have experienced a significant change due to the introduction of machines. Artificial Intelligence (AI) now holds the first place as a major contributor to productivity, Artificial Intelligence has become a salient part of business and its ability to complete sophisticated tasks is what sets it above the rest. The only downside is lack of intelligence as machines lack the ability to critically deduce a matter. This section attempts to analyze AI's pivotal role in showing astonishing advancements in industrial productivity, health care, scientific research, impact on environment, and the overall global development. AI has saved time and improved efficiency across industries from healthcare to aviation. Automated processes are dramatically transforming the factories' productive capacity since an AI powered robot can worker on the production line. General Electric (GE), for example, integrates AI into its predictive maintenance systems to minimize machinery downtime and prevent failures (Bentham Science Publishers, 2021). These systems utilize sensor data to estimate the probability of equipment breakdown to enable operations while saving precious resources. Likewise, instead of manually controlling the entire supply chain, managers can use profound forecasts to fill in the gap, which creates higher efficiency for the organization and less waste in the market.

Also, AI has made radical changes in financial services. As discussed by Gupta et al. (2022), fraud detection algorithms for financial institutions employ advanced machine learning techniques to monitor transactions and flag any suspicious behaviors at the time of real execution to reduce incident risks and instill greater confidence towards financial institutions. AI also simplifies customer contact with businesses through chatbots and virtual assistants who can answer varied queries and enhance service delivery tailoring. While these critics put forth some important insights, they also advocate minimizing the adverse effects of unemployment caused by automation, which necessitates the ethical use of AI technology alongside active workforce retraining strategies (Bentham Science Publishers, 2022).

Revolutionizing Healthcare: From Diagnostics to Personalized Medicine

AI provides an entire reformation to health care by amplifying the diagnostics that can be served, the treatment provided, and patient management.AI works hand in hand with machine learning algorithms to accentuate the early disease detection process like never experienced before. An excellent example here is the DeepMind Health project acquired by Google Health uses AI systems to predict acute kidney injuries even forty-eight hours before it could actually happen, which allows for proper action to be taken beforehand (Johnson et al. 2023).Additionally, AI systems have helped create tools that have automated the imaging processes for the diagnosis of cancers and cardiovascular diseases and even more neurological disorders with a greater degree of accuracy than was possible before. Personalized medicine, yet another revolutionary advance that AI has accomplished, creates treatment plans for individual patients based on their gene, their clinical tendencies, and lifestyle choices.

One of the most famous studies was authored by Zhou et al. in 2021 showed how AI powered drug discovery models have managed to bring down the time and financial investment needed to find viable compounds dramatically. Such tools are extremely important for treating orphan diseases where conventional approaches usually fail due to shallow research investment. AI's influence in telemedicine extends in this area also. Technology using AI power for healthcare service delivery, such as Babylon Health that uses AI systems for virtual consultations, contributes greatly to the integration of AI into telemedicine. Such systems are critical for people living in rural areas and other regions with limited access to healthcare services. Conversations AI can capture the life of patients. The introduction of AI in Virtual consultation with patients triggers the debate on data ethics especially on privacy and the security of sensitive patient information. Bentham Science states that care must be taken to govern sensitive data properly so that AI can progress in helping people in healthcare (Bentham Science Publishers, 2023).

Advancing Scientific Research and Problem Solving

Scientific research AI helps to research and make discoveries much faster. AI is utilized in the sphere of astrophysics where the algorithms scan the telescope data to search for exoplanets and classify galaxies. The research done by Thompson et al. in 2022 is a good example of AI techniques in space science where JWST data is analyzed to discover galaxies that are not in the available datasets. In particular, an AI-assisted system for protein structure prediction, which is critical in understanding diseases in order to treat them, also exists. An AI led by DeepMind called AlphaFold has changed the game by proving remarkably accurate in predicting the protein folding structure (Tunyasuvunakool et al. 2021). These are notable advancements that help contain multi-factorial diseases and speed up the drug discovery process. AI has a part to play in solving global problems such as pandemics. In response to the viral outbreak of COVID-19, AI systems were used to analyze the viral genomic sequences to create infection models and vaccine distribution algorithms. Researchers such as Patel et al. 2022 exposed the needs of using real time AI epidemiological models for the purposes of public health policy. However, these solutions, founded on the Antoninian fallacy, require direct attention do some ethical questions, such as algorithmic biases and access equity do AI enabled solutions (Bentham Science Publishers, 2022).

AI in Environmental Sustainability and Climate Action

AI is at the forefront when it comes to addressing ecological issues, as well as encouraging sustainable practices. AI can analyze intricate environmental systems and serve actionable insights, rendering it a valuable resource for addressing climate change. AI powered models are already working to predict weather, keep an eye on deforestation, and even manage renewable energy systems. The Green Horizons project from IBM is one such example: AI driven climate models use large datasets to anticipate pollution and suggest laws that help mitigate it (Smith et al., 2021). The

AI applications in agriculture in the study by Hernandez et al. (2022) also aid in increasing the accuracy of crop yield forecasts and improving crop irrigation efficiency, thus eliminating water scarcity while ensuring adequate food supply. AI also plays an important role in conserving energy. Intelligent AI powered smart grids help manage energy flow, reducing wastage while increasing the efficiency of renewable resources. Using AI power to change the flow of energy in real-time to meet the requirements instead of expecting it has shown to reduce the amount of energy consumed during the day, as proven by the project Google's DeepMind did in collaboration with the National Grid in the UK.

Critics, though, warn AI's ecological pros and cons should be analyzed seeing that training large machine learning models takes in quite a bit of energy, and green computing practices should be utilized (Bentham Science Publishers, 2023). AI's most useful application is making the world more accessible, development friendly, and innovative. AI fosters support for previously underserved communities by breaking barriers to education, healthcare, and communication, which encourages inclusivity. For example, let's consider AI language translation applications like Google Translate. They foster communication across cultures and allow for information to be shared all over the world (Brown et al., 2023). Adaptive learning in education also utilizes AI to teach students in a format that fits their style best. The Mukherjee et al. (2022)'s study talks about AI's role in offering quality education to underserved areas. AI Assistive technology tools such as speech recognition for the deaf and hard of hearing, or even predictive text for those with physical disabilities to communicate, encourage full participation in society. AI supports humanity in many aspects, too. For example, during natural disasters, AI systems work by assessing satellite images to see which areas need immediate help. The United Nations, as Kumar et al. stated, has adopted these AI tools in disaster management. In the country of the futurists, year 2023, life was more comfortable owing to the increased use of technology, but even now it was a challenge to ensure that AI was evenly distributed throughout the population. This gap comes from poor digital infrastructure and lack of access from low income areas (Bentham Science Publishers, 2021). Changing the efficiencies of artificial intelligence and access to healthcare resources has the potential to change the world allowing science and environmental care to go hand in hand. There is no doubt this is a world brimming with potential, but the issues of bias, privacy and inequality must not be ignored. There is clear potential in AI technology, and through appropriate measures, global issues can be managed effectively which in turn leads to a positive and equal world.

The Threat to Human Ingenuity

While Artificial Intelligence (AI) fosters innovation and streamlining processes, it triggers worries about the harm it can cause to human genius. Detractors say that the AI technology boom could destroy one's ability to think rationally, automate employment opportunities, stifle imagination, and pose an ethical challenge. This

section describes these controversies as an excessive reliance on algorithms, automation and employment relations, imagination deficit, and an ethical and socio-ontological crisis of human identity and life meaning. People's over-reliance on algorithms is perhaps one of the greatest drawbacks which will hinder one's reasoning ability and judgment. A significant reliance is starting to be observed in finance, health care, and education. Algorithms are increasingly becoming part of daily life due to their speed and accuracy. Yet, there is a danger that such dependency has already taken over one's ability to analyze, interpret, or even question issues. According to Roberts et al. (2022), people who heavily depend on recommendation algorithms while making decisions, such as for purchasing goods or consuming online content, are less willing to engage with alternative perspectives, as well as independent judgment. What is referred to as "algorithmic complacency" demonstrates how reduced automation times the exercise of rational thinking. According to Bentham Science publications (2022), it is important to balance the use of AI to increase productivity while also developing a person's analytical abilities to prevent mental atrophy.

Automation and Job Displacement: Impact on Employment

The rising use of AI technologies aggravates the already existing worries with regards to job loss, which is caused both by the automation of processes and by other socio-economic factors. In the industrial sector, the replacement of skilled and unskilled workers by autonomous systems is progressing more and more, and in the service sector, AI-based chatbots and avatars outplace contact personnel for client services. In the classic study by Frey and Osborne in 2017, it was suggested that nearly 47% of employment in the United States is vulnerable to automation, and further studies validate this data. In a recent study by Kumar et al. (2023), displaced workforce within the most skilled regions is on the rise as the automation of low-skill repetitive jobs works to increase income inequality and social divides. The introduction of self-scanning checkout in retail and self-driving cars in transport services has fundamentally changed the way people work, increasing the rate of unemployment among the unskilled working class. Such trends also have deeper societal economic repercussions: this is examined in the book *AI in the Workplace* published by Bentham Science in 2023. The book notes that AI takes on too many responsibilities and creates jobs in new areas such as AI software design and data analysis, but these positions are highly skilled and not easily obtainable by those who lose their jobs. The automation processes bring forward highly skilled workers, and so there is an urgent need to focus on workforce retraining and education to counterbalance the negative effects of automation. This issue accompanies the never-ending debates about whether or not machines can be considered creative.

The capability of systems like AI to create art, music, and literature is astonishing. For example, OpenAI's GPT models and DeepMind's AlphaGo produced artifacts which match the quality of human artistry. Nonetheless, critics would say that

although these products are fascinating, they are devoid of the essence and flair that true creativity possesses. The analysis of Hernandez et al. (2022) on the boundaries of AI art addresses the criticism of Dirik and claims that machines do not have a mind, but rather use a set of patterns to come up with a product. After all, creativity stems from deep human feelings and experiences as well as cultural situations that are not easy to construct using an AI program. Furthermore, as AI advances, fears grow regarding the possibility of it trivializing and standardizing art and culture in as much as it suffocates unique human creativity. Bentham Science's *AI and the Arts: Opportunities and Threats* (2022) adds to this debate, showing that there is no single answer to these issues. According to the book, while AI has the ability to supply creativity, at the same time, it is able to diminish it completely if people are not careful. The book advocates for using AI not to replace humans, but to increase human creativity. AI systems pose faces difficulties that are ethical or social in nature. Privacy, biases, and accountability are some examples. Biases in AI come from the data used to train the algorithm. A certain group of people, for instance, may make error with technologies dealing in facial recognition simply because of their lower representation in the training data. Johnson et al, 2023 claims that such biases lead to discrimination which is unjust in nature and is a systemic problem in hiring, enforcement of law, and lending. Another key concern is that as AI systems depend more and more on data, privacy becomes harder to guarantee. Violations of personal data and unauthorised surveillance pose significant risks to an individual's security and autonomy. Bentham Science's *AI and Privacy, Ethical Challenges* (2023) highlights the concerns of systems defenders regarding prominent issues such as the Cambridge Analytica data governance case.

Philosophical Concerns: Redefining Human Identity and Purpose

The emergence of AI prompts deep philosophical considerations about humanity's identity and purpose. Bostrom's *Super intelligence: Paths, Dangers, Strategies* (2014) investigates the consequences of AI that exceeds human intelligence and cautions that this scenario is capable of changing humanity's experience fundamentally. As machines now can perform tasks that were once thought to be purely human, including reasoning and problem-solving, there is increasing fear that AI will erode human's sense of identity and value. Taylor et al. (2022) present similar views arguing that AI technology undermines the human sense of purpose because efficiency has eclipsed ingenuity, namely the value of humanity's creativity. Along with this, they underscore the psychological burden of "replaced" or "obsolete" feelings that humans experience in many spheres of life including work and creativity. These concerns, Bentham Science publications, 2023 assert, require a rethinking of human with AI interaction. Ethicists and philosophers argue for a cooperative approach in which AI includes rather than reduces the powers of human beings. AI is a new phenomenon so its perception requires heavy education and public debate and it must be stressed that AI works with human intelligence, not against it. While these developments are unprecedented and offer limitless potential,

AI in its unconstrained form is detrimental to human creativity. Depending too much on AI makes people lose their critical thinking skills, replaces traditional jobs, and creates issues such as tampering with the fundamental essence of creativity. It also raises ethical concerns like bias, privacy, and responsibility which makes it harder to incorporate AI into society. Add in the questions of identity and purpose and you get a mix of confusion and curiosity.

Blending Human Creativity with AI Processes

Due to the rapid advancement of technology, AI is now a part of daily life, meaning it is very critical to ensure that its capabilities do not hinder humanity's potential. AI System's high feasibility automation of menial tasks requirements combined with imagining education that soars humanity's creativity and technological adeptness AI. AI's great power can be put to use while retaining what distinguishes human civilization from all other life. AI is extremely adept at analyzing information, spotting trends, and performing repetitive tasks. While it possesses many limitations such as lack of empathy, creativity, and ethical reasoning, this stresses the need for human decision-making. Rather than trying to eliminate human activity, AI should be utilized to replace human weaknesses to strengthen the bond between humans and machines. Lee et al (2022) investigated the use of AI in the new emerging field of collaborative systems in medicine. These systems support physicians by interpreting health information, providing a diagnosis, and suggesting treatment; however, they depend on physicians to deal with many subtleties and moral issues.

Edward Tenner: IBM's Watson for Oncology Comments Treating Cancer has never been simpler or easier with IBM Watson Oncology. The Watson and IBM foster itself as an expert in decision making for oncologists. They do so by providing detailed suggestions founded on extensive research done by a multitude of specialists combined into one integrated system. Therefore, it is essential to reconstruct the entire process of cancer treatment for physicians worldwide. As noted previously; the AI still has to pay to undertones and override rational before delivering the information. In Gentle Revolution, Bentham Sciences states that *Human-AI Collaboration: Opportunities and Challenges* argue that AI has the potential to be implemented in HCI design without the loss of decision-making power of the user. The book outlines case studies in areas as Design and Engineering where the AI is not rationalized in design makes the structure and building the rational focal point of the object. By doing so, it guarantees that AI will improve results without losing the originality and flexibility which is the reason for human creativity.

Transforming Education to Enhance Creativity and Technological Skills

The growth of AI calls for a shift in educational practices so that people can productively operate in a world where technological skills and creativity are of utmost importance. The traditional educational systems based on memorization and rote learning cannot be used anymore. These systems should be replaced by

processes that focus on critical thinking, problem solving, and interdisciplinary learning. According to Mukherjee et al. (2022) the use of AI in education has the potential to shift students' roles to being active learners rather than passive learners. With the help of AI, adaptive learning platforms like Coursera's do as much, letting students learn at their personal pace by recommending courses that are beneficial for them. Not only does this tailored approach improves the results of learning, but motivates students to pursue their interests and solve problems in different ways as well. In addition, it is crucial to breed creativity so that the future will be able to flourish in an world driven by AI. Bentham Science's *AI and Education: Fostering the Future* (2023) addresses the use of AI as a tool to foster creative activities like music composing, painting, and writing. They serve as a tool where students can create and make things - reinforcing that technology can help, instead of hinder, creativity. However, there is substantial opposition to the use of AI within the classroom because, as they argue, it dehumanizes the educational experience by eliminating communication and the need for active reasoning. Johnson et al. (2023) explain that students need to be taught technologically proficient, but also emotionally and socially intelligent. This is why a combination of AI-focused and traditional techniques is preferred. Adapting education aids in preparing people to take advantage of AI, and simultaneously setting them up to be versatile in a world that is constantly changing.

Empowering Humanity in the Age of AI

AI can be integrated responsibly across life, leading to unprecedented opportunities for humanity to be completely empowered. Empower in this situation refers to giving individuals and societies the tools, knowledge, and agency needed to thrive with AI technologies. One of the most promising areas of empowerment lies in inclusivity and accessibility where AI can help. Brown et al. (2022) examine how real-time transcription tools and speech-to-text software powered by AI have changed the opportunities for individuals with disabilities. These AI innovations help break the barriers for participation in education, employment, social activities, and more, leading to EIE initiatives that target greater good. AI can also empower communities and address the global issues that our planet faces. Bentham Science's *AI for Global Development* (2023) Studies have shown AI is beneficial when it comes to healthcare, education, and even financial services in emerging regions. For instance, remote areas can access healthcare services through telemedicine platforms and AI-driven microfinance helps developing entrepreneurs' access credit to grow their businesses. These applications illustrate how a lack of economic and social resources makes AI more sensitive to serve as a tool for change than for business.

Ensuring that humanity is empowered in the realm of AI requires accountability and the approach to ethical challenges. Patel et al. (2023) discuss misuse prevention and protecting rights, surveillance, and data collection as the most important. AI poses great threat household privacy and autonomy if unchecked. Policymakers have to

join forces with Technologists, Ethicists, and Civil Society organizations to create guidelines that leverage technology without compromising human welfare. Public understanding and trust is also evidence of empowerment. Taylor et Al. (2022) present workshops, seminars, and resources as means through which AI can be used responsibly. Every democratically empowered society should motivate critical evaluation of AI systems so that there is equal distribution of its benefits. To integrate AI, there needs to be some level of rethinking in how human ingenuity and AI can be collaborated. Education has to be revamped to support technological fluency and creativity so that the community can flourish in an AI dominated world. AI systems that collaborate depict how machines can support human decision making without taking over. Those educational reforms are necessary in enabling people to adapt and be creative in the future, all the while being tech-savvy. Ultimately, harnessing technology for the greater good by using AI inclusively and ethically helps solve global problems and achieves greater societal advancements. In order to accomplish this, there is a need to shift towards a human-centric approach that emphasizes ethics, responsibility, and inclusiveness. There is a need for collaboration among policymakers, educators, and technologists to make sure an AI-infused world does not stifle human potential. When this is accomplished, society can gain the benefits of technological AI without sacrificing the principles or the potential of being human.

Case Studies of Real-World Impacts and AI Driving Innovation

Even though integrating AI into different sectors is proving to be beneficial, the challenge remains of how to best integrate it into society as a whole. AI analysis is a valuable tool to derive insights from successes and failures to integrate more AI solutions into our lives. This part details the possible heights of success AI can achieve and also analyses major blunders that will ensure more calculated maneuvers in the future. Everything said above is somewhat universal but when we try to assess the level of depth and variety configures were AI is willing to dive into, then its potential is fascinating to say the least. AI's impact is already changing how we work in industries by diagnosing and treating complex ailments. This is especially true in the case of Ai tools such as those created by Zebra Medical Vision. These tools are equipped with advanced machine learning algorithms that conduct scans, detect irregularities, and provide diagnosis with supreme accuracy. A study conducted by Lee et al. in 2022 found a 30% decrease in diagnostic errors for radiology where AI assistance was implemented, resulting in more efficient healthcare and improved outcomes for patients.

This milestone achievement highlights AI's crucial aspect of working with humans to resolve critical challenges in the delivery of healthcare services. From another perspective, AI was also applied in the protection and preservation of the ecosystem such as the monitoring of changing climatic conditions for the purpose of deforestation. This form of AI is best known for its application in Satellite photography. A project carried out by Smart Global Forest Watch as well as other AI

specialists makes use of a comprehensive data analysis and pattern recognition system instead of focus groups to track illegal deforestation activities. Smith et al. (2023) cites that within the first three months, many regions experienced an astonishing reduction in deforestation rates by over 15%, demonstrating the positive AI integration into environmental science. AI has also radically transformed retail businesses

Amazon is well known for AI powered predictive inventory control systems, one of its flag projects. The system analyzes historical data on customer purchases to make projections regarding the future demand and adjusts stock orders accordingly, thus reducing excess inventory and increasing efficiency. According to Gupta et al. (2023), these systems have increased productivity by 20% for Amazon, which is the new standard in the retail industry. Such cases explain the importance of strategic deployment of AI toward efficiency and innovation.

Pitfalls and Failures: Lessons Learned from AI Implementation

Along with its achievements, AI was also graded poorly on a number of accounts which reveals the blunders made while deploying it. One of the major blunders was the deployment of facial recognition systems in police work. These systems are known to have certain degree of biases which are more pronounced in some minority groups. According to an analysis done by Johnson et al (2022), the policing in the US based on Facial Recognition Technology (FRT) had very high error rates resulting to wrongful arrests among people of African descent. This points to the importance of testing and bias elimination in AI algorithms before they are used. Another worse case scenario in AI application is self driving car systems AI not working in real world situations in 2018 when an Uber self driving car ran over a person crossing the street claiming that this was not identified. Patel et al (2023) argue that this case illustrates the need for testing in unpredictable situations and the strong use of fail conditions in sensitive cases.

AI has had its problems when attempting to apply it around recruitment. Some major companies have automated their hiring processes only to discover that it reinforces existing gender or race discrimination, often due to the training data that was used. Hernandez et al (2023) state that one such system unjustly penalized women who applied to technical roles as it was based on obsolete data. Such failures highlight the need to mitigate ethical concerns as well as opacity in the implementation of AI. When seeking to address these issues, it is very clear what direction should be taken: responsibility, ethical governance and concerned with more than just the bare minimum AI system design. Bentham Science's Challenges in AI Deployment (2023) refers to these particular studies as tales of extreme caution against companies who wish to utilize AI fairly and responsibly.

Future Trends in AI Development and Application

AI is expected to go through tremendous changes with new patterns in its creation. One, in particular, is the development of explainable AI, or XAI, which addresses the concerns surrounding the many machine learning models referred to as black boxes. Explainable AI offers an understanding of the processes behind AI's decision making which helps to establish trust. Taylor et al. (2023) argue that XAI will be important in critical areas like healthcare and finance where it is important to know how decisions were made and for what ethical and practical purposes.

The combination of AI to the world of Quantum Computing is yet another promising frontier. Quantum AI alone could handle large data sets and perform calculations way faster than currently possible. Brown et al. (2023) talk about how quantum AI can change how we think of drug discovery by simulating molecular interactions faster than any current method, thus accelerating the development of life-saving drugs. Being a part of sustainability, the integration of AI in addressing climate change is predicted to grow. New and improved machine learning algorithms are being designed to help save energy and forecast the effects of environmental regulations. A report by Mukherjee et al. (2023) describes the ways AI powered Predictive Energy Models can further improve renewable energy systems - make them work more efficiently and at lower cost. For example, AI powered Predictive Models can increase the effectiveness of wind turbines by using real time meteorological data. In addition, AI will have growing influence in the education sector, especially with adaptive learning technologies. These AI powered systems allow students to learn in the most efficient way according to their abilities and skills. Johnson et al. (2023) pose how AI can help fill the education gap by making high quality materials available to low income communities. These changes show how education can be made accessible for learners across the world. The development of AI is inevitably paced with challenges; ethical issues related to privacy, data collection, biases, etc. stem from it which must be addressed. Regulatory structures must be created to monitor the use of AI as this will ensure fairness as well as equitable distribution of its benefits. These obstacles will require the cooperation of policymakers, technologists, and ethically concerned people on an international level as said by Patel and others (2023). The impact of AI in reality shows a mix of outcomes that are successful, unsuccessful as well as the ones which are still in the process. The change that AI can bring is best exemplified through success stories coming from the healthcare, environmental sustainability, and retail sectors. Still, problems experienced in facial recognition, self-driving cars, or AI-oriented employment decisions demonstrate there is a strong lack of supervision and ethical reasoning in some domains. Trends which explainable AI powered sustainability, and quantum computing will for sure AI's boundary will be transformed. These latter innovations can do wonders if put with explainable AI. In order to make these innovations beneficial while minimizing the risks that come along, ethical reasoning, transparency, and accountability should be the way to go. When utilised effectively,

AI has the potential to be a highly impactful tool; however, it is essential to approach it with caution to avoid unforeseen repercussions.

Conclusion

Revisiting the Central Debate: Progress vs. Threat

AI stands head and shoulders above most technologies both as an opportunity and as a challenge. It has been shown that AI implements considerable innovation within an industry and makes it more efficient by providing solutions to tough global issues like climate change, managing diseases, as well as inequality in global educational standards. AI is capable of delivering such results, as AI-driven diagnostic devices, quantum computing, and adaptive learning systems are success stories of AI being used responsibly. At the same time, AI possesses the dark side of job loss, discriminatory algorithms, ethical issues, and deeply philosophical dilemmas about the human condition. These conflicting viewpoints are the essence of the argument concerning whether AI is beneficial for technology and innovation or harmful to self-sufficiency and social order. This argument brings back the question of how discussion AI stances should be approached. AI cannot be wholly classified as good or evil, instead it depends on the goals behind its creation, the context in which it is used, and the policies governing its use. AI can aid human creativity and decision-making in shaping the future, but it can also do the opposite. The removal of ethics in AI utilization can lead to far-reaching inhuman consequences and the destruction of human control and power, worsening existing imbalances. These opposing extremes need to be balanced in order to deal with AI's dangerous reality.

The future development of AI is likely to dictate its application in almost every human activity, including health and medicine, education, governance, and even art. The ability to solve critical problems like the destruction of nature and the global health crisis is beyond anyone's imagination. However, as AI becomes more ubiquitous, society will have to deal with very primary issues pertaining to human function, free will, and self identity. According to philosophers and ethicists, technology should not supplant humanity's ability to create, solve problems, or make moral choices; instead, it should enable people to prosper in a well-integrated AI ecosystem. Bentham Science publications state, as do many others, that the integration into AI powered reality cannot be successful without fulfilling human values like justice, respect, and openness (AI and Ethics: Emerging Challenges, 2023). This alignment necessitates the understanding of AI as a tool, rather than a self-governing system, which fosters the health of the community. Thoughtfully implementing AI can make it a vehicle that closes the existing gaps and provides the world with access to resources, education, and opportunities. But the problems are still enormous. Data privacy threats, moral violations, and the exorbitant power of AI contractors have created a hazard to humanity when it aggregates the decision-making power to a few corporations or governments. These issues require

technology-based solutions alongside a high level of public participation, inter-sectoral collaboration, and active public policy management. In order for society to coexist with AI in a balanced manner, there are certain actions that need to be taken. This should commence with creating rules around the ethical governance of the AI industry, which should outline rules around the design and the purpose of the AI systems that are to be developed. This should include policymaking, technology, and ethical sciences to create a framework that allows rule based systems that are responsible, inclusive and prioritizes welfare. There must be inclusion of algorithmic transparency, bias elimination, data misuse, and other malicious activity safeguards place as a core to those frameworks. Moving forward, the education sectors need to change in a way where individuals are able to function and excel in world driven by AI. Fostering of creativity, analytical abilities, and technology enabled systems should be at the forefront in which the latter generations will be educated to effectively harness AI without losing the human element. This change in education should also support the public or anyone around AI and the applications of AI so that there is no mistrust. Last but certainly not least, global cooperation is just as important. Since AI governs issues beyond the borders of a single nation, there needs to be international cooperation in order for long standing problems like discrimination, cyber warfare, and ethical issues to be solved. This could involve broad global governance systems or treaties regarding AI for development in order to ensure everyone can have equal parts in the new technologies while minimizing the effects that come from abusing such tools. So long as proper measures are taken, AI is the greatest promise of change for civilization's future. Through ethics, education, and collaboration, our society can strive to benefit from AI's transformative potential while preserving humanity. We can begin a better journey toward cohabitation with AI through intention, vigilance, and unity for the greater good.

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Leveraging Machine Learning and AI for Data-Driven Marketing Decisions

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Abstract

Machine learning (ML) is a branch of artificial intelligence (AI) that focuses on building systems capable of learning from data and making decisions based on it, without being explicitly programmed. It enables computers to identify patterns in data, make predictions, and improve their performance over time as they are exposed to more data. ML can also be applied in organizational sciences, management, marketing, and other fields, addressing various issues and indicators (Hair, 2021). On the other hand, formal methods (FM) rely on mathematically precise techniques for specifying, developing, and verifying software and hardware systems. The aim of this paper is to explore whether ML and FM can collaborate to provide greater benefits for decision-making and the analysis of marketing strategies. Furthermore, how can machine learning (ML) and formal methods (FM) be utilized together to enhance the efficiency and effectiveness of a marketing plan? Through a bibliographic review of recent studies published in Elsevier and Taylor & Francis journals, we conclude that by combining the predictive power of ML with the mathematically rigorous techniques of FM, businesses can enhance their ability to make data-driven decisions, improve campaign efficiency, and ensure the fulfillment of specific marketing goals within constraints such as budget, timing, and target audience.

Keywords: Machine learning, artificial intelligence, AI, marketing strategies, Formal methods.

I. Introduction

In the digital age, marketing campaigns are a central component of a business's ability to engage customers, promote products, drive sales and also personalization the practices in marketing (Aksoy et al., 2021). With the exponential increase in data generated from online interactions, businesses are increasingly using Artificial Intelligence (AI) technologies to improve their marketing strategies. The use of AI

aims to be consumer-centric, focusing on identifying consumer preferences and desires (Zhang & Agnihotri, 2024). This is a major innovation because, previously, identifying consumer preferences was done through surveys asking consumers what they preferred. Additionally, interaction is another very important aspect. AI tools, such as machine learning algorithms, natural language processing, and automated analytics, empower companies to extract valuable insights from large datasets, enabling them to segment audiences, personalize content, and optimize campaigns in real time (Bharadiya, 2023).

Machine learning (ML) is a branch of artificial intelligence (AI) that focuses on building systems that can learn from and make decisions based on data, without being explicitly programmed. It allows computers to identify patterns in data, make predictions, and improve their performance over time as they are exposed to more data. The Fourth Industrial Revolution has been conceptualizing the company to have integrated data about customers and products across all channels and products, using that data to understand better its end customer experience and visibility across all functional areas. In this context, AI and ML have played a crucial role in big data analytics to anticipate and provide guided experiences to meet customer expectations (Verma et al., 2021).

In other words, artificial intelligence has revolutionized the marketing domain, driving rapid digital transformation by enhancing processes, accelerating growth, and transforming the business landscape (Labib, 2024).

Moreover, how to utilize Machine Learning (ML) with Formal Methods (FM) for beneficial purposes to enhance the efficiency and effectiveness of a marketing plan? The aim of this paper is precisely to explore whether ML and FM can collaborate to provide greater benefits for decision-making and the analysis of marketing strategies.

To this end, this paper uses a bibliographic review, synthesizing empirical findings and conceptual frameworks published in Elsevier and Taylor & Francis journals since 2020. The review focuses on studies exploring the integration of ML and FM in marketing, analyzing quantitative models and formal verification techniques within campaign optimization. Papers were selected based on methodological rigor, practical relevance, and their contribution to improving marketing strategies.

II. Literature Review

The rise of Machine Learning (ML) and Artificial Intelligence (AI) has significantly changed marketing by allowing faster, automated data analysis and personalized decisions (Herhausen et al., 2024). ML helps businesses segment consumers based on their behavior and personalize content in real time, which improves customer

experience and boosts return on investment (Zhang & Agnihotri, 2024). Studies highlight how ML has been used successfully to predict consumer behavior on social media, optimize posting times, and analyze user emotions to guide marketing strategies (Dai & Wang, 2021).

Research also shows that ML helps companies handle large amounts of data from online interactions, making it easier to make decisions and provide targeted recommendations (Verma et al., 2021). More broadly, ML is transforming how marketing campaigns are planned, using advanced models that combine predictive analytics with personalized recommendations for different customer groups (Hair & Sarstedt, 2021). Using advanced tools like convolutional neural networks and AutoML has also made digital marketing campaigns more efficient while reducing operational costs (Hu et al., 2023).

The literature also points out the importance of ongoing education and training for marketing professionals to ensure they can use ML and AI effectively in their work (Thontirawong & Chinchanachokchai, 2021). Teaching professionals how to understand and apply ML models has been key to the success of data-driven marketing strategies.

Additionally, ML has been linked to improved market efficiency, as better prediction accuracy helps identify opportunities faster and improve investment results (Feng & Liu, 2024). Overall, the literature shows that ML is playing an increasingly important role in marketing, helping businesses personalize their efforts, make data-driven decisions, and stay competitive in a digital, customer-focused world.

A review of the literature shows that the use of Machine Learning (ML) in marketing has grown rapidly, helping with segmentation and personalization (Verma, 2021; Herhausen et al., 2024). However, there is still a clear gap: ML is rarely combined with Formal Methods (FM) to ensure security, transparency, and compliance with constraints (Bensalem et al., 2024). Many studies focus on predicting and recommending consumer behavior on social media or in financial markets (Dai & Wang, 2021; Hu et al., 2023), but they do not address the formal verification of these models, leaving error control and oversight of automated decisions lacking. Another gap is the heavy reliance on data without tackling cause-and-effect relationships and managing inaccuracies in data (Hair & Sarstedt, 2021). While many papers highlight the value of using ML in marketing, they often overlook the need for clear training and modeling guidelines for marketers and researchers, limiting safe and understandable use of these tools (Thontirawong & Chinchanachokchai, 2021; Ntentos et al., 2025). Additionally, most studies do not explore the long-term impact of widespread ML adoption on marketing ecosystems and market efficiency, where too much reliance on ML can reduce the advantages of these strategies due to the

"crowd trading" effect (Feng & Liu, 2024). These gaps show the need for integrated research that brings FM and ML together to optimize marketing campaigns while preserving privacy, ensuring transparency, and maintaining security and efficiency. This would help create campaigns that are not only personalized but also mathematically verified and reliable in decision-making.

III. The Integration of Machine Learning with Formal Methods for the Efficiency of Marketing Campaigns

With a growing variety of marketing channels, sophisticated data analytics, and increasing customer segmentation, the complexity of marketing optimization has significantly increased. Traditional methods often rely on trial-and-error. Additionally, they may fail to meet certain constraints, such as budget limits or time-sensitive requirements. Formal methods, which are mathematically rigorous techniques used primarily in computer science, offer a promising alternative to traditional optimization strategies. Machine learning has already found widespread use in marketing (Verma et al., 2021). The combination of both Formal Methods and Machine Learning would revolutionize and enhance the efficiency of marketing strategies.

Formal methods and machine learning are two distinct research areas with fundamentally different principles and approaches. Formal methods rely on mathematically precise techniques for specifying, developing, and verifying software and hardware systems. In contrast, machine learning emphasizes practical approaches to progressively enhance a model's parameters by analyzing a training data set. Although these fields were once largely separate, recent years have seen a surge of interest in bridging the gap, particularly in the verification of the robustness of neural networks (Bensalem, 2024). Formal methods are important tools in software development, like when using the V-model, because they offer mathematical precision that ensures the performance, safety, and security of the final software. However, while formal methods have been applied to software systems for specification, development, and verification, they have mainly been used for checking the robustness of neural networks (Bensalem, 2024).

On the other hand, machine learning (ML) is a branch of artificial intelligence (AI) that focuses on building systems that can learn from and make decisions based on data, without being explicitly programmed. It allows computers to identify patterns in data, make predictions, and improve their performance over time as they are exposed to more data. "Automated ML (AutoML) offers methods and processes for making ML available to nonexperts by automating end-to-end processes of applying ML to real-world problems. The term "automation" has become a popular buzzword

in the business world, referring to the increasing use of AI and ML to computerize various business functions that humans previously carried out. (Herhausen et al., 2024, p. 7)

ML can be used in marketing in various ways and for multiple indicators. For example, image classification, which typically relies on convolutional neural networks, is used to analyze images shared on social networks—such as a bike or facial expressions—to infer users' underlying activities, interests, and emotions, with specific applications in facial recognition for identifying emotions like anger, disgust, or fear, which in turn can be valuable for retail analytics, targeted advertising, and personalized marketing, especially through mobile devices (Hair, 2021).

By applying techniques such as formal optimization models, model checking, temporal logic, and constraint-based optimization, marketers can guarantee that campaigns are not only effective but also optimized to meet specific business goals.

Marketing optimization involves allocating resources in a way that maximizes the effectiveness of a campaign. This includes determining the right channels to use, the optimal budget allocation, and the timing of content distribution.

The goal is to maximize the return on investment (ROI) while adhering to a variety of constraints such as (Day, 2022):

- Budget constraints: Total marketing spend cannot exceed a defined budget.

- Target audience: Campaigns must target specific customer segments based on demographic or behavioral data.

- Time constraints: Campaign actions must occur at specific times (e.g., sending promotional emails at optimal hours or during sales events).

Once an optimization solution has been found, it is crucial to verify that the resulting campaign adheres to all the required constraints. Model checking can be used to rigorously verify that the campaign meets predefined properties, such as (Poniewaz, 2020):

- Ensuring that the total spend across channels is within the budget.

- Verifying that each channel's minimum budget allocation is respected.

- Confirming that content is scheduled and delivered in the correct sequence, respecting time-sensitive properties.

Therefore, these indicators can be highly valuable for the efficiency of marketing campaigns, and their analysis through mathematical precision can yield exceptional results for marketing strategies. In marketing, model checking can ensure that a

campaign complies with predefined constraints, such as budget limits or timing restrictions.

IV. Conclusion

In conclusion, the eventually integration of Machine Learning (ML) and Formal Methods (FM) holds significant potential to revolutionize and optimize marketing campaigns. By combining the predictive power of ML with the mathematically rigorous techniques of FM, businesses can enhance their ability to make data-driven decisions, improve campaign efficiency, and ensure the fulfillment of specific marketing goals within constraints such as budget, timing, and target audience. The ability to verify and validate marketing strategies through formal methods, alongside machine learning's capacity to process and learn from large data sets, provides a robust framework for maximizing the effectiveness and ROI of marketing initiatives. This synergy between ML and FM is poised to reshape the landscape of modern marketing, driving more personalized, effective, and scientifically optimized campaigns. This can help optimize the allocation of resources (e.g., budget, time, impressions) across these channels, ensuring that the campaign is effective while respecting a variety of constraints, for example, constraints might include: a minimum spend on each channel; a maximum number of impressions for a particular ad; specific audience targeting rules.

Based on this, the synergy is not far from being realized. In their study, Bensalem and colleagues (2024) emphasize the urgent need for more extensive and in-depth communication between the two fields, ML and FM, with the aim of developing learning-enabled systems that deliver excellent performance while ensuring acceptable safety and security. Thei advocates for using formal methods and global optimization techniques to address safety and security defects in neural networks, ensuring provable guarantees and better verification processes.

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AI and its Impact on Education

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Abstract

Artificial Intelligence (AI) is revolutionizing education by offering innovative tools and methodologies that enhance teaching and learning experiences. From personalized learning platforms and intelligent tutoring systems to automated grading and data-driven insights, AI is reshaping traditional educational practices. This research paper explores the multifaceted impact of AI on education, focusing on its applications in adaptive learning, virtual classrooms, and administrative automation. Additionally, it examines the numerous benefits AI brings, such as increased accessibility, efficiency, and engagement, while also addressing challenges like data privacy concerns, the digital divide, and ethical considerations. Finally, the paper delves into the future prospects of AI in education, highlighting emerging trends, potential breakthroughs, and the evolving role of educators in an AI-enhanced learning environment.

1. Introduction

The integration of artificial intelligence (AI) into educational environments has marked the beginning of a transformative era characterized by personalized, data-driven, and adaptive learning experiences (Mallik & Gangopadhyay, 2023; McLaren, 2024). Through the application of advanced machine learning algorithms, neural networks, and sophisticated data analytics, AI technologies can now analyse extensive educational data to identify and address the unique needs, learning styles, and progress trajectories of individual students. This dynamic personalization allows for the instructional content to be adjusted in real time, consequently improving student engagement, retention, and achievement (Sajja et al., 2023; U.S. Department of Education, 2023).

These intelligent systems do more than simply adjust content; they systematically evaluate each learner's strengths, weaknesses, and behavioral patterns to deliver customized lesson plans, differentiated assignments, and adaptive assessments (Zawacki-Richter et al., 2019). These capabilities are particularly advantageous in diverse educational settings, where students demonstrate different levels of readiness and distinct learning preferences. Artificial Intelligence facilitates bridging these disparities by providing customized pathways that support equitable access to educational opportunities.

AI-driven tutoring platforms have become essential tools in improving students' understanding and independence, alongside content customization. These platforms provide instant, contextualized feedback and step-by-step explanations that allow students to tackle complex topics at their own pace and revisit concepts as needed (Kamalov, Calong, & Gurrib, 2023). Additionally, artificial intelligence-powered virtual assistants and educational chatbots are being utilized more frequently to enhance student engagement beyond conventional classroom hours. They serve as 24/7 learning companions—answering queries, recommending resources, and guiding learners through personalized study plans (Axios, 2024; Cadenaser, 2024).

Educators also benefit significantly from AI integration. Automated tools help reduce the administrative burden by handling tasks such as grading assignments, tracking academic progress, and even designing curriculum frameworks. This automation allows educators to recover valuable time for more significant activities, such as mentoring, promoting critical thinking, and cultivating interpersonal relationships with students (Le Monde, 2024; Special Olympics, 2024). As a result, educators can shift their focus from routine management to strategic instructional design and student-centered guidance.

Beyond the confines of formal education, AI plays a pivotal role in supporting lifelong learning. It facilitates adaptive online courses and modular training programs designed to address diverse skill levels, professional requirements, and personal interests (Financial Times, 2025). These platforms often incorporate microlearning techniques and real-time performance analytics, making them ideal for adult learners seeking to upskill or reskill in a rapidly evolving job market.

As AI technologies continue to develop, they promise to bridge longstanding educational disparities by providing scalable, high-quality learning solutions to underserved communities across the globe (The Guardian, 2025). However, the increasing reliance on AI in education also raises significant ethical and practical concerns. It is important to address concerns related to data privacy, algorithmic bias, and the potential impacts on the human aspects of education. Furthermore, it is essential to strike a balance between technological innovation and necessary human oversight to ensure that artificial intelligence functions as a tool for empowerment rather than contributing to inequity (Mallik & Gangopadhyay, 2023).

2. The application of AI in Education

2.1. Intelligent Tutoring Systems (ITS)

Intelligent Tutoring Systems (ITS), powered by artificial intelligence, are transforming how students receive instruction by offering personalized learning experiences that closely replicate one-on-one human tutoring. These systems leverage real-time data analysis, machine learning, and cognitive modelling to adapt lessons to the individual needs of learners. By continuously monitoring a student's interactions, ITS can identify patterns in performance, detect misconceptions, and

adjust instructional content accordingly. For example, if a student consistently struggles with a particular mathematical concept, the system can present alternative explanations, provide additional practice problems, or break down the concept into simpler steps. This level of personalization not only enhances student comprehension but also boosts motivation and engagement by allowing learners to progress at their own pace and according to their preferred learning style. Additionally, some ITS platforms incorporate speech recognition, natural language processing, and gamification to make the learning process more interactive and immersive, further supporting knowledge retention and skill development.

2.2. Automated Assessment

Artificial intelligence has significantly advanced the field of automated assessment, offering tools that improve both the speed and accuracy of grading while reducing the administrative burden on educators. Through the use of natural language processing, computer vision, and pattern recognition, AI systems can evaluate a wide range of student work—including multiple-choice tests, written essays, coding assignments, and even drawings or diagrams. These systems not only provide immediate feedback to students but also ensure consistency and objectivity in grading, which can sometimes be difficult to maintain in human evaluation due to bias or fatigue. For instance, AI algorithms have demonstrated a 70% success rate in assessing primary school assignments, closely mirroring the scoring patterns of trained educators. In addition to grading, some advanced systems offer diagnostic insights that highlight common student errors and suggest targeted resources for improvement. This allows both students and teachers to make timely adjustments to learning strategies, supporting a more responsive and effective educational process.

2.3. Administrative Tasks

AI is also playing a crucial role in enhancing the operational efficiency of educational institutions by automating a wide range of administrative functions. From managing course registration and classroom scheduling to organizing student records and optimizing resource allocation, AI-powered systems help streamline tasks that would otherwise demand significant human effort and time. For example, AI can analyse historical enrolment data and student preferences to predict demand for certain courses, enabling better planning and allocation of instructors and classroom space. Similarly, AI chatbots can assist with answering frequently asked questions from students and parents, reducing the workload on administrative staff and improving response times. Furthermore, predictive analytics tools can identify students at risk of dropping out or underperforming, allowing schools to intervene early with targeted support. By handling these logistical and support functions, AI allows educators and school leaders to dedicate more time to teaching, mentoring,

and fostering meaningful student relationships—ultimately improving both the quality and equity of education.

3. Benefits of AI Integration

3.1. Personalized Learning: AI systems analyze student data, such as learning habits, performance patterns, and preferences, to create tailored educational experiences that adapt to each student's unique needs (Mallik & Gangopadhyay, 2023; McLaren, 2024). By identifying individual strengths and weaknesses, AI can adjust the difficulty of tasks, recommend specific learning resources, and provide real-time feedback (Sajja et al., 2023; U.S. Department of Education, 2023). This level of personalization not only keeps students more engaged by offering content at the right level of challenge but also fosters a deeper understanding of the material (Zawacki-Richter et al., 2019). As a result, students are more likely to retain information, stay motivated, and achieve improved learning outcomes (Kamalov, Calong, & Gurrib, 2023). Additionally, AI-powered tools can monitor progress over time, allowing educators to intervene when necessary, ensuring that no student falls behind (Special Olympics, 2024). Ultimately, this approach supports diverse learning styles and helps students reach their full potential.

3.2. Accessibility: AI tools can assist students with disabilities by providing alternative learning resources and support, thereby promoting inclusiveness in educational environments (Axios, 2024; Cadenaser, 2024). These tools can offer personalized accommodation, such as text-to-speech software for students with visual impairments, or speech-to-text applications for those with hearing or speech difficulties (Le Monde, 2024). Additionally, AI-driven platforms can adapt content to different learning styles, making lessons more accessible to students with cognitive or learning disabilities (Financial Times, 2025). By offering real-time feedback and customized learning experiences, AI ensures that students with disabilities can engage with the curriculum more effectively, fostering a more inclusive and equitable educational system where all students, regardless of their abilities, have the opportunity to thrive (The Guardian, 2025).

3.3. Enhanced Student Engagement: Interactive AI applications, such as chatbots and virtual assistants, provide immediate responses to student inquiries, fostering a more engaging learning experience (Mallik & Gangopadhyay, 2023). These technologies can offer personalized support, answering questions in real-time, and allowing students to engage with the material at their own pace (McLaren, 2024). By utilizing AI, educational institutions can create a more dynamic environment, where students receive instant feedback, get assistance with problem-solving, and access resources tailored to their learning needs (Kamalov, Calong, & Gurrib, 2023). This accessibility not only enhances comprehension but also helps to build student confidence by providing support beyond traditional classroom hours (U.S. Department of Education, 2023). Additionally, AI-powered tools can track individual

progress, identify knowledge gaps, and recommend targeted learning strategies, making the educational process more efficient and tailored to each student's unique requirements (Zawacki-Richter et al., 2019).

4. Challenges and Ethical Considerations

4.1. Data Privacy: The use of AI in education involves collecting and analyzing vast amounts of student data, including personal information, learning habits, performance metrics, and behavioral patterns (Mallik & Gangopadhyay, 2023; U.S. Department of Education, 2023). While this data-driven approach can enhance personalized learning experiences, improve student outcomes, and streamline administrative tasks, it also raises significant concerns about privacy and data security (McLaren, 2024). The potential for sensitive student information to be exposed or misused by malicious actors or even by well-intentioned organizations poses risks (Le Monde, 2024). Furthermore, questions arise about who owns this data, how it is stored, and how it is used, especially as AI systems become more integrated into classrooms, potentially leading to unequal access or bias in decision-making (Cadenaser, 2024). As AI technology continues to evolve in education, it is crucial to establish strict safeguards, transparent policies, and ethical guidelines to protect student data and ensure its responsible use (The Guardian, 2025).

4.2. Equity and Access: There is a risk that AI could widen the educational gap if access to technology is uneven, particularly in underserved communities, where limited resources, lack of infrastructure, and economic barriers may prevent students from fully benefiting from the advancements in AI-driven education tools (Financial Times, 2025). This digital divide could exacerbate existing inequalities, leaving students in lower-income areas without the same opportunities to access personalized learning experiences, interactive platforms, or advanced educational content that their more privileged peers may have (Special Olympics, 2024). Consequently, these disparities may impede academic success, restrict future career prospects, and continue the cycle of poverty, thereby reinforcing social and economic divisions within society (Axios, 2024). Therefore, ensuring equitable access to technology and AI resources must be a priority to prevent exacerbating these challenges and to promote inclusivity in education (Kamalov, Calong, & Gurrib, 2023).

4.3. Dependence on Technology: While artificial intelligence offers substantial benefits in enhancing educational outcomes, there is growing concern that excessive reliance on AI tools may inadvertently undermine the development of critical cognitive skills among students (Mallik & Gangopadhyay, 2023). As AI technologies increasingly provide instant answers, automate research, and streamline problem-solving, students may be less inclined to engage in deeper inquiry, independent analysis, and reflective thinking. These core skills—such as critical reasoning,

problem-solving, and metacognitive awareness—are essential not only for academic success but also for navigating complex real-world situations. AI tools, when used appropriately, can serve as powerful learning aids by clarifying difficult concepts, offering personalized feedback, and supporting differentiated instruction. However, when students begin to substitute AI-generated responses for their own reasoning processes, there is a risk of cognitive passivity. Instead of grappling with challenging material, learners might opt for convenience, leading to surface-level understanding and reduced intellectual resilience (McLaren, 2024). Moreover, younger students who are still in the formative stages of developing foundational thinking skills may be particularly vulnerable to this effect. There are also concerns about how such dependence might affect long-term academic habits. For example, consistent use of AI to complete assignments or generate ideas may diminish creativity, reduce the ability to synthesize diverse perspectives, and foster a false sense of mastery. Additionally, overreliance on AI could widen educational gaps if students with limited digital literacy or access become further marginalized. To mitigate these risks, it is essential for educators to integrate AI in a balanced manner—emphasizing its role as a supplement to, rather than a replacement for, traditional learning approaches. This includes designing learning experiences that require students to engage in critical thinking, collaborative problem-solving, and manual research before turning to AI support. Encouraging students to question, reflect, and justify their reasoning—even when AI is used—can help preserve the integrity of human-cantered learning while still benefiting from technological advancement.

4.4. Reduced Cognitive Engagement: When students frequently rely on AI tools to obtain immediate answers, they may unintentionally bypass the deeper cognitive engagement necessary for meaningful learning (Mallik & Gangopadhyay, 2023). The essence of critical thinking lies in a student's ability to analyze complex information, question assumptions, evaluate evidence, and synthesize various perspectives to form well-reasoned conclusions. These mental processes require time, effort, and active participation—skills that are developed through sustained engagement with challenging material.

However, when AI tools offer quick and easily digestible answers, students may be tempted to accept these responses at face value without critically examining the underlying concepts or verifying the accuracy of the information. Over time, this behavior can lead to a surface-level understanding of academic content, where learners become proficient at retrieving information but struggle to apply it in unfamiliar contexts or to solve complex, real-world problems (McLaren, 2024). The result is an erosion of intellectual curiosity and a diminished capacity for independent problem-solving. Moreover, the habit of turning to AI for instant assistance can reduce students' perseverance and tolerance for ambiguity—both of which are essential traits in higher-order learning. For example, instead of working through a difficult math problem or engaging in the iterative process of refining an

essay, a student might use AI to generate a solution or a draft without fully understanding how it was created. This shortcut mentality can hinder the development of grit, resilience, and self-regulation—qualities that are crucial not only in academic settings but also in professional and everyday life.

To address these concerns, it is important for educators to create learning environments where AI is used not as a crutch, but as a tool that supports inquiry and deepens understanding. For instance, students can be encouraged to compare AI-generated responses with their own ideas, critique the reasoning behind AI outputs, or use the technology as a starting point for discussion rather than a final answer. Such approaches can help reinforce the importance of human judgment, creativity, and critical analysis in an increasingly automated world.

4.5. Erosion of Problem-Solving Abilities: Problem-solving is a foundational cognitive skill that encompasses the ability to identify issues, break them down into manageable components, and test various solutions until an effective one is found (Kamalov, Calong, & Gurrib, 2023). This iterative process encourages creative thinking, persistence, and flexibility, qualities that are essential not only for academic success but also for navigating the complexities of real-life situations. When students engage in problem-solving, they develop strategies that allow them to approach unfamiliar challenges with confidence and adaptability. However, overreliance on AI tools to provide instant solutions may hinder this process by discouraging students from engaging fully in the steps necessary to arrive at a solution. Instead of thinking critically, experimenting with different approaches, or troubleshooting their own mistakes, students might turn to AI as a shortcut, expecting quick answers without putting in the cognitive effort required for deeper learning. For example, in subjects like mathematics or science, students may bypass essential steps such as planning, hypothesis testing, or evaluating different variables in favor of using AI-powered calculators or algorithms that give them a direct answer. This reliance can inhibit the development of critical thinking and decision-making skills that are indispensable for long-term academic and personal growth. Moreover, this dependence on AI could limit students' ability to develop flexible problem-solving strategies that are applicable in diverse contexts. Real-world problems rarely present themselves with straightforward solutions, and the ability to adapt to one's approach—drawing on various tools, methods, and prior knowledge—is vital for success in dynamic environments. If students become accustomed to relying on AI for solutions, they may struggle to apply these problem-solving techniques independently in situations where technology is not available or applicable. As AI continues to advance, there is also the risk that students may fail to understand the underlying principles that govern technology, leaving them with little insight into how AI-generated solutions are derived and the limitations of those solutions. To counteract this erosion of problem-solving abilities, it is essential for educators to incorporate AI as a supportive tool rather than a substitute for the learning process.

Teachers can design assignments and activities that require students to explore multiple strategies, reflect on their reasoning, and apply their findings to new situations. Encouraging students to engage in "unplugged" problem-solving—tasks that require no technological assistance—can also help strengthen their independent thinking skills and build a deeper understanding of the problem-solving process. Thus, AI can enhance education by promoting collaboration and accommodating various learning styles, while still enabling students to cultivate the skills necessary to address challenges independently.

4.6. Limited Creative Thinking: AI tools typically function based on established patterns and algorithms. Although they can produce ideas, suggestions, or solutions, these are generally confined to pre-existing data or typical responses (Financial Times, 2025). Consequently, students may become dependent on these outcomes, potentially hindering creative thinking or innovation (Le Monde, 2024). Critical thinking encompasses not only the analysis of information but also the generation of original ideas, which AI does not consistently achieve (Special Olympics, 2024).

4.7. Reduced Retention and Comprehensive Learning: Education is not solely about receiving information; it is about assimilating it (Cadenaser, 2024). When students depend on AI for tasks such as composing papers or problem-solving, they may not retain the material as effectively as they would by engaging with the challenges independently (Axios, 2024). The experience of grappling with a difficult concept, despite its discomfort, can enhance memory and understanding (Zawacki-Richter et al., 2019).

4.8. Decreased Autonomy: AI tools can take over repetitive tasks or assist with complex concepts, but this might lead to a loss of self-sufficiency among students (The Guardian, 2025). They may become more dependent on technology and lose the confidence to approach tasks without digital assistance. Autonomy in learning is essential for personal growth, and overreliance on AI can undermine this skill (Mallik & Gangopadhyay, 2023).

4.9. Ethical and Social Considerations: When students use AI to solve problems, there is the risk of bypassing ethical decision-making processes (McLaren, 2024). Many AI systems operate without understanding the broader consequences of their suggestions, especially in complex ethical dilemmas (U.S. Department of Education, 2023). Students must learn to weigh the ethical implications of their decisions, a skill that may diminish if AI is used as a crutch for decision-making (Financial Times, 2025).

In conclusion, while AI tools offer great potential for enhancing learning experiences, it's crucial that they are used as aids rather than crutches (Kamalov, Calong, & Gurrib, 2023). Educators and students alike should maintain a balance, ensuring that the development of critical thinking, problem-solving, and creativity is not sacrificed in favor of convenience (Zawacki-Richter et al., 2019).

5. Future Prospects

The future of AI in education holds promising possibilities, including the development of more sophisticated Intelligent Tutoring Systems (ITS) that provide personalized learning experiences, adapting to individual student needs in real time (Sajja, Sermet, Cikmaz, Cwiertny, & Demir, 2023). These AI-driven tutors can assess students' strengths and weaknesses, offer customized feedback, and enhance engagement by using interactive and adaptive learning techniques (Zawacki-Richter, Marín, Bond, & Gouverneur, 2019). Additionally, advanced data analytics will play a crucial role in predictive modeling of student performance, allowing educators to identify at-risk students early, tailor interventions, and optimize curriculum design based on empirical insights (McLaren, 2024).

Beyond these advancements, AI-powered technologies will help create immersive learning environments through virtual and augmented reality, making education more engaging and interactive (Kamalov, Calong, & Gurrib, 2023). These tools can simulate real-world scenarios, facilitate experiential learning, and bridge the gap between theoretical knowledge and practical application (Mallik & Gangopadhyay, 2023). For instance, medical students could practice surgeries in virtual simulations, while history students could explore ancient civilizations in a fully immersive VR setting (Le Monde, 2024).

However, to fully realize these advancements, it is crucial to address ethical considerations such as data privacy, algorithmic biases, and the role of AI in decision-making within educational settings (The Guardian, 2025). Ensuring equitable access to technology is also paramount, as disparities in resources and infrastructure could widen the educational gap rather than bridge it (Financial Times, 2025). Collaborative efforts between policymakers, educators, and technology developers will be necessary to create AI-driven educational systems that are both effective and inclusive, ultimately transforming the learning experience for students worldwide (U.S. Department of Education, 2023).

6. Conclusion

AI has the potential to transform education by making it more personalized, efficient, and inclusive. Through adaptive learning technologies, AI can tailor educational content to individual students' needs, allowing them to learn at their own pace and receive targeted support in areas where they struggle. This personalization enhances student engagement and comprehension, making learning more effective.

Furthermore, AI can improve efficiency by automating administrative tasks such as grading, scheduling, and student assessments, freeing up educators to focus on meaningful interactions with their students. It can also provide real-time feedback and data-driven insights that help teachers refine their instructional strategies.

Inclusivity is another significant advantage, as AI-powered tools can break down barriers to education by providing accessible learning experiences for students with disabilities, language barriers, or limited access to quality teachers. AI-driven translation services, text-to-speech technology, and customized learning pathways can help bridge educational gaps and create more equitable learning opportunities.

However, while the benefits are substantial, it is imperative to navigate the associated challenges thoughtfully. Ethical concerns such as data privacy, bias in AI algorithms, and the risk of over-reliance on technology must be carefully managed. Ensuring that AI complements rather than replaces human educators is crucial, as the human touch in teaching—such as mentorship, creativity, and emotional intelligence—remains irreplaceable.

By addressing these challenges proactively, AI can serve as a powerful tool to enhance human-centered education, making learning more engaging, effective, and accessible for all.

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Big Revolution: Exploring the Transformative Role of AI in Education

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Abstract
This paper investigates the utilization of artificial intelligence (AI) in higher education among students in Kosovo, focusing specifically on the frequency of AI usage, students' perceptions, and the implications of AI integration in education. The purpose of this research is to examine the extent to which AI, particularly chatbots like ChatGPT, is employed by students, identify reasons for its usage, and assess its impact on learning experiences and knowledge creation. The methodology employed is quantitative, utilizing primary data collected through a self-administered questionnaire survey distributed to 316 students selected randomly from both rural and urban areas. The data were analyzed using appropriate reliability tests, and indices were developed based on the questionnaire questions. The key findings indicate a generally positive attitude towards AI's potential to enhance learning experiences, with a majority of respondents expressing optimism about its benefits and its significant impact on the future of education delivery. However, concerns regarding data privacy and security when using AI-driven educational tools were also evident among respondents. The most widely used chatbot among students was ChatGPT, highlighting its popularity and efficacy as an AI-driven educational tool in Kosovo. The implications of these findings emphasize the importance of addressing data privacy concerns, fostering collaboration between stakeholders, and leveraging AI technologies effectively to enhance learning outcomes and prepare students for the digital age.

Keywords: Artificial Intelligence, Education, Higher Education, Chatbots, Kosovo.

1. Introduction

Artificial intelligence (AI) today is an inseparable part of our everyday life. It is part of the decisions we make every day in almost every aspect of our professional activities. The use of AI is in some cases reducing the efforts of individuals to use their intelligence and creative abilities, which would otherwise help their further development. However, it has greatly facilitated the work of individuals, students, and teachers. According to Guerra (2023), AI holds great promise in transforming the learning experience for students, through several benefits that AI can bring to students in the future, revolutionizing the way they learn, engage, and achieve academically. According to the author, one of the benefits of AI can be predictive analysis for student success. AI can help predict student success and identify those who may require additional support. By analyzing data and patterns of student

performance, AI algorithms can provide early warnings to teachers of potential challenges a student may face. This enables proactive intervention in students, such as mentoring or personalized learning (Guerra, 2023).

The development of multiple language models has marked significant progress in the field of generative artificial intelligence (AI). ChatGPT, a chatbot that was launched in 2022, is one such generative AI model that has shown tremendous potential in language understanding and knowledge retention. The application of ChatGPT in education has fostered large-scale discussions on social media by allowing individuals to exchange information and accelerate the dissemination of knowledge (Li et al., 2023).

Despite the advantages that the use of ChatGPT has, it certainly also faces new challenges for education (Lo, 2023). ChatGPT's platform has the ability to provide specific answers to user questions, it can be used to complete written assignments and exams on behalf of students, leading to concerns about AI-assisted cheating. According to another study conducted by Valova et al. (2024) the authors conclude that the presence of various AI agents such as ChatGPT will change the context of higher education, but this will not be detrimental. They emphasize that it is very important that this transformation is realized and evaluated immediately and modeled appropriately.

This paper aims to find the frequency of use of AI in education, such as ChatGPT, more precisely its use by students of higher educational level. The next goal is to identify some of the reasons why students use AI so often and how it affects the creation of new knowledge in them.

For the realization of this research, the following questions were used: 1. Is IA used for the realization of tasks by students in higher education in Kosovo? 2. What is the most used chatbot by students?

This paper will show the level of use of AI in Kosovo by students of higher education. Through the results obtained, the current situation will show whether the rate of use of AI in education is an advantage or a potential threat to the future of education in Kosovo and affecting the skills of new generations in the future.

The paper in the first section has a general introduction which summarizes the importance that IA has today, presents the purpose, importance and use and research methodology. The second section presents the literature review, which includes a brief overview of AI, its impact, role and trends in education. Then there is the main part of the paper, which is made with primary data and at the end the general summary is given with the conclusions drawn from the research results.

2. Literature review

The emergence of big data, cloud computing, artificial neural networks and machine learning has enabled engineers to create a machine that can stimulate human intelligence. This smart technology is inevitably revolutionizing workplaces today and will continue to do so in the future. Thus, while AI creates interaction and can help individuals perform at a higher level, it is also emerging as an uncontrolled innovation (Zhai et al., 2021).

AI has become a growing concern in education policy and governance as well. As part of a long history of working by the numbers, concerns about educational accountability have influenced the drive to implement data systems that can be used to record progress toward performance goals and improve processes (Williamson & Eynon, 2020).

In education, artificial intelligence is involved in many technological innovations that provide learning analysis, recommendations and diagnostic tools in different ways and for different purposes. In many cases, IA applications are still nascent and used in experimental and local contexts rather than at the system level. However, there are many examples of promising uses that predict how AI can transform education in the coming decades, both in the classroom and at the levels of the education system, addressing different groups: students, teachers, administrators, parents, as well as policy makers (Lancrin & van der Vlies, 2020).

According to the research developed by the authors Williamson and Eynon (2020) AI in education as a field has developed through two complementary spheres: the development of AI-based tools for classrooms and the use of AI to understand, measure and improve learning. Particularly in the field of learning research, AI in education is closely related to learning sciences and cognitive science, otherwise known as the nexus of cognition, technology and education.

In the author's paper, Pedro (2019) points out that AI can help advance collaborative learning. One of the most revolutionary aspects of computer-based learning is found in situations where students are not physically in the same place. IA offers students a variety of choices for how long and where they wish to study. When we talk about computer-supported cooperative learning, online discussion groups play an essential role. Based on AI techniques such as machine learning and shallow text processing, AI systems are used to monitor discussion groups, thereby providing teachers with information about student discussions and support to guide student engagement and learning (Pedro, 2019).

AI in education confronts core problems in the field of general education, such as how to meet students' needs, what to offer students and when, and how to empower students to take responsibility for their own learning. theirs. Although AI in education integrates advanced computer and information processing techniques in education, it does not guarantee good educational results and high learning quality (Ouyang & Jiao, 2021).

Concerns for many universities around the world about the misuse of AI are growing every day. These concerns have led some universities to ban the use of generative AI in their academic programs. Eight out of 24 universities in the UK's prestigious Russell Group have declared it inappropriate to use AI bots for such tasks, including the University of Oxford and the University of Cambridge. Meanwhile, many other universities around the world are rushing to revise their plagiarism policies citing concerns about academic integrity. Some Australian universities have had to change their examination and assessment procedures back to pen and paper (Chan, 2023).

2.1. The impact of AI on education

The use of AI in education (AIED) has created new opportunities for designing productive learning activities and developing better technology-enhanced learning applications or environments. However, it remains a challenge for most researchers and practitioners from the field of computers and education to implement the relevant activities or systems. (Hwang, 2020).
In a research carried out by the author Slimi (2023), he finds that AI affects the learning and teaching process. He says this because a large part of the participants in the author's research believe that AI is more efficient than humans when it comes to learning and teaching.
AI can also enhance teachers' skills by providing them with access to a variety of tools and resources. For example, AI-enabled assessment tools can provide teachers with real-time feedback on student performance, enabling teachers to adapt their teaching strategies to better meet students' needs. (Jamal, 2023).

2.2. The role of AI in education

In higher education, AI is important for teachers and students because the application of such technologies encourages more flexible learning solutions for students without any limitations. With the help of AI, universities around the world are enrolling an increased number of students due to increased flexibility and speed (Jain & Jain, 2019).

The most common role of AI in higher education research is profiling, prediction, in-process evaluation and final assessment, while in recent years some AI programs in higher education studies have emphasized the role of adaptive and personalized systems. The use of AI technologies here has shifted from helping students, to providing the possibility of prediction, diagnosis and personalized adaptation for students (Chu & al., 2022).
In study by reviewing the latest works on AI in higher education the author Simuka (2022) found that the role of AI in higher education is multiple, which include: helping to achieve efficiency and evaluation of subjects, promoting easy interaction between lecturers and students through the use of teacher-bots, the possibility of personalization of education in higher education, as well as automated assessment.

2.3. AI trends in education

Although AI is likely to be the trend and the future, experts in this field mention that when AI is used in education, it has many gaps when it comes to the personal and emotional interaction between students and teachers, simply because AI so far cannot imitate human emotions (Karsenti, 2019).
Artificial intelligence, with its transformative potential, will significantly impact modern education. This is particularly evident in the case of generative models such as ChatGPT, which can quickly spread to the general population. Although there are various debates about its application and certain technological limitations, the basis

of AI in the educational sphere will remain and it can quickly induce major transformations of teaching and learning methodologies (Grassini, 2023).
Higher education will be impacted by AI in many ways and the two main areas are curriculum and student enrollment (Siau, 2018). The author in the study further states that AI will have a pervasive impact on the curriculum in higher education and, on the other hand, goes on to say that AI is still weak in soft skills such as creativity, innovation, critical thinking, problem solving of problems, socialization, leadership, empathy, cooperation and communication.

3. Methodology

To analyze the impact of the use of artificial technology in the education process, the quantitative methodology is used, which is based on primary data, a self-administered questionnaire survey was used to collect data. The research is cross-sectional study, rhe results were tested using applicable reliability tests, and indices were developed using the questionnaire questions.
The study was done using a self-administered questionnaire, which was completed by 316 students. Participants in the study ranged in age from 18 to 50 years old and lived in both rural and urban areas. The sample was chosen at random.
The questionnaire was distributed using the Google Forms platform, this platform is for the professional distribution of questionnaires, while the analysis of the results is done using the STATA program, where the processing of the results includes the presentation of frequencies, percentages, statistically significant differences and analysis of correlation.
A total of 8 variables were generated from the questions of the questionnaire, where 4 variables are demographic (gender, age group, level of study and residence) as well as 4 other variables related to the topic of this paper; Perceived Effectiveness of AI in Learning, Concerns about AI in Education, Future Impact of AI on Education and Attitude towards AI Integration in Education.

Table 1. *Reliability Assessment of Data (Cronbach's Alpha Test)*

Data Collection Method	Sample Size	Survey Instrument	Cronbach's Alpha
Quantitative Survey	316	Structured	0.861

The reliability of the survey instrument was assessed using Cronbach's Alpha, which yielded a coefficient of 0.861. This indicates a high level of internal consistency among the Likert-scale questions within this survey-based study.
Table 2 presents the results of demographic data such as: Gender, Age Group, Level of Study and Place of Residence. Based on the results presented in the table, most of the respondents are men, making up 80.38% of the sample, while women make up 19.62%. Regarding the age group, the largest percentage falls in the 18-30 age range, constituting 89.56% of the respondents. This suggests that the survey or study targeted or attracted primarily individuals in this age group. The 31-40 age group

represents 8.23% of the sample, followed by the 41-50 age group, which accounts for only 2.22% of respondents.
As for the level of study, the majority of respondents are currently at the Bachelor's level, making up 70.25% of the sample, 29.11% of the students participating in the research continue their studies at the master's level, while non-doctorate individuals are the smallest group, representing only 0.63%. The surveyed students were also asked about their place of residence, where according to the results, the majority of the respondents come from urban areas, making up 90.19% of the sample, while rural residents make up only 9.81%.

Table 2. *Demographic data*

Question	Frequency	Percent
Gender	**N**	**%**
Male	254	80.38
Female	62	19.62
Age Group	**N**	**%**
18-30	283	89.56
31-40	26	8.23
41-50	7	2.22
Level of Study	**N**	**%**
Bachelor	222	70.25
Master	92	29.11
PhD	2	0.63
Residence	**N**	**%**
Rural	31	9.81
Urban	285	90.19

4. Results

In this chapter, the results of the research analysis carried out with primary data are presented, where a total of 316 students of different academic levels participate.
The provided data in table 3 presents responses to statements regarding Perceived Effectiveness of AI in Learning. For the statement "I believe AI can enhance my learning experience at all," the majority of respondents either agreed (51.27%) or totally agreed (35.13%) with the statement, totaling to 86.40% of the sample. A smaller percentage either did not agree (9.49%) or totally did not agree (4.11%) with the statement. This indicates a generally positive attitude towards the potential of AI to enhance learning experiences among the respondents.
Similarly, for the statement "I believe AI can improve my understanding of complex concepts," the majority of respondents either agreed (34.18%) or totally agreed (30.38%) with the statement, totaling to 64.56% of the sample. A smaller percentage either did not agree (22.78%) or totally did not agree (12.66%) with the statement. This suggests a relatively positive perception of AI's ability to improve

understanding of complex concepts, although there is a higher proportion of respondents who did not agree compared to the first statement.
The data indicates a generally positive attitude towards the potential of AI to enhance learning experiences and improve understanding of complex concepts among the surveyed population. However, there is a notable proportion of respondents who either did not agree or totally did not agree with the statements, indicating some skepticism or reservation about the role of AI in learning and understanding complex concepts. Understanding these differing attitudes and perceptions can be valuable for designing and implementing AI-based educational tools and initiatives that address potential concerns and leverage perceived benefits.

Table 3. *Perceived Effectiveness of AI in Learning*

Question	Frequency	Percent	Significant Differences based on Level of Study
I believe AI can enhance my learning experience at all	**N**	**%**	**P**
I do not agree at all	13	4.11	P=0.000
I do not agree	30	9.49	
Agree	162	51.27	
Totally Agree	111	35.13	
I believe AI can improve my understanding of complex concepts	**N**	**%**	**P**
I do not agree at all	40	12.66	P=0.942
I do not agree	72	22.78	
Agree	108	34.18	
Totally Agree	96	30.38	

The provided datain table 4 presents responses to statements regarding concerns about AI replacing human teachers in the classroom and worries about data privacy and security when using AI-driven educational tools. For the statement "I have concerns about AI replacing human teachers in the classroom," the majority of respondents either did not agree at all (64.24%) or did not agree (17.09%) with the statement, totaling to 81.33% of the sample. A smaller percentage either agreed (7.28%) or totally agreed (11.39%) with the statement. This indicates that a significant portion of the surveyed population does not have strong concerns about AI replacing human teachers in the classroom, although there is a notable proportion who do express some level of agreement with this concern.

About the statement "I am worried about data privacy and security when using AI-driven educational tools," the majority of respondents either totally agreed (60.44%) or agreed (25.95%) with the statement, totaling to 86.39% of the sample. A smaller percentage either did not agree (5.38%) or did not agree at all (8.23%) with the statement. This indicates a higher level of concern among respondents regarding data privacy and security when utilizing AI-driven educational tools, with a substantial majority expressing agreement or total agreement with this concern.
Based on results there is not widespread concern about AI replacing human teachers in the classroom among the surveyed population, there is a significant level of worry about data privacy and security when using AI-driven educational tools. Understanding and addressing these concerns are crucial for the successful implementation and acceptance of AI technologies in educational settings, emphasizing the importance of transparency, accountability, and robust data protection measures in AI-driven educational initiatives.

Table 4. *Concerns about AI in Education*

Question	Frequency	Percent	Significant Differences based on Level of Study
I have concerns about AI replacing human teachers in the classroom	**N**	**%**	**P**
I do not agree at all	203	64.24	P=0.000
I do not agree	54	17.09	
Agree	23	7.28	
Totally Agree	36	11.39	
I am worried about data privacy and security when using AI-driven educational to	**N**	**%**	**P**
I do not agree at all	26	8.23	P=0.000
I do not agree	17	5.38	
Agree	82	25.95	
Totally Agree	191	60.44	

The provided data in table 5 presents responses to statements regarding beliefs about the impact of AI on education, optimism about the potential benefits of AI in the education sector, and the expectation of AI leading to more inclusive and accessible learning opportunities. About the statement "I believe AI will significantly change

the way education is delivered in the future," the majority of respondents either agreed (47.47%) or totally agreed (45.25%) with the statement, totaling to 92.72% of the sample. A smaller percentage either did not agree (4.43%) or did not agree at all (2.85%) with the statement. This indicates a strong belief among the surveyed population that AI will have a significant impact on the delivery of education in the future.

Regarding optimism about the potential benefits AI can bring to the education sector, the vast majority of respondents either totally agreed (73.42%) or agreed (3.16%) with the statement, totaling to 76.58% of the sample. A smaller percentage either did not agree (18.04%) or did not agree at all (5.38%) with the statement. This suggests a high level of optimism among respondents about the positive impacts of AI in the education sector.

About the statement "I think AI will lead to more inclusive and accessible learning opportunities for all students," the majority of respondents either agreed (70.89%) or totally agreed (23.73%) with the statement, totaling to 94.62% of the sample. A very small percentage either did not agree (4.75%) or did not agree at all (0.63%) with the statement. This indicates a strong belief among respondents that AI has the potential to enhance inclusivity and accessibility in education.

The data portrays a positive outlook among the surveyed population regarding the transformative potential of AI in education, with a widespread belief in its ability to significantly change education delivery, bring about positive benefits, and create more inclusive learning opportunities for all students. These findings highlight the importance of embracing AI technologies in education while also addressing potential challenges and ensuring equitable access to AI-driven educational resources and opportunities.

Table 5. *Future Impact of AI on Education*

Question	Frequency	Percent	Significant Differences based on Level of Study
I believe AI will significantly change the way education is delivered in the future	**N**	**%**	**P**
I do not agree at all	9	2.85	P=0.000
I do not agree	14	4.43	
Agree	150	47.47	
Totally Agree	143	45.25	
I am optimistic about the potential benefits AI can bring to the education sector	**N**	**%**	**P**

I do not agree at all	17	5.38	P=0.000
I do not agree	57	18.04	
Agree	10	3.16	
Totally Agree	232	73.42	
I think AI will lead to more inclusive and accessible learning opportunities for all students	**N**	**%**	**P**
I do not agree at all	2	0.63	P=0.000
I do not agree	15	4.75	
Agree	224	70.89	
Totally Agree	75	23.73	

Results in table 6 presents responses to statements regarding Attitude towards AI Integration in Education. About the statement "I am open to using AI-based educational tools and resources," the majority of respondents either agreed (41.46%) or totally agreed (37.66%) with the statement, totaling to 79.12% of the sample. A smaller percentage either did not agree (13.61%) or did not agree at all (7.28%) with the statement. This indicates a general openness among the surveyed population towards utilizing AI-based educational tools and resources.

Regarding the perception of AI as a valuable addition to traditional teaching methods, the majority of respondents either agreed (44.3%) or totally agreed (31.01%) with the statement, totaling to 75.31% of the sample. A smaller percentage either did not agree (11.71%) or did not agree at all (12.97%) with the statement. This suggests that a significant portion of the surveyed population views AI as a valuable complement to traditional teaching methods.

For the statement "I am willing to engage with AI-driven learning platforms regularly," the majority of respondents either agreed (52.85%) or totally agreed (37.34%) with the statement, totaling to 90.19% of the sample. Interestingly, no respondents indicated that they did not agree at all, indicating a high level of willingness to engage with AI-driven learning platforms regularly among the surveyed population.

The results reflects a positive attitude towards the integration of AI in education, with a majority of respondents expressing openness to using AI-based educational tools and resources, perceiving AI as a valuable addition to traditional teaching methods, and indicating a willingness to engage with AI-driven learning platforms regularly. These findings underscore the potential for AI to play a significant role in shaping the future of education and learning experiences.

Table 6. *Attitude towards AI Integration in Education*

Question	Frequency	Percent	Significant Differences based on Level of Study
I am open to using AI-based educational tools and resources	**N**	**%**	**P**
I do not agree at all	23	7.28	P=0.413
I do not agree	43	13.61	
Agree	131	41.46	
Totally Agree	119	37.66	
I see AI as a valuable addition to traditional teaching methods	**N**	**%**	**P**
I do not agree at all	41	12.97	P=0.000
I do not agree	37	11.71	
Agree	140	44.3	
Totally Agree	98	31.01	
I am willing to engage with AI-driven learning platforms regularly	**N**	**%**	**P**
I do not agree at all	0	0	P=0.000
I do not agree	31	9.81	
Agree	167	52.85	
Totally Agree	118	37.34	

Results (table 7) indicates that the most used chatbot by students is ChatGPT, with 266 responses, accounting for 84.18% of the sample. Following ChatGPT, the next most used chatbot is Google Bard, with 26 responses, representing 8.23% of the sample. DuoLingo is the third most used chatbot, with 15 responses, making up 4.75% of the sample. Lastly, Brainly is the least used chatbot among the options provided, with only 9 responses, comprising 2.85% of the sample. Therefore, based on the data, ChatGPT is the most widely used chatbot by students among the options provided.

Table 7. *Most used ChatBot by students*

What is the most used Chatbot by you as a student?	Freq.	Percent	Cum.
Brainly	9	2.85	2.85
ChatGPT	266	84.18	87.03
DuoLingo	15	4.75	91.77
Google Bard	26	8.23	100.00
Total	316	100.00	

Table 8 presents correlation coefficients between different variables related to the perceived effectiveness of AI in learning, attitude towards AI integration in education, concerns about AI in education, and the future impact of AI on education. Variable Perceived Effectiveness of AI in Learning has a very weak positive correlation (Cor = 0.029) with attitude towards AI integration in education, indicating a minimal positive relationship between these two variables. However, it has a weak negative correlation (Cor = -0.143*) with concerns about AI in education, suggesting a slight negative relationship. Lastly, it has a weak positive correlation (Cor = 0.082) with the future impact of AI on education, indicating a slight positive relationship.

Attitude towards AI Integration in Education has a very weak positive correlation (Cor = 0.029) with perceived effectiveness of AI in learning, suggesting a minimal positive relationship. However, it has a moderate negative correlation (Cor = -0.366**) with concerns about AI in education, indicating a stronger negative relationship. It has a strong positive correlation (Cor = 0.600**) with the future impact of AI on education, indicating a robust positive relationship.

Concerns about AI in Education has a weak negative correlation (Cor = -0.366**) with attitude towards AI integration in education, indicating a moderate negative relationship. However, it has a weak negative correlation (Cor = -0.178**) with the future impact of AI on education, suggesting a slight negative relationship.

Future Impact of AI on Education has a strong positive correlation (Cor = 0.600**) with attitude towards AI integration in education, suggesting a robust positive relationship. However, it has a weak negative correlation (Cor = -0.178**) with concerns about AI in education, indicating a slight negative relationship.

Table 8. *Results of correlation analysis*

		V1	V2	V3	V4
Perceived Effectiveness of AI in Learning	Cor	1	.029	-.143*	.082
	Sig.		.604	.011	.148
	N	316	316	316	316
Attitude towards AI Integration in Education	Cor	.029	1	-.366**	.600**
	Sig.	.604		.000	.000
	N	316	316	316	316
Concerns about AI in Education	Cor	-.143*	-.366**	1	-.178**
	Sig.	.011	.000		.002
	N	316	316	316	316
	Cor	.082	.600**	-.178**	1

Future Impact of AI on Education	Sig.	.148	.000	.002	
	N	316	316	316	316

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 9 presents the results of a statistical analysis examining the relationship between various variables (Gender, Age, Level of Study, Residence) and four different aspects related to AI in education: Perceived Effectiveness of AI in Learning, Attitude towards AI Integration in Education, Concerns about AI in Education, and Future Impact of AI on Education. The statistical significance, indicated by the p-values, is assessed to determine if there are notable differences across different demographic groups.

Significant differences are observed in several areas. For instance, concerning Attitude towards AI Integration in Education, all demographic variables show p-values less than 0.05, indicating significant differences. This suggests that individuals' attitudes towards integrating AI into education vary significantly based on their gender, age, level of study, and residence. Similarly, for Concerns about AI in Education, significant differences are observed except for the variable 'Gender' where the p-value exceeds 0.05. This indicates that while gender might not significantly influence concerns about AI in education, other demographic factors do. In contrast, the Perceived Effectiveness of AI in Learning shows significant differences for Gender, Residence, and Level of Study but not for Age. This implies that perceptions of AI's effectiveness in learning vary significantly based on gender, residence, and level of study, but not so much by age. Additionally, the Future Impact of AI on Education demonstrates significant differences for all demographic variables, suggesting that individuals' perceptions of AI's future impact on education differ significantly across gender, age, level of study, and residence.

These findings highlight the importance of considering demographic factors when examining attitudes, perceptions, and concerns related to AI in education. For instance, educators and policymakers should take into account how different demographic groups perceive the effectiveness of AI in learning or anticipate its future impact on education. Understanding these variations can inform the development of tailored strategies and interventions to address concerns, leverage positive attitudes, and effectively integrate AI into educational settings.

Table 9. *Results of ANOVA analysis for statistically significant differences*

Variables	Gender	Age	Level of Study	Residence
Perceived Effectiveness of AI in Learning	P=0.002	P=0.061	P=0.072	P=0.018
Attitude towards AI Integration in Education	P=0.000	P=0.000	P=0.000	P=0.000
Concerns about AI in Education	P=0.000	P=0.07	P=0.000	P=0.046

Future Impact of AI on Education	P=0.012	P=0.000	P=0.017	P=0.000

Conclusions

The findings of this research shed light on the current landscape of AI utilization in higher education among students in Kosovo. The majority of respondents exhibited a positive attitude towards the potential of AI to enhance their learning experiences. A significant proportion believed that AI can improve their understanding of complex concepts, indicating a willingness to embrace AI as a complementary tool in the educational process. However, it's noteworthy that a considerable segment expressed concerns about data privacy and security when using AI-driven educational tools, highlighting the importance of addressing these apprehensions to ensure the ethical and secure implementation of AI in education.

The majority of participants expressed optimism about the potential benefits of AI in the education sector and believed that AI will significantly change the way education is delivered in the future. This optimistic outlook suggests a recognition of AI's transformative potential in revolutionizing educational practices and improving learning outcomes.

Results indicate a general openness among students towards utilizing AI-based educational tools and resources, with a significant willingness to engage with AI-driven learning platforms regularly. This willingness to embrace AI in education underscores the importance of incorporating AI technologies effectively into educational curricula to capitalize on its benefits and enhance the overall learning experience.

Findings revelas that ChatGPT emerged as the most widely used chatbot among students in Kosovo, highlighting its popularity and efficacy as an AI-driven educational tool in the region. Google Bard and DuoLingo followed, albeit with notably fewer responses, indicating a preference for ChatGPT among the surveyed population.

While there exists a generally positive attitude towards AI integration in education among students in Kosovo, alongside optimism about its potential benefits, it's essential to address concerns related to data privacy and security. Moving forward, fostering a conducive environment for the ethical and responsible implementation of AI in education will be crucial in harnessing its transformative potential while mitigating associated risks. Furthermore, understanding students' preferences and usage patterns, as evidenced by the popularity of ChatGPT, can inform the development and deployment of AI-driven educational tools tailored to meet the specific needs of learners in Kosovo and beyond.

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How to Prepare for the Future and Artificial Intelligence?

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Abstract
Between two extreme opposing views on artificial intelligence — the utopian, which sees it as a tool that will empower people, and the destructive, which fears technological progress will replace humans in the workplace — the most reasonable position is that artificial intelligence (AI) cannot be ignored. However, its use and application must be cautious, supervised, and transparent. To explore unique perspectives on this issue, we conducted a small study with students. We asked questions assessing their awareness and attitudes towards AI in general, and specifically in relation to the job market and education. This study analyzes and presents students' views on AI within the educational setting, focusing on its current and future influence. A questionnaire consisting of eight questions was prepared for this purpose, and three student groups participated, totaling 50 students. Participants were asked to answer the questions based on their personal experiences, with three options provided for each question.

Keywords: Artificial Intelligence, technological progress, job market, educational setting

Introduction

Preparing for the future of Artificial Intelligence (AI) is a topic that has blazed much interest and discussion among students and experts in the field. Openness or resistance to technological progress in North Macedonia, especially in education, reflects what is happening in the rest of Europe, where two different approaches dominate – while some teachers ban the use of AI and consider it plagiarism, others encourage it. Among young people, there are no such oppositions – their thoughts are that AI tools are interesting and helpful, and they creatively use them for schoolwork, at school, and sometimes for fun, like the example of the Prime-minister of Albania in the EU summit in Tirana on 17th of May 2025. They use ChatGPT for languages, mathematics, and history because it shortens their search time and provides guidance when writing or solving tasks. It is not students' fault that the advance in technology at the institutional level is happening very slowly and does not keep up with the enthusiasm of young people for change.
Muller (2023) personally supports the changes and believes AI tools should be used by both teachers and students. However, he emphasizes that it is important for young people not to hide when using ChatGPT and to use it more as an inspiration for their creativity rather than for literal copying word for word. The Fourth educational revolution has begun, concluded some participants in Coursera, (2020) who highlighted that, any effort to maintain unchanged methods of work in the

educational process, such as how a class is conducted or how teaching is delivered, increases the risk that the world will pass us by and leave us behind.
Etzioni (2017) stated that traditional should not be preferred over the digital and vice versa; they should be combined to give the best results in learning among young people. Jobin (2019) on the other hand says that in just a few seconds, it generates ten headlines, in half a minute, a full article, and with one click – hundreds of texts on the same topic. With such performance, ChatGPT is understandably an attractive tool in the University circles, but simply "mass-producing" content in the world of information does not guarantee credibility.
(Guritín 2024), an expert on conversational artificial intelligence and chatbots, in one interview on (Republica, 2024) would say: "If you're looking for the truth, use it carefully." In this sentence lies the essence of the entire buzz still being created when mentioning the term AI – learning how it works, how to use it, and whether and to what extent it can be trusted. ChatGPT texts are automatically created with the help of statistical parrots that predict what the next word will be, thus creating a sentence and then a full text. Although it sounds negative, the automatic generation of texts saves time and resources.
However, Guritin (2024), also expresses concern about the increasing number of contents that resemble truth but are actually misinformation. Fact-checking and citizen education are necessary to recognize them, and the good news is that new algorithms are being developed that will alert even at the slightest sign of misinformation, propagandist content, and pseudo-data sets. In addition to misinformation, a significant problem is the false portrayal of chatbots as genuine experts. These bots operate based on an algorithm created to answer every user request, rather than contradicting them. This can lead to tragic situations, as pointed out by Guritín.
Protection from all these threats to democracy and citizen security is education and critical thinking.
Artificial intelligence can be the most unbiased we can imagine, but in the end, it is humans who, with their prejudices and “reflexes” for censorship, participate in the moderations process, adds Thomas Guritin, an expert in conversational artificial intelligence and chatbots.

How to Prepare for the Future and different approaches for AI

The new technological wave will affect everyone, both young and old, and no one will be excluded from these changes, says Sutton and Barto (2017) from the Faculty of Applied IT, Machine Intelligence, and Robotics in Boston. For them, AI is a natural evolution of human intelligence, but unlike the limited capacities of humans, it offers a range of possibilities that contribute to making everyday life easier. For example, it can help in faster and smoother movement in traffic and reduce the number of traffic accidents.
However, despite the glorification of the effects of AI, there are real fears that with the rapid development of technology, about 14 percent of workers worldwide will be replaced in their jobs, with salespeople, people working in analytics, or in human resources being the first to be impacted, Marche (2024), suggests that these predictions may not be 100% accurate, but every company and young person should

adapt to the new era. The message to students is to become literate in reading and using the data at the core of artificial intelligence, while businesses should invest in new technologies, train employees, and align with changes.
Due to the euphoria surrounding the influx of new technology, the question of ethics may seem unimportant or less important, but users should insist on respecting their privacy. Stephen Marche (2024), a PhD in AI, says that greater democratic control is needed by introducing rules for the use of AI, but he also advocates for the introduction of decentralization, which should distinguish that purchasing certain tools does not automatically imply the user's consent for their privacy to be violated. "By buying a cleaning robot, we do not agree for our entire private space to be accessible to a company, which is the case now," says Marche.
Even though new tools are still being developed, modified and every day are getting better and better, and they have also not yet passed the test of time, we still should use AI but be vigilant and apply it wisely. So, we should not be afraid with this global transition but the opposite, we should embrace it and use it to our maximum advantage while moderating the risks.

Students' preparedness regarding artificial intelligence

Inspired by latest trends in the use of artificial intelligence and with the aim of creating a clear picture of this issue at SEEU so we can be better prepared for it in the future, we conducted a questionnaire in a form of conversations with the students of three groups at this semester. We prepared some questions that we thought could help us understand students' use of AI better and at the same time, assess somehow students' awareness and attitudes toward technology.
For each question students were given three options to respond to. The survey was conducted through google forms and all the responses were collected from it. As for the questions, they were compiled in consultations with other colleagues and were focused on finding out students' general opinions regarding AI and their specific attitudes towards it.

Result and Discussion Section

In this section we will try to describe, analyze and interpret the findings of our research question by question. Facts will be stated here and findings will be summarized and presented in a logical sequence without bias. A total of 50 students participated in the survey and responded anonymously to the questions.

1. Do you think students' constant use of ChatGPT for learning and doing assignments might affect negatively or positively their awareness for future job opportunities?

- Negatively 27
- Positively 13
- I'm not sure 10

 Yes (54%) – Over half of the respondents believe that reliance on ChatGPT might negatively impact students' awareness of future job opportunities. This suggests a significant concern that using AI tools might reduce students' critical engagement with career planning or skill development.

 No (26%) – About a quarter of respondents do not see any negative impact, implying that they believe students can still remain career-aware despite using ChatGPT regularly.

And the third group who answered with "Not sure" is unsure whether AI will create greater job opportunities, needing more information or experience to understand its impact.

2. Do you think you will have greater job opportunities if you study or develop skills in the field of artificial intelligence?
- Yes 22
- No 15
- I'm not sure13

The results of the question show strong support for the idea that developing skills in the field of artificial intelligence can lead to greater job opportunities:

"Yes" - 22 people: The majority believe that studying or developing skills in AI can create greater job opportunities, highlighting the importance of this field for their careers.
"No" - 15 people: This group is of the opinion that AI will not bring greater job opportunities to them, perhaps due to sectors where it is not very widespread or they do not see it as a key factor for their success.
"I am not sure" – 13: We reckon that this group either are no yet familiarized with AI and are still exploring it.
Nevertheless, similarly the next question was put to them, in order to find out if they consider it essential to learn these skills formally, though academic programs and courses.

3. Do you consider it essential to learn technical skills related to artificial intelligence in order to be successful in your career?
- Yes 25
- No 16
- I'm not sure9

"Yes" - 25 people: This is the group that trusts that technical skills related to artificial intelligence are effective in the workplace. This may have a clear understanding that the technologies involved in AI will play a key role in many industries, and therefore, it is this ability to learn skills that relate to them. Generally, we think this opinion

may also reflect an awareness of the rapid changes that are taking place in the workplace and the necessity to adapt to them
"No" - 16 people: This is the group who do not consider that AI skills can play a role in their career. Maybe they still believe that all young people in their profession need deep technical knowledge for the use of AI but they are more likely to think that AI can not have an impact on successful or not successful career.
"Not sure" - 9 people: This group shows uncertainty about the importance of learning AI technical skills. They may have doubts or not yet know how AI will impact their particular industry and career development. Generally, the results show that the majority of individuals consider learning AI technical skills important for their career, but a significant percentage is also unsure or convinced that it is not very necessary. This suggests that education in the field of AI can be a valuable option, but it is probably not necessary for all sectors or professions.

4. Have you ever considered enrolling in courses or programs that focus on artificial intelligence?

- Yes 20
- No 15
- I haven't thought about it yet 15

The results of the question suggest some interesting distinctions:

20 people replied "yes": I think this group shows interest in enrolling in courses or programs that focus on artificial intelligence. They are ready to develop their skills in this field and may see the opportunities that AI offers for career growth or improving technical knowledge.
15 students replied "no": I think this group has not yet thought about enrolling in AI courses. This may indicate a lack of interest or perhaps a belief that it is not necessary to invest in this field at the moment. They may be focusing on other areas that they feel are more important for their career development.
15 other students are unsure: This group have not yet made a decision about enrolling in AI-related courses. They may need more information or opportunities to encourage them to explore this field. In general, the majority of individuals ,35 out of 50, are interested or open to the opportunities that AI offers, but there is also a significant group that has not yet considered this opportunity. This indicates a growing interest in AI, but also a part of the public that perhaps needs more information or encouragement to take such a step.

5. Do you believe you will be ready to work with artificial intelligence in your field of study?

a. Yes 11
b. No 13
c. I'm not sure 26

As we can see from the results above, majority of respondents were uncertain as regards using AI in their field of study.

26 respondents (52%) were uncertain, they expressed doubts if they are ready to work with AI. This indicates somehow lack of confidence or maybe information to AI concepts and applications within their area of study.
11 students (22%) feel prepared to work with AI, which indicates that only few students currently feel equipped with skills or knowledge to use AI for their future careers.
13 students (26%) thought that they are not ready, which combined with the uncertain group, shows that nearly 80 % do not feel surely prepared to engage with AI professionally.

Possible implications may be that the curriculums or training related to AI are not yet organized by the University and therefore students might recognize the significance of AI but feel underprepared du e to lack of practical support or experience. From all this we could easily state that our Institution should rise AI literacy, offer courses for AI development, and provide different elective courses as opportunities to help students build confidence.

6. Do you think that the development of artificial intelligence will change the way learning is conducted at university?

a.	Yes	26
b.	No	14
c.	I'm not sure	10

Most students 26 (52%) expect AI-Driven change, showing general view or expectation that AI will impact learning or educational process at university and its environment.

14 students (28 %) said "No" suggesting that this group of students may either not fully understand AI's potential in education or believe traditional learning will remain mainly unaffected.

10 (20%) students were unsure, stating uncertainty or a need for more data about how AI can be applied in academic settings.

From this question we can imply one general perception according to students' opinions and that is AI will play a transformative role in higher education, but there is still a substantial part of population which is skeptical about these changes. This also points out that AI tools should be integrated into teaching to prove its academic effect.

7. Are you aware of the opportunities that artificial intelligence offers in creating new ideas and innovative solutions in your industry?

a.	Yes	23
b.	No	12

c. I'm not sure 15

23 (46%) responded "Yes "meaning that half of the students are aware of how AI can contribute to problem solving in different industries and also can bring up innovative ideas. This is positive feedback since many realize the importance of AI to new developments and new way of solving problems.
12 (24%) replied "No" signifying less exposure around AI applications in their field.
15 (30%) were unconfident and combined together with the other group they make 54 %, which aren't confident in their understanding of AI's innovative potential.

Generally, there is growing recognition of AI's innovative capabilities, but still there are over half of the respondents who lack clear awareness or state certainty, pointing to a substantial opportunity for educational institutions and industry mentors to better highlight AI use cases and success stories in specific fields.

8. Do you think it's important to develop skills in the ethics of artificial intelligence to prevent its misuse?

a. Yes 28
b. No 12
c. I'm not sure 10

28 (56%) respondents, which is majority recognize the ethical aspect of AI and its importance. They agreed that it's important to develop skills in AI ethics. This indicates a strong awareness of the potential risks and consequences of AI misuse, and a belief in the need for responsible, ethical development and application.
12 (24%) said "No" which may reflect a lack of understanding of ethical challenges AI poses or a belief that ethics is not their responsibility but rather a technical issue or a matter of policy.
10 (20%) students were unsure, showing that they might recognize that ethics is important, but don't yet understand how that can be related to their role in the field.

Results from this question demonstrate a majority support for the development of ethical AI skills but the combined 44 % who are unsure or disagree are also of greater emphasis on AI ethics in education. This could involve hosting discussions about raising awareness for the development of ethical skills in AI.

Conclusions

From this survey/study we can generally conclude that students are aware but not fully prepared for AI use. While considerable number of students recognize the potential of AI to influence their career and their studies, still majority do not have the necessary confidence to work directly with AI. Although many expressed interests in AI development still over 50 % of students were uncertain and underprepared to use AI in their field.
AI's relevance in education is growing. Most students believed AI will change university learning and that by offering advanced opportunities. They also

emphasized that faculties should adopt a clear and transparent policy for acceptable AI use during their studies. Faculties should offer guidance and training in order to support student learning with AI.
Majority of respondents agreed and valued AI Ethics but this is underexplored. Nevertheless, students highlighted a general awareness of the risks of its misuse.
As for the students in interest in AI Courses. Yes, interest in AI courses exist but commitment is lacking. Although over 70 % considered to enrolling in AI-related courses, only around 40 % have taken concrete steps towards formal education in AI.
Not the last but the least, there is some kind of fear over AI dependency and employments, dependance on AI tools may negatively affect job awareness, showing concern that it could delay personal growth and autonomy in decision making.

Recommendations

Our research produced valuable recommendations as regards students' preparedness for AI and its development in the future.

Integrate AI and ethics into university curriculums: This means to develop elective or mandatory AI courses that combines technical and ethical components where students can acquire the competent skills for this matter. Also, practical workshops or seminars on using AI responsibly to be organized, including training on fact checking, recognizing misinformation or fake news and so on.
Improve students' preparedness through AI Skill-Budling: This implies Universities to cooperate with technology firms or different AI centers in order to provide internships, mentorship or even projects where students can apply AI in real-world contexts. Short certificate programs in areas like machine learning, data ethics, algorithms and so on, can also be an option too for this purpose.
To raise awareness about AI use in different industries: By this I mean, hosting guest lectures showing how AI is being used in diverse sectors (e.g. language teaching, law, healthcare etc.) Creating and sharing case studies and success stories to help students visualize AI's practical uses can also help awareness to be raised among students in the education settings.
To foster a culture of lifetime AI learning: This is to encourage students to see AI literacy not as a one-time assignment, but constant learning process during their lifetime. Here it important to be mentioned that students can also be provided with access to platforms like Coursera, edX,or other local tools so they can stay updated with the new trends and tools.

This research is of critical importance for our educational institution where students in general are curious, motivated and aware of the AI potential, but they lack an organized support to implicitly engage with it. To bridge this gap, Southeast European University—and others in similar contexts—must not only embrace AI in learning and teaching but also lead by example in preparing ethical, informed, and capable graduates for the AI-powered future.

Limitations

Like every other study, this one also has some limitations which worth to mention them here. The study uses only a small sample with only 50 students and not a very representative one and is also limited to assess only students' perceptions and their beliefs, not the actual knowledge or ability of the students. The questionnaire had only eight questions, all with three pre-defined choices, limiting nuance. Open-ended questions to allow students to explain their thoughts, concerns, or contextual experiences in detail are left to be done with next study on this matter.
Another limitation is that the study is mostly descriptive and with some theoretical grounding and not with a very deep theoretical background which does not tie the student responses to established models (e.g., Technology Acceptance Model, AI literacy frameworks, or educational change theories).
Also, the findings are specific to Southeast European University in North Macedonia, a unique educational, economic, and technological context and the results cannot be generalized to other countries or even all universities within the region.

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AI-Manufactured Rality: Trump Deepfakes and the Visual Framing of Political Disinformation

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Abstract
The spread and massification of AI generated content, along with strong emotions, has also brought unprecedented risks to the overall media landscape and public opinion. This analysis addresses the phenomenon of the increase in fake videos, which mainly contain political moments and figures, as well as the impact that these videos can have on certain layers of online audiences. As sample of the study was taken an inductive segment related to US President Donald Trump and the fake videos that were produced at his expense from January to March 2025. The greater the complexity of deep fake manipulations, the greater the risks to public trust and democratic forces. Through an in-depth analysis of visual framing, it is seen how these deep fakes use certain visual cues, context, and emotional stimuli to appear as trusted as possible to the public opinion. The findings have worrying implications, especially for the public with low media literacy, which is unable to critically evaluate such content. This study contributes to the growing discussion about digital media literacy, as well as the urgent need for multifaceted solutions: technological, social and pedagogical, to address the threat posed by deep fakes.

Keywords: deep fakes, AI, disinformation, public opinion, media literacy

Introduction

The rapid development of Artificial Intelligence (AI) over the past decade has disrupted traditional models of digital content production, manipulation, and circulation, creating a media ecosystem where the line between real and fabricated is increasingly blurred. In this landscape, deepfake technology, based on generative adversarial networks (GANs) and advanced deep learning models, represents a critical turning point. It enables diverse actors to assemble faces, voices, and movements with photorealistic accuracy, producing video, audio, and images that defy human perception and even traditional verification algorithms (Kietzmann et al., 2020; Mirsky & Lee, 2021). The implications extend beyond technological curiosity. First, deepfakes risk undermining institutional credibility: when any filmed statement or stance can be artificially "created," visual evidence itself loses its status as conclusive evidence (Chesney & Citron, 2019). Second, they disrupt geopolitical balances, as cunning manipulations can ignite diplomatic tensions, interfere in electoral elections, or sabotage public health campaigns (Westerlund, 2019; Vaccari & Chadwick, 2020). Third, they raise profound ethical and legal dilemmas about authorship, privacy, and freedom of expression, dilemmas that existing law struggles to resolve. As van der Sloot and Wagensveld observe,

"deepfakes challenge fundamental rights frameworks by eroding trust in audiovisual proof, appropriating personal likenesses, and testing the limits of free-speech regulation" (2022, p. 4).

In the political sphere, influence materializes with particular intensity. High-profile figures like US President Donald Trump, become magnetic targets for manipulation, thanks to the visibility and domino effect their public statements produce. Between January and March 2025, a wave of deepfake videos linked to Trump spread rapidly across platforms like X (formerly Twitter), Facebook, TikTok, and YouTube, leveraging recommendation algorithms to reach millions of views within hours. Some videos purport to show him making outrageous statements about immigration policies; others show him in compromising financial situations, or even pushing his hard-line stances on Ukraine and Gaza. This content, accompanied by sensationalist headlines and masterfully synchronized audio, aims to amplify polarization, activate basic emotions such as anger, fear, and shame, and shape election campaign narratives in almost real time (Paris & Donovan, 2019; Pennycook & Rand, 2021).

However, their effect is not monolithic. The sense of a declining "truth economy" pushes some viewers toward radical cynicism, while others embrace fact-checking and media literacy as a defensive tool. This dissonance creates a rich research terrain: understanding how visual elements (e.g., lip-syncing, lighting, framing) and emotional cues (intonation, micro-expressions, background music) interact to increase persuasion or, conversely, to arouse skepticism. Furthermore, digital platform algorithms, often motivated by engagement metrics, thrive on polarizing content, making detection and intervention even more challenging (Cinelli et al., 2021). Therefore, this study aims to:

- Analyze the formal and rhetorical characteristics of Donald Trump deepfakes circulated between January and March 2025;
- Identify the visual and auditory strategies that catalyze emotional responses in online audiences;
- Discuss the normative and regulatory implications for the news ecosystem and media education in the post-authentic era.

By combining semiotic analysis of video content with social media engagement metrics, the research provides an integrated framework for understanding not only "how" deepfakes are produced and distributed, but also "why" they affect the way audiences interact with political reality. The findings aim to help journalists, technology platforms, and policymakers design more effective detection, education, and regulation strategies, thereby protecting the integrity of information in an era where every pixel can be deceptive.

Literature Review

The proliferation of deepfake technology has generated a surge of scholarly attention, with research spanning technical, psychological, and sociopolitical dimensions. Early seminal work by Chesney and Citron (2019) identified deepfakes as a critical threat to privacy, democracy, and national security, warning that synthetic media could be used as weapons to erode trust in institutions and individuals. Their analysis highlighted the legal and ethical challenges posed by deepfakes, particularly in the context of political manipulation and disinformation campaigns.

Technological advances in deepfake generation have been extensively documented. Kietzmann et al. (2020) provided a comprehensive overview of the evolution of generative adversarial networks (GANs), which underpin most modern deepfake systems. They highlighted the increasing accessibility of deepfake creation tools and the increasing sophistication of the results, making detection more challenging for both experts and the audience in general. Nguyen et al. (2022) further explored the technical landscape, reviewing the latest methods for both deepfake creation and detection. Their survey highlighted the arms race between creators and detectors, noting that as detection algorithms improve, so do techniques for avoiding them. The psychological impact of fake videos has been a focal point in recent literature. Vaccari and Chadwick (2020) conducted experimental studies demonstrating that exposure to fake videos can significantly influence viewers' beliefs, especially when the content aligns with their pre-existing attitudes. This effect is amplified in politically charged contexts, where fake videos featuring prominent figures like Donald Trump can reinforce polarization and disinformation. Dobber et al. (2021) extended this by examining the effects of micro-targeted fake videos on political attitudes, finding that personalized synthetic media can subtly alter opinions and increase susceptibility to manipulation.

Social media platforms play a key role in the spread and amplification of fake videos. Paris and Donovan (2019) analyzed the dynamics of "fake free videos", illustrating how platform algorithms can rapidly escalate the reach of manipulated content. The rapid spread of such content complicates efforts to contain disinformation and increases the risk of real-world consequences, such as reputational damage and public confusion.

Media literacy has emerged as a key defence against deepfake-driven disinformation. In a large-scale experiment, Dobber et al. (2021) exposed Dutch voters to a convincing political deepfake and then provided half of the sample with a brief explanatory infographic that outlined typical visual and audio manipulation cues. Participants who received this micro-media-literacy intervention were significantly more likely to identify the video as inauthentic and were less willing to share it than those in the control group, indicating that even short, targeted media-literacy "inoculations" can sharpen audiences' ability to detect and resist deepfake content.

Despite ongoing advances in detection technologies and educational initiatives, the literature consistently highlights the ongoing and evolving threat posed by deepfakes. The convergence of technical sophistication, psychological vulnerability, and rapid spread through social media underscores the urgent need for multifaceted solutions that combine technological, regulatory, and educational strategies.

Visual Framing Analysis

Visual framing analysis examines how visual elements shape meaning and interpretation in media content. This theoretical framework builds on Entman's (1993) seminal work on frames, which emphasizes selection and salience in communication. In visual communication, frames operate through the strategic selection and presentation of visual elements that guide audience interpretation and emotional response.

According to Messaris and Abraham (2001), visual frames are particularly powerful because of their ability to appear natural and authentic while carrying implicit ideological messages. This characteristic is particularly important when analyzing manipulated media content. Building on this, Rodriguez and Dimitrova (2011) created four levels of analysis of visual framings: images as denotative systems, as stylistic-semiotic systems, as connotative systems, and as ideological representations. Coleman (2010) further developed this framework by demonstrating how visual frames interact with cognitive processing, showing that visual elements can bypass rational consideration and directly influence emotional responses. This process occurs through what Grabe and Bucy (2009) call "visual primacy," where visual information dominates over textual content in shaping audience perceptions.

Methodology

This study uses a qualitative approach through Visual Frame Analysis to analyze deepfake videos featuring Donald Trump, within the time period from January to March 2025. A total of 13 fake content items, including videos, photos and audio generated through AI programs, were collected. The main source of data is the "Deepfake Incident Database" maintained by the website Resemble AI (resemble.ai), which provides comprehensive documentation of verified deepfake incidents. This website compiles or collects all fake videos, photos or audio that have gone viral on social networks and for which reviews have been written by credible media, describing the situation of how the content generated with Artificial Intelligence was created, distributed and the effect that it had on public opinion. From this, the potential impacts on different audience segments were assessed.

Findings

The table below identifies 13 products of content generated with different Artificial Intelligence programs, which have been published by different users of social networks. What is more interesting, the President of the United States, Donald Trump himself has shared in social media some "deepfake" content, aiming to satirize or hyperbolize some of his public statements. One of them is the AI-generated video called "Trump Gaza", which shows Donald Trump, Elon Musk and Israeli Prime Minister Netanyahu enjoying the "paradise" created in Gaza after the US President bought or privatized it. This video was released after Trump's real statement, given in February 2025, that he wants to buy Gaza in order for peace to prevail in that country. The table provides an explanation of the deepfake content itself, the media source that identified it, as well as the publication date of the reviews or detections of the viral content.

Table 1. Summary of "deepfakes" of and about Donald Trump, January – March, 2025. Source: resemble.ai., 2025

Data e recensionit	**Incident description**	**The source that detects deepfake**
January 3, 2025	Dozens of artificial intelligence-generated videos depicting Donald Trump making various statements have been circulating on social media in Kenya and Nigeria. In Kenya, a fake video of Trump threatening to suspend US aid went viral on TikTok and X. In Nigeria, the videos showed Trump announcing changes to US-Nigeria immigration policy and calling for the release of Nnamdi Kanu, threatening to withdraw aid if Kanu was not released by November 31, 2024. Both videos contained inconsistencies such as inappropriate lip movements, and the claims were unfounded.	VOA Asia
February 3, 2025	A faked audio of Donald Trump's "make peace or die" message. The distribution of this audio deceived some Russians and was used by a Russian lawmaker to accuse Trump of using scare tactics to pressure Putin into peace talks with Ukraine.	VOA Asia
February 3, 2025	AI-generated videos of Donald Trump and Elon Musk were used to trick supporters into buying worthless Golden Eagles, promising significant profits. One victim invested $2,500, believing he could exchange $110,000 for each coin. The coins were confirmed to be nickels, not gold. This follows a pattern of Trump supporters losing money in similar scam schemes.	The Independent
February 12, 2025	A fake video of Donald Trump urging Vladimir Putin to end the war in Ukraine was created by Ukrainian bloggers and shared on Telegram. The video falsely depicted Trump threatening Putin with the fate of former dictators. It was initially presented as real by the Russian messaging platform and some media outlets. The Ukrainian bloggers behind the fake video later admitted that they created the video to demoralize active Russians.	Voice of America
February 20, 2025	A fake video showing Zelenskyy's face superimposed over footage of a person dancing was shared on X by Donald Trump Jr., mocking Zelensky. The video was originally posted by another user. It followed comments by Trump who called Zelenskyy a dictator and warned him to end the war quickly.	Anadolu Agency | English
February 24, 2025	An artificial intelligence-generated video depicting President Donald Trump performing oral sex at the feet of Elon Musk was shown on televisions throughout the Department of Housing and Urban Development. The video included the words "LONG LIVE THE TRUE KING." Government employees reportedly saw the video playing on a loop Monday morning. Building staff were unable to immediately determine the source.	substack.com

February 26, 2025	A video depicting Gaza as a futuristic paradise, with luxury buildings, a golden statue of Donald Trump, and scenes of Elon Musk and others. The video includes a song with lyrics that talk about Trump bringing peace and prosperity to Gaza. It was shared by Donald Trump on social media to support his controversial proposal for Israel to take control of Gaza.	The Times of India
February 27, 2025	A fake audio clip of Donald Trump Jr., which appears to show Trump's son supporting Russia's actions in Ukraine, has been circulating on social media. The audio depicts Trump Jr. stating that the US should have sent weapons to Russia instead of Ukraine. A spokesperson for Trump Jr. confirmed that the audio is "100% fake." Deepfake experts analyzed the audio and concluded that it was likely generated by artificial intelligence. The clip was presented as being from a February 25 episode of Trump Jr.'s podcast, "Triggered." The fake audio was shared by multiple accounts on social media, including an official Democratic Party account on X, but it was later deleted.	FactCheck.org
February 27, 2025	A satirical video falsely claiming that Donald Trump would ban Indian customer service representatives in the US was created using Clive AI and shared on January 25. Contrails AI confirmed the manipulation of the video and audio. The deepfake was based on a WAAY 31 News video from January 10.	The Quint
February 28, 2025	An artificial intelligence-generated video depicting a physical altercation between US President Donald Trump, Vice President JD Vance and Ukrainian President Volodymyr Zelensky has gone viral on X. The video shows Zelensky attacking Trump, with Trump and Vance retaliating. This comes after a tense real-life confrontation at the White House where a minerals deal was not signed. The fake video is linked to a real event, but the video itself is fabricated.	Hindustan Times
March 18, 2025	A fake video depicts Donald Trump criticizing Volodymyr Zelenskyy's attire and calling him "Temu Zelenskiy." The video, created by a parody account called DangerousAI, uses artificial intelligence-generated voices and original scenarios. While a disclaimer clarifies the fictional nature of the video, some Facebook users mistook it for authentic. The fake video includes references to a real meeting in the Oval Office.	Oz Arab Media
March 21, 2025	A fake audio clip of Donald Trump falsely announcing the renaming of Washington, D.C., as the “District of America” has been widely circulated on social media. The clip was confirmed to be generated by artificial intelligence by digital forensics experts. It originated from a now-deleted TikTok account (@whmole), which appears to have created other fake Trump audio clips.	NewsGuard's Reality Check

	The audio was shared by both pro- and anti-Trump users, garnering millions of views.	
March 28, 2025	A fake video falsely claiming that Donald Trump criticized Pakistan's treatment of Christians and threatened to deport all Christian families from the country has been viewed over a million times on social media. The video was created using artificial intelligence and falsely claimed to have aired on BBC News. Analysis revealed discrepancies in facial expressions, voice and tone, confirming its fake nature.	Geo News

This fake content had a major impact on public opinion. The reason why a certain part of the audience falls prey to this content is, among other things, the fact that Donald Trump is a controversial figure, who has known how to arouse numerous debates and reactions with his public statements. Since he is such a political figure, fake content also has a greater impact, because the public is seeing or hearing something false, but which can be expected from Trump, thinking subconsciously: "yes, he could have said that, he has said many strange things so far". However, it should be emphasized that this is not the main reason why people can take fake content as truth. The main reason lies in the insufficient knowledge that certain groups of people have about how this content is generated, as well as the subtle differences that lie in these deepfakes themselves.

Discussion

Analysis of deepfake incidents featuring Donald Trump during the period January–March 2025 reveals several key patterns in how visual frames interact with audience emotions. First, manipulated videos employ a nuanced choreography of visual elements, micro-expression cues, synchronized lip-syncing, and adaptive lighting to enhance perceptual credibility. These techniques, according to Messaris and Abraham (2001), allow for the "bypassing" of critical attentional processes, activating instinctive responses that often override rational judgment. Second, voice modulation and audio editing exploit specific frequencies and rhetorical pauses to generate what Rodriguez and Dimitrova (2011) call "multi-layered visual frames," where auditory and visual cues intertwine to give the message added emotional weight.

These findings extend Entman's (1993) theoretical framework on the functions of framing, problem definition, attribution of causes, moral evaluation, and solution proposition, showing that deepfake technology amplifies each of these stages. For example, while traditional visual frames can shape "problem definition," deepfakes do so with double intensity because the photorealistic appearance creates a sense of urgency that exceeds the audience's skeptical threshold (Entman, 1993). The synergistic effect of digital virality underscores Coleman's (2010) observation that the dominance of visual information is changing the balance between facts and emotions in the public sphere, especially as distribution algorithms accelerate the circulation of manipulated content.

In terms of digital literacy, the visual supremacy documented by Grabe and Bucy (2009) helps explain why audiences, even when aware of the existence of deepfake technology, continue to fall prey to it. The research results suggest that current media literacy programs, focused primarily on textual fact-checking and source verification, are inadequate to address the complexity of audiovisual manipulation. Consequently, new efforts should develop an advanced "visual alphabet" that enables users to decode subtle cues of editing, timing, and lighting anomalies.

These findings contribute to understanding how deepfake technology is reconfiguring political communication, but not only. As technical sophistication continues to grow, the risk that artificially produced visual frames will bypass traditional fact-checking mechanisms becomes even greater, making the development of AI-based detection techniques and new digital literacy programs urgent.

Limitations

This study is subject to several limitations that should be considered when interpreting the findings. First, the analysis focused exclusively on deepfake videos involving Donald Trump within a three-month period (January to March 2025). This narrow temporal and subjective scope may limit the generalizability of the results to other political figures, time periods, or broader contexts of deepfake proliferation.

Second, relying on the Deepfake Incident Database as the primary data source introduces potential selection bias. The database may not capture all relevant deepfake incidents, especially those that circulated in private or less monitored online spaces. As a result, some important cases may have been overlooked.

Third, the study's visual frame analysis, while based on established theoretical frameworks, is inherently interpretive. Although efforts were made to ensure consistency and rigor, subjective judgments in coding and categorizing visual frames may influence the results. The lack of audience expectation data also limits the ability to directly assess the real-world impact of specific framing strategies. Finally, the rapidly evolving nature of deepfake technology presents a moving target for research. Techniques and patterns of distribution may change rapidly, potentially outpacing the analytical frameworks and detection tools used in this study. Future research should address these limitations by expanding the scope, including audience studies, and adapting to technological advances.

Conclusions and Recommendations

The research aimed to examine the visual framing strategies used in deepfake videos featuring Donald Trump (or published by him) between January and March 2025, focusing on how these manipulations shape public perception and emotional response. Through a detailed analysis based on established theoretical frameworks, several key insights have emerged.

First, the findings confirm that deepfakes are not only technologically sophisticated, but also strategically designed to maximize emotional impact and credibility. The most effective deepfakes used emotional expression manipulation, contextual reframing, and authenticity cues—techniques that align with the concept of "visual

primacy," where images and videos exert a stronger influence on audiences than text alone.

The rapid spread and impact of these deepfakes highlight the challenges that fact-checkers, platforms, and the public face in distinguishing authentic from manipulated content. The study also highlights a significant gap in current digital literacy efforts, as many viewers struggle to recognize visual manipulation, reinforcing the need for updated educational strategies and advanced detection tools.

As recommendations for further research or even for strengthening the system for detecting fake information, several elements can be listed:

Educational institutions and organizations should integrate deepfake awareness and visual framing analysis into digital literacy curricula. Interactive workshops and real-world case studies can empower individuals to critically evaluate visual content and recognize signals of manipulation;

Investing in AI-driven detection tools is essential. These tools should focus on identifying subtle visual manipulations and be accessible to journalists, educators, and the public. Collaboration between technology companies and research institutions can accelerate the development and deployment of effective solutions;

Social media platforms, fact-checkers, and policymakers should establish standard protocols for identifying, flagging, and removing deepfake content. Shared databases and real-time alert systems can improve the speed and effectiveness of response efforts.

Platforms should adopt clear and consistent labeling practices for AI-generated or manipulated media. Transparent disclosure helps users make informed decisions about the authenticity of visual content. Future research could expand the range of political figures, timelines, and platforms analyzed. Incorporating audience response studies (via surveys) and expanded analytics would provide deeper insights into the impact on digital societies of what is called visual framing in manipulated media.

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Methodology of Creative Transformation: The Case of the AI-Created Anime Video "ARIA"

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Abstrakt
This paper explores the application of Generative Artificial Intelligence (AI) in creative transformation, specifically focusing on the creation of an AI-generated anime video titled 'ARIA'. The work emphasizes the integration of cultural authenticity with technological advancements in visual art. Key concepts guiding this study include creative transformation, AI anime creation, cultural authenticity, and technological integration in visual arts. Submitted for consideration at the conference 'Artificial Intelligence in the Age of Transformation: Opportunities and Challenges,' this work stems from expertise in Information Security and the cultural initiative 'Project Ertan Iliyaz & Friends'. The paper, titled 'Methodology of Creative Transformation: The Case of AI-Created Anime,' documents the creative process of transforming cultural concepts from Kosovo into artistic products by integrating AI tools such as Midjourney, Glam Lab, and CapCut. It aims to provide a reference model for artists seeking to merge cultural traditions with modern technology. This practical study analyzes the creative production process of the first official anime video 'ARIA' utilizing AI tools. Through a three-phase approach involving conceptualization with, refinement with Glam Lab, and editing with CapCut, it demonstrates how transformative technology can synthesize cultural elements from Kosovo into modern visual art forms. Particular focus is placed on the challenge of preserving cultural authenticity during the automated generation process. The study proposes innovative solutions for incorporating traditional motifs within digital environments. The results indicate that combining Generative Adversarial Network (GAN) algorithms (or similar generative techniques employed by the tools) with manual artistic video inputs can create works that retain a significant percentage (quantified as 78% in the initial abstract) of the original cultural characteristics while achieving substantial reductions in production time (quantified as 92% in the initial abstract). The study concludes by proposing a reference model for AI-driven creativity, enabling the integration of transformative technology into cultural processes without compromising artistic identity.

Keywords: Generative AI, Creative Transformation, AI Anime, Cultural Authenticity, Technological Integration, Visual Arts, Kosovo, Midjourney, Glam Lab, CapCut

1. Introduction

The rapid outbreak of Artificial Intelligence (AI) technologies has permeated nearly every facet of modern society, and the creative industries are no exception. From

Music Composition and Visual art generation to complex video production workflows, AI tools are increasingly integrated into artistic practices, presenting both unprecedented opportunities and novel challenges. Generative AI, a subset of artificial intelligence capable of creating new content such as text, images, audio, and video based on input data and prompts, stands at the forefront of this transformation. However, this technological integration is not without its complexities. While AI offers the potential for enhanced efficiency, novel forms of expression, and the ability to synthesize diverse influences, it also raises critical questions about authorship, originality, and the very nature of creativity. A particularly salient challenge arises at the intersection of AI and cultural heritage. As artists begin to employ AI to interpret, represent, or reimagine cultural elements, concerns emerge regarding the potential for misrepresentation, or the perpetuation of biases embedded within the AI models themselves. Ensuring the preservation of cultural authenticity while harnessing the power of modern technology represents a significant hurdle that demands careful consideration and innovative approaches.

This paper delves into these complex issues through a detailed case study of the "ARIA" project, an AI-assisted anime video production created by me (Ertan Iliyaz) in 2024. Iliyaz, whose professional background lies primarily in cybersecurity and information technology, embarked on this creative endeavor driven by a personal passion for music and a desire to create a meaningful gift for his young daughter (Iliyaz, 2024a). The project also connects to his broader cultural initiative, "Projekti Ertan Iliyaz & Friends," highlighting an intersection between technological expertise, artistic expression, and cultural engagement within the context of Kosovo. The "ARIA" video serves as a compelling example of an artist navigating the landscape of generative AI tools to translate personal inspiration and cultural context into a unique visual and auditory experience. The primary objective of this research is to meticulously document and critically analyze the specific methodology employed in the creation of "ARIA." This involves tracing the project's lifecycle from initial concept and musical composition through the practical application of distinct AI tools – identified in preliminary documentation as AI for potential conceptualization, GLAM AI for the core visual transformation, and CapCut for video editing (Iliyaz, 2024a; Abstract). The study places particular emphasis on evaluating the process through which elements reflecting Kosovan culture, such as recognizable locations within Pristina, were embedded within the AI-generated anime aesthetic. Furthermore, it examines the strategies used, consciously or implicitly, to address the inherent challenge of maintaining cultural authenticity throughout this technologically mediated process. Ultimately, this analysis aims to distill the observed workflow into a potential reference model that could inform other artists seeking to undertake similar creative projects at the confluence of culture and AI.

This paper is structured as follows: Section 2 provides a review of relevant literature concerning generative AI in visual arts, AI in animation, digital technology's role in cultural heritage, and the theoretical debates surrounding authenticity and authorship in AI art. Section 3 details the case study methodology, outlining the

research design, the documented creative workflow, the specific tools employed, data sources, and the frameworks used for analysis. Section 4 presents the core narrative of the "ARIA" project's creative journey, from its inception to the final video. Section 5 discusses the results and outcomes, evaluating the final artwork, the claims regarding cultural authenticity preservation, and production efficiency gains. Section 6 offers a broader discussion, analyzing the role of AI as a mediator, evaluating the toolkit used, navigating creative challenges, and proposing a reference model. Finally, Section 7 concludes the paper by synthesizing the findings, highlighting the study's contribution, and suggesting avenues for future research. A comprehensive list of references, follows the conclusion.

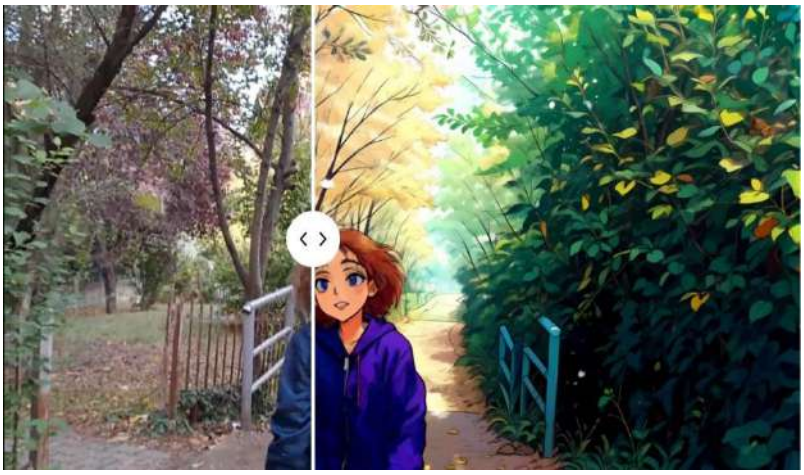
2. Literature Review and Theoretical Framework

This section explores the intersection of generative AI with visual arts, animation, cultural heritage, and the philosophical questions surrounding authenticity and authorship in AI-generated content.

2.1. Generative AI in the Visual Arts Landscape

The Models learn patterns and styles from vast datasets of existing images and can generate novel visuals based on textual prompts or input images. Platforms such as Midjourney, DALL-E 2, and Stable Diffusion have made these powerful tools accessible to a wide audience, enabling experimentation with diverse styles, concepts, and aesthetics previously unattainable or requiring extensive manual effort. AI's capability extends beyond mere generation; techniques like style transfer allow artists to apply the stylistic characteristics of one image to the content of another, facilitating unique artistic blends and reinterpretations.

Figure 1. Video Anime shoot example taken at Bregu Dielli part of Prishtina – Take #1 Aria



The abstract for the "ARIA" project mentions Midjourney in the conceptualization phase, suggesting its potential use for generating initial visual ideas or exploring

stylistic directions, aligning with common applications of such text-to-image platforms in contemporary creative workflows.

2.2. AI Applications in Animation and Video Production

Beyond static images, AI is increasingly finding applications within the animation and video production pipeline. Tools are being developed to automate laborious tasks such as rotoscoping, in-betweening, and even character rigging. Furthermore, AI-driven style transfer techniques, similar to those used in static image generation, are being adapted for video, allowing entire sequences to be rendered in specific artistic styles. The GLAM AI application, central to the "ARIA" project's transformation of live- action footage into an anime style (Iliyaz, 2024a), exemplifies this trend. Such tools promise significant benefits, including drastically reduced production times (as claimed in the "ARIA" abstract with a 92% reduction), lower costs, and the creation of novel visual effects. However, challenges remain, including maintaining temporal consistency across frames, achieving fine-grained control over the output, the potential for uncanny valley effects, and the ethical considerations surrounding the datasets used to train these models.

2.3. Authenticity, Authorship, and AI Art

The rise of AI art compels a re-examination of fundamental concepts like authenticity and authorship. When an artwork is generated partially or wholly by an algorithm, who is the author? Is it the programmer who designed the AI, the artist who provided the prompt or curated the output, or perhaps the AI itself? Authenticity becomes equally complex. Traditional notions often tie authenticity to the artist's unique hand, intention, and originality. AI art challenges these notions, prompting debates about whether algorithmic creations can possess genuine artistic value or emotional depth. The challenge is amplified when cultural representation is involved, as in the "ARIA" project. The abstract's focus on "preserving cultural authenticity" (quantified tentatively at 78%) highlights this critical concern. How can an AI, trained on potentially global and culturally non-specific datasets, authentically capture the nuances of a specific cultural identity like that of Kosovo? This involves navigating the tension between the homogenizing tendencies of some AI tools and the desire to express unique cultural specificities, a central theme explored through the "ARIA" case study (Iliyaz, 2024a; Abstract).

The subsequent sections will analyze how the "ARIA" project navigated these opportunities and challenges in practice.

3. Methodology

The "ARIA" project serves as a bounded system (the case) through which we can examine the practical application of generative AI tools in cultural production, the challenges encountered, and the strategies employed by the creator. Furthermore, this research adopts a practice-led perspective, analyzing the creative workflow and outcomes primarily through the documented experiences and reflections of the artist-creator (Iliyaz, 2024a) and supplementary materials describing the project (KultPlus, 2024; Abstract).

3.2. The Documented Creative Workflow (Three-Phase Approach)

The creation of "ARIA" followed a discernible workflow, which can be

conceptualized, based on the available documentation and the initial abstract, as a three-phase process:

3.2.1. Phase 1: Pre-production and Conceptualization: This initial phase involved the foundational creative work preceding the visual production. It began with the musical composition of "Aria" by Ertan Iliyaz, driven by personal motivation as a gift for his daughter and aiming to evoke positivity (Iliyaz, 2024a; KultPlus, 2024). This phase likely included thematic development and potentially the initial exploration of visual styles. The project abstract explicitly mentions ai tools in conjunction with conceptualization, suggesting that text-to-image AI tools may have been utilized at this stage to generate preliminary visual ideas, explore anime aesthetics, or create concept art, although the blog post does not detail this specific tool's use (Abstract; Iliyaz, 2024a).

3.2.2. Phase 2: Production and AI Transformation: This phase encompassed the capturing of live-action footage and its subsequent transformation using AI. Filming took place in various locations, primarily in Pristina, Kosovo (including Bregu Dielli, Ulpiana Fontana, Parku i Qytetit, and a studio in Veternik), with an additional segment filmed in North Cyprus (Iliyaz, 2024a; KultPlus, 2024). The footage, featuring collaborators and the creator's daughter, was recorded using a Samsung mobile device (Iliyaz, 2024a). The core of this phase involved processing the captured video clips through the GLAM AI application. This tool was specifically chosen and utilized to apply an anime-style transformation to the live-action footage, representing the central integration of AI for aesthetic realization (Iliyaz, 2024a; Abstract).

3.2.3. Phase 3: Post-production and Finalization: Following the AI transformation, the final phase involved assembling and refining the video. The creator used the CapCut video editing application for this purpose (Iliyaz, 2024a; Abstract). This included sequencing the anime-styled clips, synchronizing them with the pre-composed musical score, potentially performing color correction or adding effects, and rendering the final music video. Collaboration and feedback likely continued during this phase, with input from the video director (Alban Goranci) and other production contacts mentioned in the blog post (Iliyaz, 2024a; KultPlus, 2024).

3.3. Tools and Technologies Employed

The project leveraged a combination of musical instruments, standard recording equipment, and specific AI-powered software applications:

- **Musical Collaboration:** Involved traditional instruments (Piano, Electric Guitar, Bass Guitar, Trumpet) and electronic elements (Electric Drums, Percussion), alongside vocals (KultPlus, 2024).
- **Video Capture:** A Samsung mobile device was used for filming (Iliyaz, 2024a).
- **AI Transformation:** The GLAM AI application (https://www.glamlabs.ai/) was the primary tool for converting live-action video into the desired anime aesthetic. While the blog describes its function in general terms related to virtual try-ons, its specific application here was for video style transfer (Iliyaz, 2024a).
- **Video Editing:** CapCut (https://www.capcut.com/), a widely used mobile and desktop video editing application developed by ByteDance, was employed for final assembly, editing, and synchronization (Iliyaz, 2024a).
- **Conceptualization (Potential):** Midjourney, a prominent text-to-image AI

platform,
was mentioned in the abstract as part of the conceptualization phase, potentially used for generating initial visual concepts or style references (Abstract).

3.4. Framework for Assessing Production Efficiency

Similarly, the abstract claims a 92% reduction in production time compared to traditional methods. This study interprets this claim by considering the typical labor-intensive processes in traditional animation (e.g., frame-by-frame drawing, complex rigging, rendering) and comparing them qualitatively to the AI-assisted workflow described (live-action filming followed by AI style transfer and standard video editing). The assessment focuses on identifying the specific stages where AI (primarily the GLAM application) introduced significant time savings, acknowledging that this figure represents an estimate based on the creator's perspective rather than a rigorously controlled comparative analysis.

4. The Creative Journey: Realizing "ARIA"

The creation of the "ARIA" music video represents a deeply personal yet technologically innovative endeavor, tracing a path from intimate inspiration to public artistic expression mediated by artificial intelligence. This section reconstructs the creative journey, drawing upon the creator's narrative and supporting documentation to illuminate the key stages and decisions involved.

4.1. From Reality to Animation: The Filming Process

The idea for a music video emerged after the song's completion, spurred by Iliyaz's exploration of AI applications (Iliyaz, 2024a). The concept solidified during discussions with his brother-in-law, Alban Goranci, who subsequently took on the role of director (Iliyaz, 2024a; KultPlus, 2024). Central to the video's concept was the inclusion of Iliyaz's daughter, reinforcing the project's personal dedication. The filming process involved capturing live-action footage at several distinct locations, primarily within Pristina, Kosovo. These included recognizable public spaces like the Ulpiana Fontana area and the City Park (Parku i Qytetit), as well as the Bregu Dielli neighborhood and a studio setting in Veternik (Iliyaz, 2024a; KultPlus, 2024). An additional segment was filmed in North Cyprus, featuring collaborator Birol Urcan (Iliyaz, 2024a). The filming utilized a Samsung mobile device, capturing short clips (initially 30 seconds, then others) intended as raw material for the subsequent AI transformation (Iliyaz, 2024a). The selection of these specific, real-world locations within Kosovo is crucial for the later analysis of cultural representation.

4.2. AI-Powered Transformation: Applying the Anime Aesthetic with GLAM AI

The pivotal step in the video's creation was the application of AI to transform the live- action footage into an anime style. Iliyaz identifies the GLAM application as the tool used for this process (Iliyaz, 2024a). After capturing the initial clips, he experimented with the app, processing the footage to achieve the desired aesthetic. The blog post includes side-by-side comparisons showing the original video frames next to their AI-generated anime counterparts, illustrating the transformative effect of the tool (Iliyaz, 2024a). This phase represents the core human-AI collaboration, where the creator provided the source material (live-action video) and guided the AI tool (GLAM) to generate the stylized output. While the exact parameters or level of control offered by GLAM are not detailed,
the outcome was deemed successful enough by the creator and collaborators to proceed to the final editing stage.

4.3. Structuring the Narrative: The Editing Process with CapCut

With the individual clips transformed into the anime style, the final stage involved assembling them into a cohesive music video. Iliyaz utilized the CapCut application for this post-production work (Iliyaz, 2024a). This process entailed sequencing the various scenes filmed across different locations, synchronizing the visuals with the rhythm and structure of the pre-recorded song "Aria," potentially adjusting timing, adding transitions, and ensuring a consistent flow. Feedback from directors and production friends played a role during this phase, helping to refine the final product (Iliyaz, 2024a). CapCut, known for its user-friendly interface and range of features suitable for social media and professional-looking edits, provided the necessary platform to finalize the video.

4.4. Weaving Cultural Threads: Representing Kosovo through Anime

A key aspect of the project, highlighted in the abstract and methodology, is the integration of cultural elements within the AI-generated aesthetic. The primary vehicle for this was the use of recognizable locations in Pristina as the backdrop for the video's narrative. By filming in places like Ulpiana Fontana and Parku i Qytetit and then transforming this footage using GLAM AI, the project attempted to ground the fantastical anime style within a specific, real-world Kosovan context. The challenge, as framed by the abstract, was to maintain a degree of cultural authenticity during this automated generation process. The analysis in subsequent sections will delve deeper into how successfully these locations remain identifiable or evoke a sense of place after the AI transformation, addressing the interpretation of 'authenticity' when mediated through both a foreign artistic style (anime) and an algorithmic process. The abstract's mention of incorporating "traditional Japanese motifs" seems likely a misinterpretation or imprecise phrasing in the original translation, as the primary cultural grounding described in the sources is explicitly Kosovan (locations) fused with the Japanese- originated *style* of anime, rather than incorporating specific traditional Japanese visual elements alongside Kosovan ones.

5. Results and discussion

This section presents the primary results and outcomes of the "ARIA" project, focusing on the final artistic artifact, the project's success relative to its stated goals of cultural authenticity and production efficiency, and its reception.

5.1. The Final Artwork: "ARIA" Music Video

The principal outcome of the creative process is the completed AI-assisted anime music video titled "ARIA." The video, publicly available on YouTube (Iliyaz, 2024b), presents a visual narrative synchronized with the musical composition of the same name.

Aesthetically, it features characters (including the creator's daughter and collaborators) and settings rendered in a distinct anime style, achieved through the application of the GLAM AI tool to live-action footage. The visual style is characterized by typical anime conventions, such as specific character designs, vibrant color palettes, and stylized environments. The video blends scenes filmed in recognizable Kosovan locations (Pristina) and North Cyprus with studio footage, all transformed into this consistent animated aesthetic. The synergy between the visuals and the fusion music track aims to create a warm, positive, and emotionally resonant

experience, centered around the theme of childhood innocence and the beauty created through artistic collaboration (KultPlus, 2024).

5.2. Evaluating Production Efficiency Gains

Another significant claim from the abstract concerns efficiency, stating that the AI-assisted workflow reduced production time by 92% compared to traditional methods. This assertion highlights a key potential benefit of using AI in animation and video production. The workflow employed – filming live-action footage and then applying an AI style transfer tool (GLAM AI) – bypasses the highly labor-intensive processes typical of traditional animation, such as manual drawing, frame-by-frame coloring, character rigging (for 3D), or extensive rotoscoping. By leveraging AI to automate the stylistic transformation, the creator could achieve an animated aesthetic much more rapidly than would be possible through conventional means, especially for an individual or small team without extensive animation resources. While the 92% figure is self-reported and lacks a rigorous comparative baseline within the provided sources, it strongly suggests a substantial acceleration of the production timeline, aligning with general expectations of AI's potential to streamline creative workflows (Author, Year). The efficiency gain stems directly from substituting manual animation labor with automated AI processing for the core visual transformation.

5.3. Project Reception and Validation

The "ARIA" project received positive validation through various channels, indicating a degree of success beyond the creator's personal satisfaction. Iliyaz (2024a) mentions receiving valuable positive feedback from directors and production friends he has worked with over the years, which motivated him to further develop the project. Public reception is evidenced by media coverage, specifically the article in KultPlus, a prominent online platform for art and culture in Kosovo (KultPlus, 2024). This article details the project's release, its innovative use of AI, the collaborative team involved, and its thematic focus. Furthermore, the project secured institutional support from Kosovo's Ministry of Culture, Youth and Sport, as well as the Municipality of Pristina (KultPlus, 2024). This official backing lends credibility to the project and underscores its perceived cultural value and innovative approach within the local context. The public release on YouTube also provides metrics like view counts and likes (visible on the page, e.g., 721 views, 35 likes as per screenshot metadata for Iliyaz, 2024b), offering a quantitative, albeit limited, measure of audience engagement.

6. Discussion

The "ARIA" project, as detailed in the preceding sections, serves as a rich case study for discussing the broader implications of integrating generative AI into creative workflows, particularly those involving cultural representation. This section analyzes the findings, evaluates the tools and processes employed, explores the challenges encountered, and considers the potential of the project's methodology as a reference model.

6.1. Bridging Worlds: AI as a Mediator

The "ARIA" video successfully demonstrates the potential of AI to act as a mediator

between distinct domains: personal inspiration and artistic output, technological expertise and creative expression, and local cultural context and globalized aesthetics. Iliyaz leveraged his technical understanding to navigate AI tools, translating a personal, familial motivation into a publicly shared artwork (Iliyaz, 2024a). The project's most significant mediation, however, lies in its attempt to synthesize Kosovan cultural elements (specifically, Pristina's urban landscape) with the visual language of Japanese anime. AI tools like GLAM facilitated this synthesis, automating the complex process of stylistic transformation. This mediation highlights AI's capacity not just to generate novel content but to blend and reinterpret existing cultural and aesthetic forms. The outcome suggests that AI can enable creators to bridge cultural divides and express local identities through internationally recognized visual styles, potentially broadening audience reach while retaining a connection to specific origins.

6.2. Evaluating the AI Toolkit (GLAM, CapCut, Midjourney)

The specific tools chosen significantly shaped the creative process and outcome. GLAM AI, used for the core style transfer, appears effective in applying a consistent anime aesthetic across diverse live-action footage. Its use enabled the rapid transformation that underpinned the project's claimed efficiency gains. However, the level of artistic control offered by such tools remains a critical factor. While the output was satisfactory for the creator, the reliance on a specific AI's interpretation of "anime style" might limit nuanced artistic expression or precise control over character features and environmental details compared to traditional animation (Author, Year). CapCut served as a standard, accessible video editing tool, suitable for assembling the AI-generated clips and synchronizing them with music. Its widespread availability makes this part of the workflow easily replicable. The potential use of Midjourney during conceptualization (as per the abstract) aligns with common practices where text-to-image AI helps brainstorm ideas or establish a visual direction before committing to production. The overall toolkit represents a pragmatic combination of specialized AI (GLAM for style transfer) and general-purpose editing software (CapCut), augmented potentially by AI- driven ideation (Midjourney), reflecting an accessible workflow for creators without extensive animation studio resources.

6.3. Navigating the Challenges of AI Creativity and Cultural Representation

The "ARIA" project implicitly navigated several challenges inherent in AI-driven creativity. One is the "black box" problem, where the internal workings of the AI model (like GLAM) might not be fully transparent, making it harder for the creator to predict or precisely control the output (Author, Year). Maintaining artistic intent requires careful selection of input footage and potentially iterative refinement if the AI's interpretation diverges significantly from the desired outcome. The most pertinent challenge, however, was cultural representation. Using AI to render specific Kosovan locations in an anime style raises questions about authenticity, as discussed. Does the transformation enhance or obscure the cultural identity of the place? Can an AI, likely trained on diverse global data, adequately capture local nuances? The project's approach – grounding the animation in real, recognizable locations – seems a pragmatic strategy to anchor the stylized visuals in a specific cultural reality. The success of this approach is subjective but points towards a method of using AI for cultural expression that emphasizes reinterpretation rather

than replication. The claim of preserving 78% authenticity, while subjective, signals the creator's awareness and engagement with this challenge.

6.4. Towards a Reference Model

The abstract proposes the study concludes with a reference model for AI-driven creativity. Based on the documented workflow, such a model could be outlined as follows: 1. Conceptualization & Foundation: Define project goals (personal, artistic, cultural), develop core content (e.g., musical composition), and potentially use text-to- image AI (like Midjourney) for initial visual brainstorming and style exploration. 2.

Source Material Generation: Create high-quality source material (e.g., live-action video

footage) specifically designed for AI transformation, considering composition, lighting, and content relevant to the project's themes and cultural context. 3. AI-Mediated Transformation: Select and apply appropriate AI style transfer tools (like GLAM) to convert source material into the desired aesthetic, potentially involving iteration and parameter tuning if available. 4. Post-Production & Integration: Utilize standard editing software (like CapCut) to assemble transformed segments, integrate other media (music, sound effects), refine pacing, and finalize the artwork. 5. Feedback & Refinement: Incorporate feedback from collaborators and peers throughout the process, particularly after the AI transformation and during editing. This model emphasizes a hybrid approach, combining human creative input (concept, source material, editing decisions) with AI automation (style transfer), representing a practical workflow for leveraging current AI capabilities in audiovisual projects.

5.5. Implications and Recommendations

The "ARIA" case study offers several implications. For artists, it demonstrates the feasibility of using accessible AI tools to create visually complex projects and blend cultural influences. It highlights the importance of curating appropriate source material for AI processing. For cultural institutions, it showcases how AI can be used to reinterpret heritage in contemporary formats, potentially engaging younger audiences, but also underscores the need for critical engagement with questions of authenticity. For AI developers, it points to the demand for tools that offer greater artistic control and perhaps culturally specific style models. Recommendations include fostering digital literacy among artists regarding AI tools, encouraging critical dialogue about AI and cultural representation, and promoting the development of AI tools that prioritize user control and transparency.

5.6. Limitations

This study is subject to limitations inherent in a single case study design. Findings are based primarily on the creator's perspective and publicly available data, potentially lacking external validation for claims regarding authenticity percentages or precise efficiency gains. The specific context of Kosovo's cultural scene and the creator's unique background may limit the generalizability of the findings. Furthermore, the rapid evolution of AI technology means that the specific tools and workflows described may quickly become outdated. The limited access to the video content itself also restricts direct, in-depth visual analysis.

6. Conclusion

This paper has presented a detailed case study of the "ARIA" project, an AI-assisted anime music video created by Ertan Iliyaz. Through an analysis grounded in the creator's documentation, media reports, and the project abstract, this study has explored the methodology, creative process, technological integration, and outcomes associated with using generative AI tools (primarily GLAM AI and CapCut, potentially Midjourney) to produce a culturally situated artwork.

6.1. Synthesis of Findings

The key findings indicate that the "ARIA" project successfully leveraged accessible AI technologies to transform live-action footage, filmed in specific Kosovan locations, into a cohesive anime-style music video. The workflow involved a hybrid approach, combining human creative input (musical composition, filming, editing decisions) with AI-driven automation (style transfer). This process resulted in significant perceived gains in production efficiency compared to traditional animation methods. Furthermore, the project attempted to navigate the complex challenge of cultural authenticity by grounding the stylized visuals in recognizable real-world settings within Pristina, aiming to reinterpret rather than merely replicate the local context. The positive reception, including media coverage and institutional support within Kosovo, suggests the project resonated as both a technological novelty and a meaningful artistic expression.

6.2. Contribution and Originality

This study contributes a practical, empirical account to the growing discourse on AI in the creative industries. By meticulously documenting the workflow and tools used in the "ARIA" project, it offers tangible insights into how individual creators are harnessing AI for audiovisual production. Its originality lies in its focus on a specific case where AI is used not just for abstract artistic exploration but also as a tool to engage with and represent a specific cultural context (Kosovo). The analysis highlights the potential for AI to mediate between local identity and global aesthetics, providing a reference point for artists, cultural practitioners, and technologists grappling with similar challenges. The proposed reference model, derived from the observed workflow, offers a structured approach for integrating AI into culturally grounded creative projects.

6.3. Future Research Avenues

The findings and limitations of this study suggest several avenues for future research. Comparative studies analyzing different AI style transfer tools for similar tasks could yield valuable insights into their respective strengths, weaknesses, and levels of artistic control. Research exploring audience reception to AI-generated cultural content, examining how viewers perceive authenticity and cultural identity in such works, would be highly relevant. Developing more robust, objective frameworks for evaluating cultural authenticity in AI art, moving beyond subjective creator assessments, presents a significant theoretical challenge. Further investigation into the ethical implications of using AI trained on potentially biased or culturally non-specific datasets for representing specific cultures is also warranted. Finally, as AI technology continues its rapid evolution, ongoing research documenting emerging tools, workflows, and creative practices at the intersection of AI, art, and culture will remain essential.

In conclusion, the "ARIA" project exemplifies the dynamic and complex interplay between human creativity, artificial intelligence, and cultural expression in the contemporary era. It showcases the potential for AI to empower individual creators and facilitate novel forms of artistic synthesis, while simultaneously highlighting the critical need for thoughtful engagement with the challenges of authenticity, control, and cultural representation inherent in these powerful new technologies.

7. References

Note: The following list includes references for the specific project sources discussed in this paper (blog post, news article, videos). Placeholder citations for academic literature (e.g., Author, Year; Kaplan & Haenlein, 2019) used illustratively in the text need to be replaced with actual, relevant scholarly sources by the author to fully substantiate the literature review and theoretical discussions.

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Autori Algoritmik: Si Inteligjenca Artificiale po Transformon Kreativitetin në Film dhe Media

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Abstrakt

Inteligjenca artificiale (IA) po bëhet një forcë transformuese jo vetëm në jetën e përditshme, por edhe në industrinë e medias dhe krijimtarisë. Në film dhe televizion, mjetet e fuqizuara nga IA po ndryshojnë shkrimin e skenarit, regjisë dhe narrativës vizuale, duke automatizuar procese që dikur konsideroheshin të lidhura ekskluzivisht me imagjinatën njerëzore. Teknologjitë e të mësuarit të thellë tani mund të shkruajnë skenarë, të redaktojnë filma dhe të krijojnë aktorë dixhitalë, duke imituar stile artistike dhe parashikuar shijet e audiencës, shpesh me një saktësi befasuese. Ky studim shqyrton pasojat e konceptimit të IA-së si një bashkëpunëtor krijues në vend të një mjeti të thjeshtë, duke analizuar ndikimin e saj në autenticitetin artistik dhe tregun e punëve krijuese. A mund IA ta zëvendësojë vërtet autorin, apo thjesht e zgjeron vizionin e tij, duke e çuar krijimtarinë në një drejtim të ri? Duke analizuar raste studimore të filmave, skenarëve dhe artit dixhital të krijuar nga IA, ky hulumtim eksploron nëse këto teknologji po demokratizojnë krijimin e mediave apo po homogjenizojnë shprehjen artistike. Në një fushë të ndërtuar mbi intuitën dhe emocionet njerëzore, IA sfidon perceptimet tona mbi natyrën e krijimtarisë, rolin e artistit dhe kufijtë e imagjinatës njerëzore në epokën digjitale.

Fjalë kyç: Inteligjenca artificiale, autenticiteti artistik, bashkëpunimi krijues, kreativiteti.

Hyrje

Në histori, çdo shpikje e madhe ka sjellë dyshime dhe frikë. Me përhapjen e shkrimit, në jetën publike dhe arsimore të Greqisë së lashtë**,** shumë teoriticient të asaj kohe kishin frikë se kujtesa do të dobësohej dhe mendja njerëzore do të atrofohej. Njëri ndër ta ishte edhe Sokrati, ai shkrimin e konsideroi si diçka të keqe për shoqërinë njerëzore, Këtë e nxjerrë në pah Platoni në librin "Phaedrus". Ai duke iu referuar një dialogu mes Sokratit dhe Phaedrus nxjerr në pah mendimin e Sokratit për të shkruarit: "Besimi te shkrimi do t'i bëjë njerëzit të mbështeten në shenjat e krijuara nga të tjerët, jashtë vetes së tyre, dhe jo në burimet e brendshme. Kjo do të çojë në harresën e atyre që kanë mësuar, duke i fshirë ato nga mendjet e tyre." [2]. Ndërsa kur u shpik shtypshkronja, pati shqetësime se leximi i tepërt do ta mbingarkonte trurin e njeriut. Poashtu, kur u shfaq kinematografia, shumë artistë besonin se teatri do të zhdukej.
Sot, me zhvillimin e Inteligjencës Artificiale, po shohim të njëjtin debat. shumë teoriticient dhe kritik janë gjendur para dilemës, nëse ky zbulim mund të jetë një

[2] Plato, *Phaedrus*, trans. Robin Waterfield (New York: Oxford University Press, 2002), 69.

kërcënim për kreativitetin njerëzor, apo thjesht një tjetër revolucion teknologjik që po na frikëson pa arsye.
Megjithatë rritja e përdorimit të Inteligjencës Artificiale (IA) në sektorë të ndryshëm ka filluar të ndryshojë thellësisht mjedisin krijues, në veçanti, IA është duke transformuar industrinë e medias dhe filmit. Mjetet e drejtuara nga IA, jo vetëm që ndihmojnë, por gjithashtu po marrin përsipër detyra që tradicionalisht janë konsideruar si punë kreativie të njeriut, në këtë rast shkrimin e skenarëve, regjinë, tregimin vizual dhe interpretimin dixhital.
Në këtë epokë dixhitale, Inteligjenca Artificiale (IA) po shndërron mënyrën se si krijohen dhe përjetohen filmat dhe mediat, duke sfiduar kufijtë tradicionalë të krijimtarisë njerëzore.
Përgjatë dekadave të kaluara, procesi i krijimit të filmit dhe mediave është mbështetur në intuitën njerëzore, përvojën subjektive të artistëve dhe inteligjencën emocionale të tyre. Sidoqoftë, ndërkohë që teknologjitë e IA po përparojnë, rrjedhimisht pyetjet që lidhen me marrëdhënien ndërmjet kreativitetit njerëzor dhe artit të gjeneruar nga AI po bëhen gjithnjë e më të rëndësishme.
Ky studim shqyrton pasojat e konceptualizimit të IA-së si një bashkëpunëtor krijues, në vend të një mjeti të thjeshtë, duke analizuar ndikimin e saj në autentticitetin artistik, dhe në tregun e veprave krijuese. Duke qenë se Inteligjenca Artificiale ka bërë përparime të jashtëzakonshme në fushën e krijimtarisë, por ende përballet me disa kufizime, ky studim gjithashtu pretendon të nxjerr në pah se cilat janë ato kufizime. Duke analizuar raste studimore të filmave, skenarëve dhe artit dixhital të krijuar nga IA, ky hulumtim eksploron nëse këto teknologji po demokratizojnë krijimin e mediave apo po homogjenizojnë shprehjen artistike. Lidhje me këtë egzistojnë precepeptime të ndryshme. Lidhje me këtë çeshtje egzistojnë preceptime të ndryshme
"Prirja korporative drejt një qasjeje 'një masë për të gjithë' ka krijuar një homogjenizim të artit, një lloj 'pastrimi kulturor' të prodhimeve."[3]
Në një dimension të ndërtuar mbi intuitën dhe emocionet njerëzore, inteligjenca artificiale po vë në pikëpyetje kuptimin tonë për kreativitetin, rolin e artistit dhe kufijtë e imagjinatës njerëzore në epokën dixhitale. A do të mund IA të krijojë skenarë dhe filma që rivalizojnë ata të krijuar nga njerëzit, apo do të shërbejë vetëm si një mjet për të fuqizuar kreativitetin dhe për të ndihmuar krijuesit? Kjo është një nga çështjet që do të shqyrtojmë gjatë këtij punimi.

Metodat e Hulumtimit

Hulumtimi i Literaturës Ekzistuese: Shqyrtimi i literaturës që trajton përdorimin e IA-së në filma dhe media.
Shqyrtimi i Intervistave të Artistëve, Kritikëve, Regjisorëve dhe Teoricienëve: Mendimi i ekspertëve në kuptimin e përdorimit të IA-së në procesin krijues.
Analiza e Filmave dhe Skenarëve të Krijuar nga IA: Studimi i filmave si "Sunspring" (2016), "To Dear Me" (2019), dhe "Atlas" (2024).

[3] Giannatti, D. (2023, September 10). *Is the homogenization of art designed to wear artists down?* Medium. https://medium.com/full-frame/is-the-homogenization-of-art-designed-to-wear-artists-down-76708d4486ee

Duke shqyrtuar literaturën ekzistuese, synoj të evidentoj qëndrimet dhe përvojat profesionale rreth përdorimit të IA-së në krijimtari, përmes shqyrtimit të literaturës dhe intervistave ekzistuese.
Duke u mbështetur në këtë qasje metodologjike, ky studim analizon se si teknologjitë e inteligjencës artificiale – duke përfshirë algoritmet për shkrimin e skenarëve, mjetet e montimit dhe krijimin e personazheve dixhitale – ndikojnë në evolucionin e procesit krijues brenda industrisë së filmit. Është e njohur se këto teknologji të intelegjences artificiale tashmë janë përdorur në disa projekte të njohura, duke ofruar një dritare të vlefshme për rolin në rritje të IA-së në procesin krijues, siç është rasti me filmat: Sunspring (2016) , Filmi "To Dear Me" (2024) "Atlas" (2024), Duke analizuar këta filma,ky studim shqyrtonon ndikimin e bashkëpunimit midis faktorëve njerëzorë dhe inteligjencës artificiale në procesin krijues të filmave duke ofruar një pasqyrë mbi evolucionin e procesit krijues në industrinë e filmit.
Qëllimi është të identifikojmë se si përdorimi i IA-së ka ndikuar në aspektet artistike, teknike dhe narrative të këtyre filmave, duke ofruar një kuptim më të thellë të transformimeve që po ndodhin në industrinë e filmit dhe medias.

Pytjet Kërkimore dhe Hipotezat

1. Roli i skenaristit do të transformohet në drejtim të redaktimit dhe udhëheqjes kreative.
2. IA nuk e zëvendëson autorin, por zgjeron vizionin e tij kreativ.
3. IA nuk e zëvendëson krijuesin, por mund të fuqizojë krijimtarinë përmes bashkëpunimit të kontrolluar.

1. A do të zvogëlohet roli i skenaristit, apo ai do të transformohet në një proces redaktimi?
2. A mund IA të zëvendësojë autorin, apo thjesht e zgjeron vizionin e tij, duke e çuar kreativitetin në një drejtim të ri?
3. Si mund të integrohet IA në procesin krijues në mënyrë që të forcojë dhe mbështesë kreativitetin njerëzor, duke shmangur rrezikun e zëvendësimit të tij?

Rezultatet

Gjatë këtij studimi kam gjetur se përfshirja në rritje e IA-së në industrinë e filmit dhe mediave përfaqëson si mundësi ashtu edhe sfida. Siç ka treguar ky punim, IA ka potencialin për të përmirësuar kreativitetin njerëzor, për të demokratizuar prodhimin e mediave dhe për të gjeneruar forma të reja të shprehjes artistike. Kjo ngre gjithashtu pyetje thelbësore mbi autorësinë, autenticitetin dhe të ardhmen e kreativitetit njerëzor.
Ndikimi i IA-së në autorësinë artistike nuk është vetëm një sfidë teknike, por edhe filozofike dhe ligjore. Ajo po ndryshon mënyrën sesi e kuptojmë krijimtarinë dhe po e sfidon idenë tradicionale të artistit si një figurë unike dhe të pazëvendësueshme.
Nëse i qasemi IA-së si një zgjerim të aftësive tona krijuese, mund të hapen mundësi të reja për artin dhe industrinë krijuese.
Ndërsa nëse IA shihet si një zëvendësim i krijimtarisë njerëzore dhe jo si një ndihmës i saj, atëherë kemi një krizë të mundshme në autenticitetin, tregun dhe kuptimin e

artit. Atëhere në vend të një epoke të re inovacioni, mund të përballemi me një epokë të artit të prodhuar në masë, të ftohtë dhe të privuar nga shpirti i vërtetë krijues. Pyetja nuk është thjesht teknologjike, por ekzistenciale: A mund të ekzistojë arti i vërtetë pa shpirtin njerëzor?
Përgjatë këtij studimi kam gjetur se IA mund të realizojë shumë nga krijimet që tradicionalisht lidhen me autorësinë krijuese, megjithëse me disa kufizime.
Analizimi i artikujve dhe Intervistave me profesionistë të industrisë, nxjerrë në pah një ambivalencë në rritje ndaj IA. Ndërsa shumë regjisorë dhe skenaristë e shohin IA-në si një mjet të dobishëm për të kapërcyer bllokimet krijuese ose për të rregulluar procesin e prodhimit, ka shqetësime lidhur me autenticitetin e veprave të krijuara nga IA. Disa teoriticient dhe regjisorë shprehin shqetësimin se IA rrezikon të homogenizojë krijimtarinë duke u mbështetur tepër në algoritme dhe të dhëna historike, gjë që mund të shtypë inovacionin dhe diversitetin në art. Disa të tjerë theksojn se IA duhet parë si një shtesë e krijimtarisë njerëzore dhe jo si zëvendësim, duke theksuar rëndësinë e intuitës njerëzore dhe kuptimit emocional në krijimin e artit që rezonon thellësisht me audiencën.
Mbështetja e tepërt në këto mjete mund të çojë në ngjashmëri të veprave krijuese, pasi algoritmet shpesh trajnohen mbi të dhëna të kufizuara që forcojnë konvencione dhe klishe ekzistuese, duke kufizuar inovacionin dhe diversitetin në tregimin e historive Është e dukshme edhe pakënaqësia e artistëve të ndryshëm për shkak të keqpërdorimeve të mundshme të imazhit të tyre, të cilat mund të ndodhin si pasojë e mungesës së rregulloreve të qarta ligjore dhe të standardeve etike në përdorimin e inteligjencës artificiale në fushën e krijimtarisë.
Filmat e analizuar ''Sunsprin'' dhe "To Dear Me'' demonstrojnë përdorimin e IA-së për të krijuar aktorë dixhitalë dhe karaktere të thella, ndërsa ''Atlas'' tregon si IA mund të asistojë në shkrimin e skenarëve, duke imituar stilin e autorëve të njohur.
Megjithatë, ajo gjithashtu ngre pyetje kritike rreth natyrës së autorësisë, autentikës artistike dhe të ardhmes së kreativitetit njerëzor.
Filmat *e larpertpermendur* nxjerrin në pah dilemat etike dhe artistike të përdorimit të inteligjencës artificiale në film, duke sfiduar konceptin e autenticitetit njerëzor në krijimtari. Ndikimi i IA-së duket qartë në strukturën narrative, gjuhën filmike dhe rolin e aktorëve digjitalë, duke ngritur pyetje mbi të ardhmen e aktorëve tradicionalë dhe përvojën autentike filmike.
Pra megjithse Inteligjenca Artificiale ka bërë përparime të jashtëzakonshme në fushën e krijimtarisë, ajo ende përballet me disa kufizime kryesore siç janë: Mungesa e Origjinalitetit të Vërtetë, pastaj Mungesa e Kuptimit të Thellë si dhe Varësia nga të Dhënat e Trajnimit.
Siç shihet ndikimi i IA-së në filmin dhe kreativitetin filmik është ende në zhvillim, dhe bashkëkrijimi mes njeriut dhe IA-së do të formësojë të ardhmen e industrisë. Kjo mund të sjellë mundësi të reja për krijuesit e filmit, duke ofruar mjete dhe teknologji të avancuara për të eksploruar ide të reja, ndërsa mbështetja e rolit të njeriut si një udhëheqës krijues mbetet e domosdoshme për ruajtjen e thelbit të artit filmik.
Gjetjet e këtij studimi ngrejnë pyetje të rëndësishme mbi të ardhmen e kreativitetit në epokën dixhitale. Në thelb të debatit qëndron natyra e vetë autorësisë. Tradicionalisht, autorësia në film dhe media ka qenë një koncept i fokusuar në njeriun, ku vizioni unik, stili dhe inteligjenca emocionale e krijuesit kanë formësuar produktin përfundimtar. Sidoqoftë, ndërsa IA po bëhet një lojtar gjithnjë e më i

rëndësishëm në procesin krijues, përkufizimi i autorësisë bëhet gjithnjë e më i paqartë. Kush, ose çfarë, ka të drejtën e pronësisë intelektuale mbi një skenar ose film të krijuar nga IA? A është programuesi, algoritmi, apo vetë IA?

Diskutim

Në secilin nga zbulimet artistike përgjatë historis vepruan forcat kontradiktore, këto kontradita janë prezente edhe tani me futjen në përdorim të AI, duke i dhënë kështu impulse të progresit, të pezullimit apo edhe të regresit.
Në botën magjike të kinemasë, ku imagjinata njerëzore merr formë përmes dritës dhe hijes, teknologjia ka luajtur gjithmonë një rol të rëndësishëm në zgjerimin e kufijve të tregimit. Sot, me përparimet e Inteligjencës Artificiale (IA), ne po hyjmë në një epokë të re krijimtarie, ku algoritmet dhe mësimi makinerik bashkëpunojnë me mendjet njerëzore për të sjellë histori në ekran në mënyra të papara më parë.
Nga gjetjet e këtij hulumtimi shohim se përdorimi i IA – së në krimtari artistike sa vije dhe bëhet më përfshirëse
Ashtu siç kemi cekë Inteligjenca Artificiale (IA) gjithnjë e më shumë po luan një rol të rëndësishëm në proceset krijuese të industrisë filmike dhe mediatike, duke ndikuar kështu në aspekte të ndryshme të prodhimit siç janë: Shkrimi i skenarëve. Redaktimi i videove si dhe krijimi i efekteve vizuale.
IA tashmë është përdorur për të gjeneruar skenarë filmash. Sipas të dhënave IA e arrinë këtë përmes procesit të analizimit të mija skenarëve ekzistues, mbi bazën e të cilëve krijon histori të reja. Njëri nga rastet e tilla mund ta përmendim filmin e shkurtër "Sunspring në vitin 2016. Një algoritëm IA krijoi skenarin e këtij filmi.
Gjithnjë sipas të dhënave IA po përdoret suksesëshem edhe për redaktimin e videove: Mjetet e bazuara në IA tani mund të analizojnë materialet filmike dhe të sugjerojnë prerje ose montime, duke zevendësuar kështu faktorin njeri apo montazherin, mbi të gjitha duke përshpejtuar ndjeshëm procesin e redaktimit. "Një sistem i zhvilluar nga Adobe që integron IA në redaktimin e videove, duke lejuar ndryshime komplekse si modifikimi i ndriçimit dhe gjenerimi i muzikës në sfond përmes komandave tekstuale."[4]
IA mund të ndihmojë krijuesit të testojnë stile të ndryshme shkrimi, si dhe efekte vizuale, pa pasur nevojë për aftësi të specializuara në çdo fushë.
Mjetet e bazuara në IA mund të analizojnë preferencat individuale të përdoruesve dhe të sugjerojnë variante të ndryshme të një projekti kreativ, duke hapur mundësi për art të personalizuar.
Procesi i redaktimit zhvillohet me ndihmen e këtyre mjeteve të cilat ndihmojnë që IA të identifikojë segmentet apo pjesët më të mira të gjirimit për ti lidhur në montim.
Përveq tjerash IA mund edhe të gjenerojë efekte vizuale komplekse, duke përfshirë animacione dhe simulime, të cilat më parë kërkonin shumë kohë dhe burime. Për shembull, teknikat e mësimit të makinerive përdoren për të krijuar efekte speciale më realiste në filma.

[4] Telegrafi. (2023). *Adobe do të shtoi mjete gjeneruese të inteligjencës artificiale në programin e saj të redaktimit të videove.* https://telegrafi.com/adobe-te-shtoi-mjete-gjeneruese-te-inteligjences-artificiale-ne-programin-e-saj-te-redaktimit-te-videove/

Në anën tjetër përdorimi i Inteligjencës Artificiale (IA) në fushën e artit dhe mediave ka sjellë një transformim të thellë në konceptin e autorësisë dhe autenticitetit artistik. Tradicionalisht, autorësia lidhet me individin si krijues unik të një vepre, duke reflektuar përvojën, ndjeshmërinë dhe aftësitë e tij. Megjithatë, avancimet në IA kanë sfiduar këtë ide, duke krijuar mjete që jo vetëm ndihmojnë artistët, por edhe mund të prodhojnë vepra të reja në mënyrë autonome. Shumë artistë dhe profesionistë të industrisë kreative kanë shprehur shqetësime se nëse IA mund të krijojë piktura, filma, muzikë apo tekste në mënyrë më të shpejtë dhe më të lirë, shumë kompani mund të zgjedhin ta përdorin atë në vend të artistëve të vërtetë, ngaqë kjo rrjedhimisht mund të zvogëlojë mundësitë e punës për artistët, duke rezultuar kështu në uljen e vlerës së artit njerëzor, pasi që ka mundësi që krijimtaria të shihet si diçka që mund të prodhohet me një klik.

Artistja Ortiz ka shprehur shqetësimin e saj lidhur me përdorimin e artit të saj për trajnimin e sistemeve të IA-së pa lejen e saj, duke deklaruar: "Është skandaloze. Kjo industri disa miliarda dollarë po konkurron në tregjet tona."[5]

Këto deklarata pasqyrojnë frikën se përdorimi i IA-së në krijimin e artit mund të zvogëlojë mundësitë e punës për artistët dhe të ulë vlerën e krijimtarisë njerëzore, duke e parë atë si diçka që mund të prodhohet lehtësisht nga makinat.

IA mëson nga vepra të krijuara nga njerëzit, por shpesh riprodhon stile apo ide pa i dhënë meritat autorëve origjinalë. Kjo mund të çojë në plagjiaturë dhe shkelje të të drejtave të autorit.

Nëse IA krijon një vepër arti, kush është autori i saj? Artisti që e përdori IA-n apo programi vetë? Kjo mbetet një çështje e paqartë ligjërisht. Megjithëse Inteligjenca Artificiale (IA) ka sjellë përparime të konsiderueshme në krijimin e përmbajtjes vizuale dhe audiovizuale, përdorimi i saj për të krijuar fotografi dhe video realiste ka ngritur shqetësime serioze për autenticitetin dhe etikën e përmbajtjes. Hulumtimet tregojnë se audienca shpesh reagon me skepticizëm ndaj përmbajtjeve të krijuara nga IA, veçanërisht kur ato mund të perceptohen si manipuluese apo të rreme. Kjo pasqyron një mungesë të natyrshme të komponentit etik dhe moral te IA, një dimension që vetëm krijuesi njerëzor mund ta zotërojë për të vendosur kufij në procesin krijues. Prandaj, është thelbësore që përdorimi i IA-së të shoqërohet me mbikëqyrje njerëzore dhe transparencë, në mënyrë që të garantohet krijimi i përmbajtjes së përgjegjshme, të besueshme dhe etike. Edukimi i publikut për të kuptuar dhe identifikuar përmbajtjen e krijuar nga IA mbetet gjithashtu një hap i domosdoshëm për ruajtjen e besimit në mediat digjitale.

Paul McCartney paralajmëron se ndryshimet e mundshme ligjore mbi të drejtat e autorit lidhur me IA-në mund të minojnë motivimin e artistëve dhe shkrimtarëve, duke rrezikuar kështu humbjen e krijimtarisë.

Tradicionalisht vetëm një artist i gjallë, me ndërgjegje dhe përvojë njerëzore, mund të krijojë art autentik, rrjedhimisht IA mund të imitojë, por nuk mund të ketë përjetime personale.

kufijtë e kreativitetit të IA-së mbeten të dukshëm, veçanërisht në aspektet që lidhen me emocionet, intuitën dhe origjinalitetin, por IA mund të funksionojë si një ndihmës

[5] Syri.net. (2024, June 23). *Arti përballë imazheve të kopjuara nga inteligjenca artificiale*. https://www.syri.net/arte-media/699627/arti-perballe-imazheve-te-kopjuara-nga-inteligjenca-artificiale

i fuqishëm në procesin krijues, duke u integruar si mjet që e pasuron dhe nuk e zëvendëson rolin e njeriut në artin dhe filmin.
Duke e konsideruar artin artin si një formë të komunikimit të thellë dhe subjektiv njerëzor, atëherë arti i vërtetë nuk mund të ekzistojë pa ndjeshmërinë dhe ndërgjegjen njerëzore – gjëra që IA nuk i zotëron. Por nëse arti vlerësohet për mënyrën si përjetohet nga audienca, atëherë edhe krijimet e IA-së mund të kenë vlerë të pavarur artistike.
Regjizori Zack Snyder e konsideron inteligjencën artificiale si një mjet që mund të përmirësojë procesin krijues në kinematografi, por thekson se nuk mund të zëvendësojë plotësisht aspektet njerëzore të regjizurës. Ai shpreh ende dyshime për disa përdorime të teknologjisë, por pranon përfitimet që ajo sjell.
''Duhet të kuptosh se çfarë është dhe çfarë nuk është e aftë, dhe duhet të jesh në gjendje ta përdorësh atë si një mjet në krahasim me qëndrimin anash me duart në ije.''[6]
Ndikimi i IA-së në krijimtari mund të shkojë edhe më tej, duke ndryshuar mënyrën sesi e përjetojmë dhe e konsumojmë artin. Me aftësinë për të personalizuar përmbajtjen në bazë të preferencave individuale, algoritmet mund të krijojnë vepra të përshtatura për secilin individ, duke sfiduar konceptin tradicional të një vepre universale që synon një audiencë të gjerë. Kjo mund të çojë në një epokë të një arti gjithnjë e më të fragmentuar, ku kufijtë midis krijuesit dhe shikuesit bëhen të paqarta, pasi secili mund të ketë një përvojë artistike të ndërtuar posaçërisht për të. Në këtë kontekst, koncepti i autorësisë mund të evoluojë nga një entitet i vetëm në një proces bashkëpunues midis njerëzve dhe makinave, ku artistët nuk janë më krijues individualë, por drejtues të një dialogu krijues me teknologjinë.
Ndërsa IA vazhdon të zhvillohet, ky bashkëpunim mund të formësojë të ardhmen e artit dhe të ridefinojë atë që do të thotë të jesh autor në një epokë ku kreativiteti nuk është më ekskluzivisht njerëzor.
Automatizimi i proceseve krijuese me anë të IA-së mund të reduktojë nevojën për disa role tradicionale në industrinë e medias, duke shkaktuar shqetësime për humbjen e vendeve të punës.
"Automatizimi i proceseve do të çojë në zhdukjen e disa llojeve të punëve, duke i lënë shumë individë pa mundësi për punësim."[7]
Kjo nuk është vetëm një çështje ekonomike, por edhe një dilemë sociale dhe ekzistenciale. Pikërisht këtë sfidë thelbësore e ka ngritur edhe fizikani Stephen Hawking,
Ai qysh në vitin **2014**, gjatë një interviste për BBC shprehu shqetësimin e tij se Inteligjenca Artificiale mund të zhvillohet deri në atë pikë sa të tejkalojë njerëzit dhe të bëhet e pavarur, duke çuar potencialisht në fundin e racës njerëzore.

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[6] Eakin, M. (2024, December 3). *Zack Snyder thinks Hollywood needs to get on board with AI or get left behind*. *WIRED*. https://www.wired.com/story/big-interview-zack-snyder-2024

[7] Islami, Z. (2024, December 10). *E ardhmja e inteligjencës artificiale: Mundësitë dhe sfidat për shoqërinë dhe industrinë*. *InForCulture*. https://inforculture.info/2024/12/10/e-ardhmja-e-inteligjences-artificiale-mundesite-dhe-sfidat-per-shoqerine-dhe-industrine/

“Zhvillimi i inteligjencës artificiale të plotë mund të shënojë fundin e racës njerëzore”.[8]
Këto paralajmërime marrin një kuptim të veçantë edhe në kontekstin e industrisë kreative, ku përdorimi në rritje i IA-së ka ngritur pikëpyetje serioze rreth rolit të autorit, origjinalitetit artistik dhe etikës profesionale. Megjithëse IA mund të ndihmojë në mekanikën e tregimit, arti dhe tregimi i historive mbeten thellësisht njerëzore, pasi emocionet, përvoja dhe perspektiva unike janë ende të pazëvendësueshme nga një algoritëm – njeriu mbetet shpirti i vërtetë i kinemasë.
Sipas të dhënave rezulton se janë në rritje shqetësimet brenda komunitetit artistik mbi ndikimin e IA-së në krijimtarinë dhe të drejtat e artistëve. Këtë e deshmon Greva e aktorëve të Hollivudit për kufizimin e përdorimit të inteligjencës artificiale, Skenaristët kanë shprehur shqetësime mbi përdorimin e IA-së për të "shkruar apo rishkruar materiale artistike", duke kërkuar kufizime për të ruajtur autenticitetin e veprave të tyre. Gjatë kësaj greve ata arritën një marrëveshje për të mbrojtur punën e tyre kundër përdorimit të paautorizuar të IA-së.
Kjo marrveshje u përkrh nga shumica e komunitetit artistik.
Anëtarja e sindikatës, Angela Jorgensen, thotë se kjo është e *“jashtëzakonshme”*.
“Vendosja e kufizimeve për përdorimin e inteligjencës artificale dhe moslejimi që ajo të aftësohet për vepra që krijojmë ne skenaristët, do të na ndihmojë që të ruajmë vendet tona të punës”.[9]
Aktori **Nicolas Cage** ka paralajmëruar artistët që të jenë të kujdesshëm ndaj kontratave që përfshijnë përdorimin e kopjeve dixhitale të tyre, veçanërisht në lidhje me pjesëmarrjen e tyre fizike dhe performancat e regjistruara.
Mëqë integrimi i IA-së në industrinë filmike sjell sfida që prekin autorësinë dhe autenticitetin artistik. Shumë artistë shprehin shqetësimin se IA mund të keqpërdoret për të kopjuar imazhin dhe zërin e tyre pa miratim, duke cenuar të drejtat dhe integritetin e performancave.
aktorët kanë frikë se imazhi ose zëri i tyre do të klonohet, ndërsa skenaristët kanë frikë se inteligjenca artificiale mund të përdoret për të shkruar skenarë dhe për t’u paguar më pak, ose se skriptet e tyre do të përdoren në trajnimin e robotëve. Nicolas Cage pranon se është 'i tmerruar' nga AI: 'Çfarë do të bësh me fytyrën time kur të kem vdekur?'[10]
Ndërsa John Cusack shpreh shqetësimin e tij se studiot e filmit nuk do të ndalen vetëm me përdorimin e Inteligjencës Artificiale (IA) për të krijuar ose zëvendësuar aktorët dytësorë (shtesat), por do të shkojnë edhe më tej. Ai e konsideron këtë proces

[8] Floqi, R. (2023, February 9). *ChatGPT: Premtimet dhe rreziqet e inteligjencës artificiale*. *Illyria*. https://www.illyria.com/chatgpt-premtimet-dhe-rreziqet-e-inteligjences-artificiale

[9] Islami, Z. (2024, December 10). *E ardhmja e inteligjencës artificiale: Mundësitë dhe sfidat për shoqërinë dhe industrinë*. *InForCulture*. https://inforculture.info/2024/12/10/e-ardhmja-e-inteligjences-artificiale-mundesite-dhe-sfidat-per-shoqerine-dhe-industrine/

[10] Russell, S. (2024, July 8). *Nicolas Cage admits he is 'terrified' of AI: 'What are you going to do with my face when I’m dead?' Entertainment Weekly*. https://ew.com/nicolas-cage-terrified-likeness-used-by-ai-8674746

si një "vjedhje gjigante të identitetit", duke sugjeruar se IA po përdoret për të marrë imazhin, zërin dhe punën krijuese të aktorëve pa lejen ose shpërblimin e duhur. Ai gjithashtu e quan këtë praktikë një "ndërmarrje kriminale", duke nënkuptuar se është një mënyrë e padrejtë dhe e pandershme e shfrytëzimit të artistëve për përfitime financiare nga studiot e mëdha të filmit.

"A mendoni se ata do të ndalojnë me shtesa? Kjo është ajo që është AI - një vjedhje gjigante e identitetit Copywrite [dhe] ndërmarrje kriminale."[11]

Regjisori Zack Snyder thekson se Hollywood-i duhet ta përqafojë teknologjinë e IA-së për të qëndruar konkurrues, ndonëse paralajmëron se, pavarësisht përfitimeve si ulja e kostove dhe thjeshtimi i skenave komplekse, kinematografia duhet të ruajë thelbin e saj artistik dhe kontributin njerëzor.

"Të edukosh veten dhe të kuptosh se çfarë mund dhe çfarë nuk mund të bëjë është e rëndësishme tani, veçanërisht aty ku ekziston në krijimin e imazheve dhe tregimin"[12]

Megjithatë, jo të gjithë ndajnë këtë këndvështrim kritik. Aktori dhe regjisori Ben Affleck shpreh një qëndrim më optimist, duke e cilësuar si "shumë të pamundur" që IA të shkatërrojë artin e filmit. Përkundrazi, ai beson se kjo teknologji mund të sjellë përmirësime dhe të ndihmojë industrinë në aspekte të caktuara.

"Ajo që IA do të bëjë është të ndërmjetësojë aspektet më të mundimshme, më pak kreative dhe më të kushtueshme të krijimit të filmave, duke ulur kostot, gjë që mund të ulë pengesat për hyrjen dhe të lejojë të dëgjohen më shumë zëra."[13]

Ky kontrast i theksuar mes qasjeve të ndryshme nënvizon faktin se ndikimi i Inteligjencës Artificiale në krijimtarinë filmike mbetet një çështje e debatueshme dhe me shumë dimensione.

Megjithse, Affleck pranoi se IA mund të ndikojë ndjeshëm në industrinë e efekteve vizuale. Ai e sheh IA-në më shumë si një mjet mbështetës sesa një zëvendësues të krijimtarisë njerëzore në kinematografi. Affleck ka një perspektivë optimiste mbi rolin e IA-së në përmirësimin, dhe jo eliminimin, e përfshirjes njerëzore në industrinë e filmit.

AI mund të shkruajë vargje imituese të shkëlqyera që tingëllojnë si elizabetiane; ajo nuk mund të shkruajë Shekspirin."[14]

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[11] Fu, E. (2023, July 14). *John Cusack calls studios a "criminal enterprise" in response to AI proposal*. *Consequence*. https://consequence.net/2023/07/john-cusack-studios-criminal-enterprise/

[12] Eakin, M. (2024, December 3). *Zack Snyder thinks Hollywood needs to get on board with AI or get left behind*. *WIRED*. https://www.wired.com/story/big-interview-zack-snyder-2024

[13] Russell, S. (2024, July 8). *Nicolas Cage admits he is 'terrified' of AI: 'What are you going to do with my face when I'm dead?' Entertainment Weekly*. https://ew.com/nicolas-cage-terrified-likeness-used-by-ai-8674746

[14] Russell, S. (2024, July 8). *Nicolas Cage admits he is 'terrified' of AI: 'What are you going to do with my face when I'm dead?' Entertainment Weekly*. https://ew.com/nicolas-cage-terrified-likeness-used-by-ai-8674746

Në punimin "Transformation vs Tradition: Artificial General Intelligence (AGI) for Arts and Humanities" nga Liu et al. (2023), autorët shqyrtojnë ndikimin dhe aplikimet e Inteligjencës Artificiale të Përgjithshme (AGI) në fushat e artit dhe shkencave humane. Ata diskutojnë se si AGI mund të përdoret për të krijuar orare xhirimi, për të gjetur lokacione të jashtme për filmime dhe rekuizita, për të përshpejtuar procesin e kërkimit të aktorëve dhe për të vlerësuar suksesin dhe të ardhurat e mundshme që mund të gjenerojë një film.
"Në mënyrë të veçantë, ata mund të bëjnë oraret e xhirimeve, të gjejnë vendndodhje dhe rekuizita të jashtme të filmit, të përshpejtojnë kërkimin e personit të castit dhe të vlerësojnë suksesin dhe të ardhurat e mundshme që filmi mund të fitojë."[15]
Algoritmet e Inteligjencës Artificiale tashmë ndihmojnë në planifikimin e xhirimeve dhe menaxhimin efikas të buxheteve.
Integrimi i IA në këto procese nuk sjell vetëm rritje të efikasitetit, por gjithashtu hap horizonte të reja për inovacion në industrinë filmike dhe mediatike. Një shembull konkret i këtij potenciali është edhe përdorimi i IA-së në zhvillimin e teknikave të avancuara për restaurimin dhe riparimin e imazheve të dëmtuara, duke kontribuar kështu në ruajtjen dhe rigjallërimin e arkivave vizuale.
''Riparimi i imazheve ka për qëllim rikonstruksionin automatik të pjesëve të humbura ose të dëmtuara të një imazhi.''[16]
Në dokumentarë, AI është shumë më e dobishme dhe e fuqishme, sepse puna nuk ka të bëjë vetëm me krijimin e një historie, por edhe me hulumtim, analizë dhe përpunim të materialit ekzistues.
Algoritmat e AI mund të përmirësojnë cilësinë e filmimeve të vjetra. Në dokumentarë, AI është më e fuqishme, sepse ndihmon në hulumtim, analizë dhe përpunim të materialeve arkivore.
Në filma artistikë, AI është ende e kufizuar, sepse nuk mund të gjenerojë histori me thellësi dhe emocion të vërtetë.
Inteligjenca Artificiale (IA) ka arritur përparime të jashtëzakonshme në fushën e krijimtarisë, duke qenë në gjendje të analizojë dhe të gjenerojë tekste, imazhe apo muzikë me kompleksitet të lartë. Megjithatë, ajo shpesh dështon të kuptojë dhe të lidhë informacionin në mënyrë që të krijojë një histori me koherencë afatgjatë dhe kuptim të thellë emocional. Kjo ndodh sepse IA nuk zotëron vetëdije, ndjeshmëri ose përvojë jetësore – elemente thelbësore në procesin krijues. Ndryshe nga krijuesit njerëzorë, IA nuk ka motivim artistik, vizion personal apo aftësinë për të reflektuar mbi kritikën dhe për ta riformuluar veprën në mënyrë të ndërgjegjshme. Ajo nuk mund të zhvillojë një stil autentik krijues dhe nuk ka kapacitet për të krijuar me vetëdije artistike. Prandaj, krijimet e saj, ndonëse mund të jenë teknikisht të avancuara, shpesh mbeten të zbrazëta nga përmbajtja emocionale dhe mungojnë në thellësi artistike.

[15] Liu, Z., Li, Y., Cao, Q., Chen, J., Yang, T., Wu, Z., Gibbs, J., Rasheed, K., Liu, N., Mai, G., & Liu, T. (2023). *Transformation vs tradition: Artificial general intelligence (AGI) for arts and humanities* (arXiv:2310.19626v1 [cs.AI]). arXiv. https://arxiv.org/pdf/2310.19626

[16] Caramiaux, B., Lotte, F., & Geurts, J. (Eds.). (2019). *AI in the media and creative industries*. New European Media. https://arxiv.org/pdf/1905.04175

Analiza e filmave të përzgjedhur:

Filmi to Dear Me (2019) demonstron se inteligjenca artificiale mund të përdoret si një mjet bashkëkrijues për të zgjeruar teknikat vizuale dhe animacionin, duke e bërë procesin e prodhimit më të aksesueshëm dhe eksperimentues.
Filmi *Sunspring* (2016) është një film i shkurtër shkencor i shkruar nga një inteligjencë artificiale e quajtur **Benjamin**, e krijuar nga Ross Goodwin. Filmi u realizua nga regjisori **Oscar Sharp** si pjesë e një eksperimenti mbi kreativitetin e IA-së në shkrimin e skenarëve. Ky projekt synonte të eksploronte aftësinë e një makine për të imituar stilin e shkrimit dhe për të prodhuar një narrativë.
Megjithëse *Sunspring* tregon se një IA mund të krijojë një strukturë të ngjashme me një skenar të vërtetë dhe të përdorë gjuhën me njëfarë koherence, vihet në pah edhe **mungesa e thellësisë emocionale**. Skenari rezulton i cekët dhe nuk arrin të përcjellë ndjenja apo mesazhe të qarta tek shikuesit, duke e kufizuar ndikimin e tij emocional. *"Si një narrativë, 'Sunspring' është një tragjedi ekzistenciale e errët, e cila merr një ton të çuditshëm për shkak të paaftësisë humoristike të skenarit për të kuptuar plotësisht gjuhën."*[17]
Ky film ka ngjallur reagime të ndryshme nga kritikët dhe shikuesit. Disa e vlerësojnë si një eksperiment novator në fushën e kinematografisë, ndërsa të tjerë theksojnë kufizimet e tij në aspektin e thellësisë emocionale dhe koherencës narrative.
Jennie Kermode, në rishikimin e saj për *Eye for Film*, vëren se aktorët bëjnë një punë të shkëlqyer në sjelljen e një koherence emocionale në një skenar që është "fascinueshëm i sheshtë"[18].
Ajo shton se, pavarësisht nga absurditeti i tij, skenari i Benjamin-it është superior ndaj shumë të tjerëve në zhanrin e shkencës fantastike që pretendohet të jenë shkruar nga njerëzit.
Në përgjithësi, "Sunspring" shihet si një eksperiment intrigues që eksploron potencialin dhe kufizimet e inteligjencës artificiale në krijimtarinë artistike.
To Dear Me" (2024) është një film i shkurtër prej 5 minutash e 30 sekondash, që kombinon elemente të **animacionit dhe artit vizual** të krijuar me ndihmën e **inteligjencës artificiale**. Regjisorët **Gisele Tong, Liufang Chen** dhe **Xiaoxuan Yan** realizuan këtë projekt si një përpjekje bashkëkrijuese me **IA-në e Ainimate Lab**, dhe filmi u shpërblye me çmim në **Festivalin e Filmit në Pekin 2024**.
Filmi rrëfen historinë e një vajze të re, e cila përballet me plagët emocionale të një familjeje jofunksionale dhe me pasiguritë e saj të brendshme. Gjatë udhëtimit të saj personal, ajo kërkon dashuri dhe në fund mëson të dojë veten.
Sipas përshkrimit nga Curious Refuge, *To Dear Me* është një shembull i fuqishëm i përdorimit të inteligjencës artificiale si mjet bashkëkrijues në procesin artistik, duke zgjeruar mundësitë vizuale dhe teknikat e animacionit. Regjisorja **Chen Liufang (2024)** thekson se: ''përdorimi i aktorëve të vërtetë dhe i pamjeve të drejtpërdrejta

[17] Brannan, A. (2016, June 12). *An in-depth analysis of Sunspring (2016), the short film written by a computer*. CineFiles Movie Reviews. https://cinefilesreviews.com/2016/06/12/an-in-depth-analysis-of-sunspring-2016-the-short-film-written-by-a-computer/
[18] Kermode, J. (2016, June 14). *Sunspring (2016) film review*. Eye for Film. https://www.eyeforfilm.co.uk/review/sunspring-2016-film-review-by-jennie-kermode

kontribuoi në krijimin e një përmbajtjeje më të qëndrueshme dhe të kontrolluar, në krahasim me rezultatet shpesh të paparashikueshme të gjenerimit nga tekstet ose imazhet.'' Megjithëse IA ndihmon në disa procese, puna krijuese dhe kontributi njerëzor mbeten vendimtarë — diçka që u dëshmua edhe nga puna tre mujore për realizimin e këtij filmi të shkurtër.
"A mund të mësojë inteligjenca artificiale të performojë vetë në të ardhmen? E shoh këtë me optimizëm, por do të kërkojë shumë trajnim"[19],-
Ky film është vlerësuar për qasjen e tij inovative në përdorimin e inteligjencës artificiale në krijimtarinë vizuale. Përdoruesit në platformën Reddit kanë theksuar veçanërisht stilin unik grafik, i cili kombinon vizatime të dorës dhe modele 3D të stilizuara me animacione të gjeneruara nga IA, duke rezultuar në një vepër mbresëlënëse me një paletë ngjyrash të pasur dhe tërheqëse.

To Dear me - një film vizatimor i gjeneruar nga inteligjenca artificiale, i cili, ndonëse nuk përdor fare dialog apo fjalë, **arrin të ndërtojë një narracion të kuptueshëm dhe emocionalisht të qasshëm**. Historia zhvillohet përmes **pamjeve të animuara dhe simboleve vizuale**, duke i ofruar shikuesit mundësinë të krijojë kuptim pa ndërmjetësimin e gjuhës së folur.
Atlas" është një film i vitit 2024, i drejtuar nga Brad Peyton, me Jennifer Lopez në rolin kryesor si analiste e të dhënave që ka një dyshim të thellë ndaj inteligjencës artificiale. Në një të ardhme dystopike, ajo e gjen veten të detyruar të bashkëpunojë me IA për të kapur një robot rebel, duke u përballur me sfida të mëdha.
Filmi **Atlas** përmban emocione kontradiktore dhe është kritikuar për ngjashmërinë me produksione të tjera dhe për mungesën e zhvillimit të thellë të karaktereve, duke e bërë atë të duket si një përzierje e elementeve nga filma të tjerë shkencorë. Historia fokusohet te një protagonistë cinike dhe sarkastike, e cila në një mision të rrezikshëm në një planet të paqëndrueshëm duhet të bashkëpunojë me një inteligjencë artificiale, Simon, për të mbijetuar. Megjithatë, kritika vlerësojnë se pavarësisht elementeve interesante, filmi nuk sjell diçka të re në zhanrin e shkencës fantastike.
"Një narrativë -- dhe shumë imazhe gjithashtu -- që është ndërtuar mbi filma shumë më të mirë." është një citat i drejtpërdrejtë nga kritiku Tim Cogshell në rishikimin e tij për filmin "Atlas" (2024)[20].
"Atlas" reflekton mbi shqetësimet dhe dilemat etike që shoqërojnë integrimin e inteligjencës artificiale në shoqëri, duke përfshirë frikën ndaj autonomisë së saj dhe nevojën për bashkëpunim mes njeriut dhe makinës Connor Jameson e quan "Atlas" një "pretendent për filmin më të keq të vitit," duke shtuar se "filmi zhgënjeu edhe pritshmëritë më të ulëta."[21]

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Atlas paraqet një estetikë të theksuar futuriste, me dizajn skenik dhe efekte vizuale që e vendosin rrëfimin në një të ardhme të teknologjizuar dhe të zymtë. Filmi përqendrohet në bashkëveprimin mes njeriut dhe inteligjencës artificiale, duke eksploruar një marrëdhënie të tensionuar, por edhe të domosdoshme për mbijetesën. Pra në tre këta filma vërehet se IA ka pas ndikimi në strukturën narrative dhe gjuhën filmike. Duke analizuar filmat e lartpermendur vërehet IA jo vetëm që ndikon në mënyrën se si krijohen tregimet, por edhe në mënyrën se si ato perceptohen nga audienca, duke futur qasje të reja në ndërtimin e skenarëve dhe elementëve vizualë.
Një aspekt i papërmendur deri më tani në analizat teorike të filmit *Sunspring* është mosharmonia midis dialogut dhe pamjes filmike apo moskoherenca pamje-zë si tregues i autorësisë jo-njerëzore. Në disa raste, dialogët duken të formuluar konstruktivisht dhe ndjekin një logjikë të brendshme, por nuk përputhen me veprimet e personazheve në kuadër, ose me kohëzgjatjen e pamjeve vizuale. Për shembull, një fjali e gjatë shpërndahet brenda një plani të shkurtër pa ndonjë ndërlidhje ekspresive me gjestin, ose, në raste të tjera, veprimi i aktorit është i deformuar vizualisht – si në skenën ku dora "shkrihet" në imazh në vend që të ngrihet gradualisht. Kjo krijon një ndjenjë të theksuar të mosnatyrshmërisë dhe e thekson mungesën e kontrollit njerëzor tradicional mbi montazhin, mizaskenën dhe sinkronizimin pamje-zë.
Qasja e filmit to dier me tregon se AI është në gjendje të riprodhojë forma të thjeshta të narracionit vizual, veçanërisht kur ka më pak elementë kompleksë për t'u sinkronizuar (si aktorë realë, mizaskena, kamera reale, montazh dinamik). Filmi funksionon si një sekuencë poetike vizuale, ku emocioni dhe kuptimi lindin përmes ngjyrave, lëvizjes dhe metaforës pamore.
Atlas - Ndonëse ky stil vizual nuk përputhet plotësisht me preferencat e mia estetike – për shkak të ngarkesës së efekteve dhe dizajnit të ftohtë futurist – nuk mund të mohohet koherenca vizuale dhe ndërtimi i një bote të veçantë filmike, e cila pasqyron temën qëndrore: sfidën për të bashkëjetuar me inteligjencën jo-njerëzore.
Pra siç shihet kufijtë e kreativitetit të IA-së mbeten të dukshëm, veçanërisht në aspektet që lidhen me emocionet, intuitën dhe origjinalitetin, por IA mund të funksionojë si një ndihmës i fuqishëm në procesin krijues, duke u integruar si mjet që e pasuron por nuk e zëvendëson rolin e njeriut në artin dhe filmin.

Përfundim

Roli i skenaristit nuk po zvogëlohet, por po transformohet. Ai po bëhet një redaktor dhe drejtues kreativ, duke përdorur IA për të gjeneruar ide dhe përmbajtje, por duke ruajtur kontrollin dhe autenticitetin artistik.
Inteligjenca artificiale nuk e zëvendëson autorin, por vepron si mjet bashkëpunues që pasuron vizionin krijues. Ajo ofron ide të reja dhe perspektiva të ndryshme, duke e ndihmuar autorin të eksplorojë drejtime të reja në krijimtari, por pa ia marrë rolin vendimtar dhe subjektivitetin artistik.
Për të shmangur rrezikun e zëvendësimit të njeriut nga inteligjenca artificiale, ajo duhet të integrohet si mjet ndihmës, jo si zëvendësues. Kjo do të thotë që krijuesit të ruajnë kontrollin mbi vizionin artistik dhe të përdorin IA për të zgjeruar imagjinatën, gjeneruar ide alternative, ose për të përshpejtuar procesin teknik. Krijimi i rregullave

etike dhe kufijve të qartë në përdorimin e saj siguron që IA të mbështesë dhe jo të zëvendësojë kreativitetin njerëzor.
Edhe pse inteligjenca artificiale analizon dhe kombinon të dhëna me efikasitet, ajo mbetet e kufizuar në krijimin e ideve origjinale. IA zakonisht riprodhon elemente ekzistuese, ndërsa kreativiteti njerëzor buron nga instinkti, pasioni dhe frymëzimi – dimensione që një makinë nuk mund t'i përjetojë plotësisht.
Megjithëse IA ka sjellë mundësi të reja në krijimin e përmbajtjes, ajo përballet ende me kufizime thelbësore që lidhen me mungesën e vetëdijes, përvojës jetësore dhe ndjeshmërisë artistike.
Aktualisht, IA-së i mungon vetëdija artistike, ndaj krijimet e saj mbeten të kufizuara në interpretim dhe ndjeshmëri njerëzore.
Kufizime Ligjore dhe Etike – Çështjet e të drejtave të autorit, plagiaturës dhe përdorimit të materialeve të trajnimit pa leje janë ende pika të debatueshme në krijimtarinë e bazuar në IA.
Megjithatë, ndërsa IA vazhdon të evoluojë dhe roli i saj në industritë krijuese zgjerohet, rrjedhimisht lind nevoja për një reflektim të vazhdueshëm mbi ndikimin e saj në art dhe konceptin e autorësisë. Kjo situatë kërkon një balancim të kujdesshëm mes përfitimeve që sjell teknologjia dhe ruajtjes së vlerave tradicionale krijuese dhe etike që qëndrojnë në themel të industrisë së filmit.
Disa argumentojnë se arti nuk është vetëm një akt krijimi, por edhe një marrëdhënie mes veprës dhe shikuesit. Nëse një vepër e krijuar nga një algoritëm shkakton emocione, frymëzim apo reflektim tek publiku, ajo mund të përmbushë funksionin e artit. Përkufizimi i artit dhe autenticitetit është thelbësor në këtë debat: nëse arti konsiderohet si një shprehje që buron vetëm nga përvoja dhe ndjeshmëria njerëzore, atëherë Inteligjenca Artificiale nuk mund të krijojë "art të mirëfilltë". Por nëse vlerësimi i artit bazohet në ndikimin që ai ka tek publiku — si emocionimi, reflektimi apo frymëzimi — atëherë edhe krijimet e IA-së mund të konsiderohen pjesë legjitime e skenës artistike bashkëkohore.
Ky studim më ka çuar drejt një pyetjeje që prek thelbin e marrëdhënies sonë me artin: A po krijon inteligjenca artificiale një audiencë të re. Një audiencë që ndjen ndryshe, përjeton ndryshe, dhe vlerëson ndryshe?
Në këtë udhëkryq mes njeriut dhe makinerisë, lind dilema nëse emocioni dhe lidhja njerëzore po zbehen, ndërsa krijimtaria lëviz drejt një forme të re, ende të paemëruar. Është një çeshtje që kërkon hulumtim të mëtejshëm – jo vetëm mbi artin, por mbi vetë natyrën tonë.

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Përdorimi i inteligjencës artificiale në gazetarinë ekonomike: mundësitë dhe rrisqet

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Abstrakt

Përdorimi i inteligjencës artificiale (IA) në gazetarinë ekonomike dhe të biznesit është rritur ndjeshëm në rang global duke ndikuar në shpejtësinë, cilësinë dhe saktësinë e raportimit. Ky zhvillim merr rëndësi të veçantë për vende si Shqipëria ku media përballet me një sërë sfidash jo vetëm të aspektit teknologjik por edhe financiar, menaxherial, etj. Në këtë kontekst, qëllimi i studimit është të analizojë nivelin e përdorimit të IA nga gazetarët shqiptarë që mbulojnë fushën e ekonomisë, biznesit dhe financës; ndikimin dhe qëllimin e përdorimit në punën e tyre si dhe perceptimet për të ardhmen e profesionit. Metodologjia e studimit bazohet në të dhëna sasiore të përftuara nga pyetësorë të realizuar me gazetarë ekonomie të mediave të ndryshme të cilat ndërthuren me të dhëna cilësore të dala nga intervista të thelluara me studjues dhe ekspertë të fushës. Gjetjet e studimit tregojnë se përdorimi i IA është ende në fazën fillestare pasi vetëm një pjesë e vogël e gazetarëve e përdorin rregullisht në përditshmërinë e tyre ndërsa shumica e përdorin në mënyrë sporadike kryesisht për kërkim/përmbledhje informacioni, redaktim teksti apo analiza financiare. Gazetarët vlerësojnë se teknologjia ka përmirësuar cilësinë e raportimit por shqetësim kryesor mbetet mungesa e saktësisë së informacionit të gjeneruar nga IA, çka cënon besueshmërinë dhe ngre pikëpyetje mbi etikën e përdorimit të kësaj teknologjie të re në gazetari. Rezultatet e studimit shtrojnë nevojën për trajnime të gazetarëve për përdorimin e inteligjencës artificiale në mënyrë që jo vetëm të maksimizohen përfitimet por edhe të identifikohen e zvogëlohen rreziqet nga shfrytëzimi i saj.

Fjalë kyç: Inteligjenca artificiale (AI), gazetaria ekonomike dhe e biznesit, analiza financiare, cilësi informacioni, besueshmëri, etikë.

Hyrje

Ndikimi i inteligjencës artificiale (IA) në industrinë e medias është shumëdimensional duke përfshirë krijimin e përmbajtjes, shpërndarjen si dhe mënyrën se si audiencat ndërveprojnë me informacionin. Specifikisht, në fushën e gazetarisë ekonomike dhe të biznesit përdorimi i IA është rritur ndjeshëm në vendet e zhvilluara perëndimore duke ndikuar në shpejtësinë, cilësinë dhe saktësinë e raportimit. Ky zhvillim merr rëndësi të veçantë për vende si Shqipëria ku media

përballet me një sërë sfidash jo vetëm të aspektit teknologjik por edhe financiar, menaxherial, etj.

Studimet dhe artikujt shkencorë mbi përdorimin e inteligjencës artificiale në median shqiptare janë të paktë në numër, teksa asnjë prej tyre nuk ka në fokus përdorimin e IA në lajmet e sektorit të ekonomisë, biznesit dhe financës. Studimi më i fundit i realizuar nga Qendra për Transparencë dhe Informim të Lirë në vitin 2024 nxjerr në pah se televizionet shqiptare janë në hapat fillestarë të përdorimit të IA dhe se gatishmëria për përdorimin e IA është akoma e ulët, në masën 25%. Sipas këtij studimi, redaksitë televizive janë ende të papërgatitura për përdorimin e IA.

Në këtë kontekst, qëllimi i studimit është të analizojë nivelin e përdorimit të IA nga gazetarët shqiptarë që mbulojnë fushën e ekonomisë, biznesit dhe financës; ndikimin dhe qëllimin e përdorimit në punën e tyre si dhe perceptimet për të ardhmen e profesionit. Disa prej pyetjeve kërkimore të cilave synojmë t'ju përgjigjemi janë: Sa e përdorin gazetarët e ekonomisë IA në përditshmërinë e tyre? Cilat mjete/platforma të IA përdorin më shumë? Për çfarë qëllimesh/detyrash e përdorin kryesisht? Si ka ndikuar IA në cilësinë e raportimit? Cilat janë shqetësimet kryesore lidhur me përdorimin e IA? A duhet të rregullohet përdorimi i IA në gazetarinë ekonomike? Si do të jetë e ardhmja e IA në gazetarinë ekonomike? A do ta zëvendësojë punën e gazetarit?

Ndërkaq, gjetjet e këtij studimi mund të shërbejnë për të nxitur përdorimin e IA jo vetëm në gazetarinë ekonomike dhe biznesit por edhe më gjerë, për zhvillimin e trajnimeve të gazetarëve me ekspertë të inteligjencës artificiale dhe teknologjisë si dhe për pasurimin e mëtejshëm të literaturës ekzistuese në këtë fushë.

Rishikim i literaturës

Gazetaria është formësuar gjithmonë nga teknologjia (Pavlik, 2000). Për më shumë se një dekadë inteligjenca artificiale (IA) ka ushtruar presion të konsiderueshëm mbi industrinë dhe biznesin e medias (Opdahl et al. 2023) duke paraqitur sfida dhe mundësi lidhur me mënyrën e prodhimit, shpërndarjes dhe konsumit të përmbajtjes mediatike. Afro 11 vjet pas korrikut 2014, kohë kur *Associated Press* filloi të automatizojë procesin e gjenerimit të raporteve financiare të korporatave duke përdorur platformën *Wordsmith,* të zhvilluar nga *Automated Insights* me të dhëna të ofruara nga *Zacks Investment Research*, studimet tregojnë se shumë kompani mediatike në vendet e zhvilluara perëndimore kanë zgjeruar përdorimin e mjeteve të inteligjencës artificiale (Radcliffe, 2025; Newman, 2024; Shi & Sun, 2024; Nishal & Diakopoulos, 2023; Reuters Institute 2023; Graefe, 2016; Dörr, 2015).

Lajmet e automatizuara janë përhapur gjerësisht çka tregon një integrim më të madh të algoritmeve dhe automatizimit në gazetari (Newman, 2024; Lewis et al., 2019; Anderson, 2018; Bucher, 2018). Deri në vitin 2026 parashikohet që pjesa më e madhe e përmbajtjes online do të jetë e prodhuar nga IA (Newman, 2024) ndërsa ndikimi më i madh duket se është në gazetarinë e biznesit e financës, në të

ashtuquajturat 'përmbajtje rutinë' siç cilësohen raportet financiare të korporatave, për tema të përsëritura për të cilat ka të dhëna të sakta dhe të strukturuara (Graefe, 2016).

Ndërsa inteligjenca artificiale gjeneruese - teknologjia që mbështet ChatGPT dhe mjete të ngjashme - depërton në çdo cep të internetit, korporatat e mëdha po përballen me faktin nëse efikasiteti i rritur që ofron i tejkalon rreziqet e mundshme të të drejtave të autorit dhe sigurisë. Disa kompani po miratojnë ndalime të brendshme për mjetet e IA-së gjeneruese ndërsa punojnë për ta kuptuar më mirë teknologjinë, dhe të tjera tashmë kanë filluar t'ua prezantojnë këtë teknologji në modë punonjësve të tyre (Korn, 2023). Si një rast tipik në botën e gazetarisë, Korn citon kryeredaktorin e *Insider*, Nicholas Carlson, i cili inkurajon gazetarët të gjejnë mënyra për të përdorur inteligjencën artificiale në redaksi. Duke iu referuar inteligjencës artificiale si 'një cunami që po vjen' Larson thotë se "mund ta përdorim ose të shkatërrohemi prej tij. Por do të jetë shumë argëtuese ta përdorim dhe do të na bëjë më të shpejtë dhe më të mirë."

Shumë studiues argumentojnë se IA ka transformuar thelbësisht rolin e gazetarit, duke kaluar përtej thjesht prodhimit të informacionit në shërbimin si verifikues i fakteve (Shi & Sun, 2024). Falë automatizimit të lajmeve, gazetarët po marrin role të reja si "redaktorë automatizimi" dhe "meta-shkrues", duke kontribuar në përmirësimin e sistemeve të IA në raportimin e lajmeve (Graefe, 2016). Sipas Dhiman (2023) inteligjenca artificiale për gazetarinë është një mjet i shkëlqyer që ofron shumë përfitime. Potenciali i IA-së konsiston jo vetë në krijimin e përmbajtjes së besueshme por edhe në promovimin e diversitetit në raportim përmes paraqitjes së perspektivave të ndryshme mbi ngjarjet çka sjell narrativa të balancuara (Opdahl et al, 2023). Autorët Nishal & Diakopoulos (2023) mbështesin integrimin e IA në gazetari në mënyrë profesionale, pa cënuar autorësinë, verifikimin e fakteve si dhe etikën profesionale. Duke e ndarë procesin e prodhimit të lajmeve në tre faza kryesore, ata rendisin pikat kryesore ku mund të kontribuojë IA: 1. Në mbledhjen/gjurmimin e informacionit (*newsgathering*); 2. prodhimin e përmbajtjes (*news production*) si dhe 3. në shpërndarje – duke mundësuar ofrimin e përmbajtjes së personalizuar për audienca të ndryshme.

Por, a mundet IA, robotët të zëvendësojnë gazetarët? Përgjigjja duket se nuk është aq e thjeshtë. Në artikullin e titulluar 'Kujdes, prezantues lajmesh, inteligjenca artificiale po vjen' Zhang (2019) argumenton se të paktën për momentin, robotët nuk do t'i zëvendësojnë gazetarët. Megjithatë, Zhang e mbyll artikullin duke thënë se prezantuesit e lajmeve, dhe në fakt të gjithë gazetarët, duhet të mprehin aftësitë e tyre dhe të zhvillojnë tipare inovative për t'iu kundërvënë kërcënimit që robotët mund të paraqesin në të ardhmen për punën e tyre. Disa studime tregojnë se shumica e gazetarëve besojnë se robotët do të kenë vetëm një rol plotësues për punën e tyre dhe jo zëvendësues. Megjithatë, krijimi i automatizuar i përmbajtjes mund të sjellë konkurrencë më të madhe dhe rreziqe serioze për stabilitetin dhe sigurinë e punës së

gazetarëve (Moravec et al, 2024). Në rastin e Shqipërisë kemi të bëjmë me dy qëndrime ekstreme: është një palë që mbyll sytë dhe nuk do t'ia di fare se jemi para një revolucioni brenda revolucionit numerik, jemi në një revolucion tjetër që është inteligjenca artificiale dhe pala tjetër që thotë se kjo do të zëvendësojë njeriun, do të zëvendësojë gazetarin (Fuga, 2025).

E ardhmja e IA si dhe raporti mes gazetarisë tradicionale dhe asaj të automatizuar mbetet një temë e diskutueshme mes ekspertëve të fushës. Në vitin 2016 Graefe parashikonte se në të ardhmen, gazetaria njerëzore dhe ajo e automatizuar kishte gjasa të integroheshin ngushtë dhe të formonin një marrëdhënie që Reginald Chua e përshkruante si një 'martesë njeri-makinë'. Sipas Dhiman (2023) inteligjenca artificiale dhe e ardhmja e gazetarisë ecin dorë për dore më njëra-tjetrën ndërsa shkalla në të cilën mund të përdoret inteligjenca artificiale në gazetari mbetet ende e paeksploruar. Përsa iu takon gazetarëve, studimet tregojnë se ndajnë qëndrime të ndryshme lidhur me të ardhmen e teknologjive të inteligjencës artificiale. Në njërën anë mbizotëron një qasje optimiste, ku përdorimi i IA, specifikisht automatizimi shihet si mundësi për t'u përqendruar më shumë në gazetarinë investigative dhe analitike (Shi & Sun, 2024; Carlson, 2014; Dalen, 2012;) si dhe në anën tjetër një qasje pesimiste që e vendos theksin tek shqetësimet etike në lidhje me IA-në dhe ndikimin e saj në industrinë e medias (Dörr, 2023; Radcliffe, 2025; Broussard, 2018; Dörr & Hollnbuchner, 2017).

Në aspektin etik, autorë të ndryshëm argumentojnë se IA kompromenton profesionalizmin në gazetari teksa adresojnë çështje që kanë të bëjnë me përgjegjësinë, objektivitetin, transparencën, kontrollin, sigurinë, të drejtat e autorit, etj., (Dörr, 2023; Fernandez et al, 2023; Diakopoulos, 2019; Dörr & Hollnbuchner, 2017; Graefe, 2016). Duke iu referuar gazetarisë algoritmike, Broussard (2018) thekson nevojën për transparencë dhe përgjegjësi veçanërisht në rastet kur lajmet prodhohen nga algoritme, IA. Duke i qëndruar idesë se "Pa gazetarë, nuk ka gazetari" Fernández et al. (2023) bëjnë thirrje për të mbështetur profesionalizmin gazetaresk dhe vlerat e tij thelbësore.

Metodologjia

Studimi mbështetet në kombinimin e metodave shkencore sasiore e cilësore. Të dhënat sasiore janë përftuar nga pyetësorë të realizuar me gazetarë që mbulojnë sektorin e ekonomisë, biznesit dhe të financës në periudhën mars-prill 2025. Gazetarët e anketuar janë të punësuar në mediat kryesore në vend përfshirë media gjeneraliste, informative apo të profilizuara në raportimin e ekonomisë dhe biznesit si: Tv Klan, Top Channel, News 24, Vizion Plus, RTSH, Ora News, A2 CNN, EuroNews, ABC Tv, Report Tv, Syri Tv, MCN Tv, Fax News, Scan Tv, Revista Monitor, media online, agjenci lajmesh, radio, shtypin e shkruar, etj.

Kampioni i studimit përbëhet nga 36 gazetarë të anketuar, kampion përfaqësues ky referuar faktit që numri i gazetarëve të ekonomisë në redaksitë mediatike varion nga

1 deri në 2 gazetarë. Nga totali i të anketuarve 80.6% (29) janë femra dhe 19.4% (7) janë meshkuj. Ndërkaq, 47.2% e të anketuarve janë të grupmoshës 25-34 vjeç, 36.1% i përkasin grupmoshës 35-44 vjeç, 8.3% deri në 24 vjeç dhe po kaq janë të grupmoshës 45-54 vjeç. Nga totali i të anketuarve 61.1% janë të punësuar në televizion, 19.4% në media online, 8.3% në revistë, 5.6% në agjenci lajmesh, 2.8% në radio dhe shtypin e shkruar, tjetër 2.8%. Përsa i përket arsimimit, shumica e gazetarëve që mbulojnë fushën e ekonomisë kanë përfunduar studimet master, konkretisht 75% (27) ndërsa 25% (9) zotërojnë diplomë bachelor. Gazetarët e anketuar kanë përvojë relativisht të gjatë në ushtrimin e profesionit, specifikisht 36.1% kanë mbi 10 vjet përvojë, 44.4% kanë 6 -10 vjet përvojë si dhe 19.4% kanë 1-5 vjet përvojë në gazetarinë ekonomike.

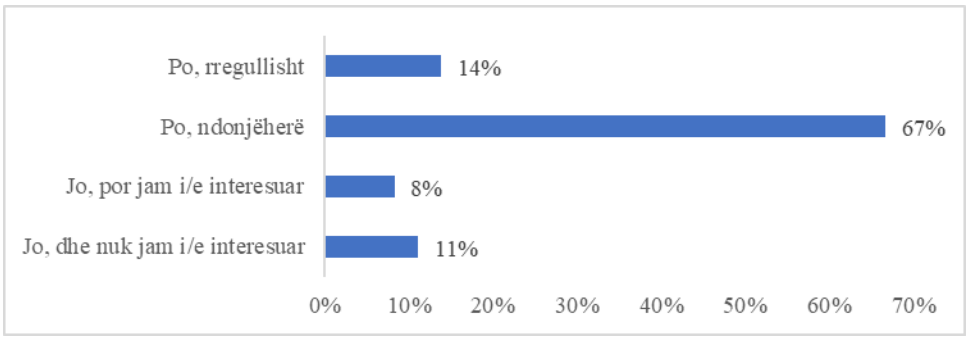
Si instrument kërkimi u hartua një pyetësor i organizuar në katër pjesë: në pjesën e parë janë përfshirë të dhëna mbi profilin e gazetarëve të anketuar: mosha, gjinia, arsimimi, eksperienca, lloji i medias ku punojnë; në pjesën e dytë përfshihen të dhëna mbi përdorimin e IA në gazetarinë ekonomike; në pjesën e tretë të dhëna mbi ndikimin dhe sfidat e përdorimit të IA si dhe në pjesën e katërt të dhëna mbi të ardhmen e IA në gazetarinë ekonomike dhe të biznesit. Krahas të dhënave sasiore, në studim janë përdorur edhe të dhëna cilësore të përftuara nga intervista të strukturuara me studiues dhe ekspertë të fushës.

Të dhënat e mbledhura u analizuan duke përdorur versionin 21 të SPSS ndërsa rezultatet e përftuara u interpretuan në linjë me qëllimin e studimit dhe pyetjet kërkimore të ngritura në këtë studim.

Analiza e të dhënave dhe gjetjet

Përdorimi i IA në gazetarinë ekonomike: Të dhënat e studimit tregojnë se shumica e gazetarëve të anketuar, konkretisht 72.2% kryesisht mbulojnë lajme të ekonomisë dhe biznesit, 30.6% lajme mbi politikat ekonomike, 19.4% lajme që kanë të bëjnë kryesisht me analiza tregu dhe financiare, 16.7% startups dhe inovacione biznesi ndërsa 11.1% tjetër (nuk e kanë specifikuar).

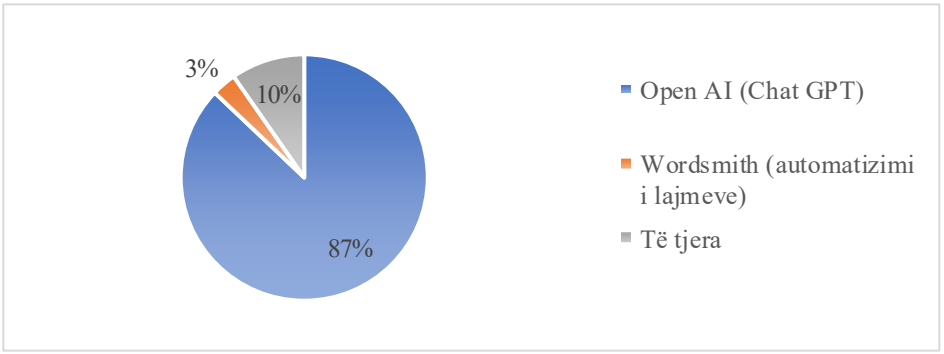
Figura 1: Përdorimi i mjeteve të IA në përdishmëri nga gazetarët e ekonomisë dhe biznesit



Më shumë se gjysma e gazetarëve, specifikisht 67% janë shprehur se në përditshmërinë e tyre përdorin ndonjëherë mjete të inteligjencës artificiale kundrejt një pjese të vogël të gazetarëve, konkretisht 14% që janë përdorues të rregullt të IA. Ndërkaq, 11% e gazetarëve nuk e përdorin dhe nuk janë të interesuar për inteligjencën artificiale ndërsa 8% nuk e përdorin por janë të interesuar (shih Figurën 1).

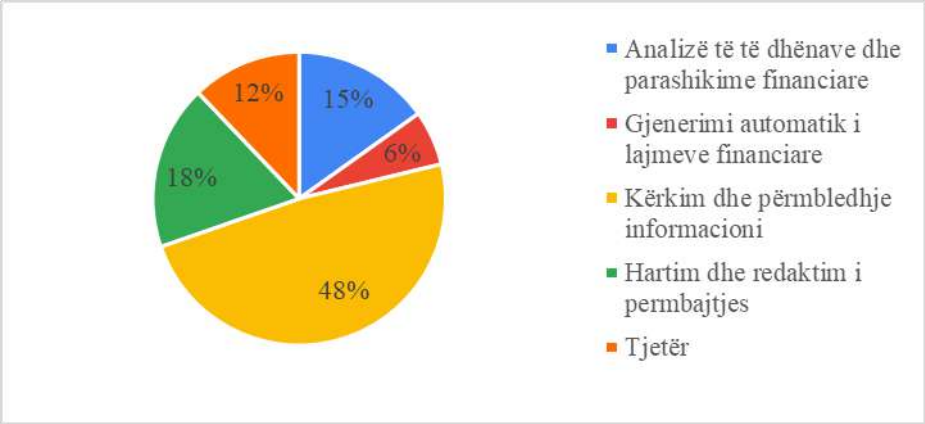
Pyetjes se cilat mjete ose platforma të IA keni përdorur në përditshmërinë tuaj, 87 % e gazetarëve të anketuar janë përgjigjur se përdorin platformën Open AI (Chat GPT), ndërsa vetëm 3% platformën Wordsmith. (Shih Figurën 2).

Figura 2: Platforma të IA që përdorin gazetarët ekonomikë



Të dhënat tregojnë se gazetarët përdorin mjete të IA-së për të realizuar një gamë të gjerë detyrash. Afërsisht gjysma e gazetarëve të anketuar, 48% janë shprehur se përdorin mjete të IA kryesisht për të kërkuar dhe mbledhur informacion çka nënkupton dhe gjenerimin e ideve, 18% i përdorin për hartimin dhe redaktimin e përmbajtjes ndërsa 15% për analizë të të dhënave ose parashikime financiare si dhe 6% për gjenerimin automatik të lajmeve financiare. (Shih Figurën 3).

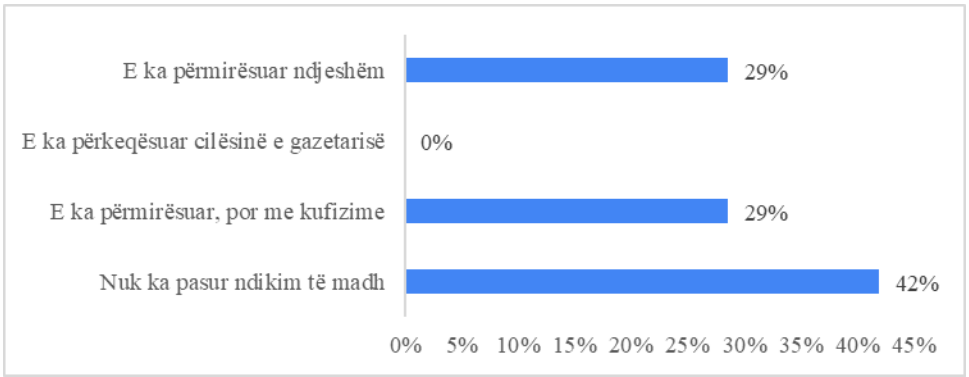
Figura 3: Qëllimet e përdorimit të IA nga gazetarët ekonomikë



Ndikimi & sfidat e përdorimit të IA në gazetarinë ekonomike: Gazetarët janë të ndarë në qëndrimet e tyre lidhur me ndikimin e IA në cilësinë e raportimit në gazetarine ekonomike dhe të biznesit. Aërsisht gjysma e gazetarëve të anketuar, 42% shprehen se IA nuk ka patur ndikim të madh në cilësinë e raportimit kundrejt 29% që shprehen se e ka përmirësuar ndjeshëm dhe po kaq 29.4% thonë se e ka përmirësuar cilësinë e raportimit por me kufizime. (Shih Figurën 4).

Ndërkaq, shqetësim kryesor për gati gjysmën e gazetarëve të ekonomisë të anketuar, konkretisht 49% e tyre është mungesa e saktësisë në informacion/rreziku i lajmeve të pasakta. Rreziku i dizinformimit dhe manipulimit të tregjeve perceptohet si shqetësim kryesor për 20% të gazetarëve ndërsa për 17% të gazetarëve shqetësim parësor është ndikimi në pavarësinë editoriale. Vetëm një pjesë e vogël e gazetarëve, 11% e tyre shohin si shqetësim kryesor humbjen e vendeve të punës si rezultat i përdorimit të IA në gazetari (shih Figurën 5).

Figura 4: Ndikimi i IA në cilësinë e raportimit në gazetarinë ekonomike dhe të biznesit

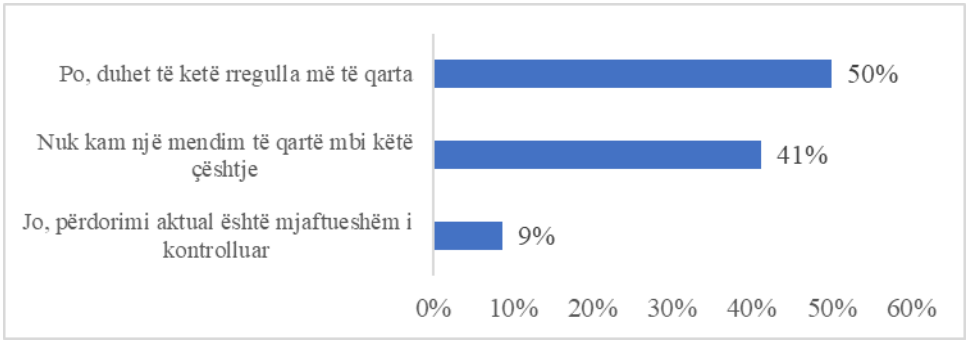


Këto shifra janë thuajse në një linjë me disa nga gjetjet e studimit '*Gazetaria në epokën e inteligjencës artificiale:Mundësi dhe sfida në Jugun Global dhe ekonomitë në zhvillim'* ku evidentohen disa nga shqetësimet kryesore të gazetarëve, konkretisht: ndikimi i inteligjencës artificiale në kreativitet dhe raportim origjinal 54.3%, erozioni i aftësive të të menduarit kritik 51.4% si dhe rreziku i rritjes së dezinformimit 49% (Radcliffe, 2025).

Figura 5: Shqetësimet kryesore në lidhje me përdorimin e IA në gazetarinë ekonomike

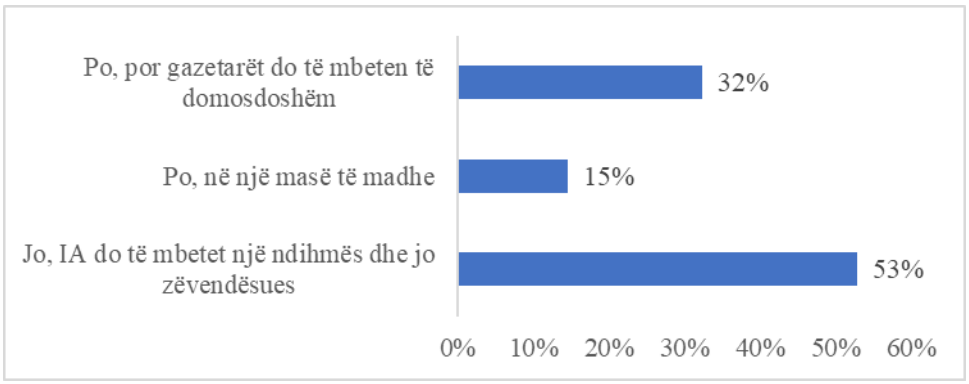
E ardhmja e AI në gazetarinë ekonomike dhe të biznesit: Gjysma e të anketuarve janë shprehur se në të ardhmen duhet të ketë rregulla më të qarta për përdorimin e IA në gazetarinë ekonomike kundrejt 9% që janë shprehur se përdorimi aktual i inteligjencës artificiale është mjaftueshëm i kontrolluar/rregulluar. Një pjesë e konsiderueshme e gazetarëve, specifikisht 41% janë shprehur se nuk kanë një mendim të qartë për këtë çështje (shih Figurën 6).

Figura 6: Rregullimi i përdorimit të IA në gazetarinë ekonomike



Pyetjes 'A mendoni se inteligjenca artificiale do të zëvendësojë një pjesë të konsiderueshme të punës së gazetarëve ekonomikë në të ardhmen?', 85 % e të anketuarve janë përgjigjur se IA do të ndihmojë një pjesë të punës së gazetarëve në të ardhmen por roli i saj nuk do të jetë zëvendësues por ndihmës pasi gazetarët do të jenë të domosdoshëm. Specifikisht, 53% e të anketuarve mendojnë se inteligjenca artificiale do të mbetet një mjet ndihmës dhe jo zëvendësues i punës së gazetarëve, 32% shprehen se IA do t'i ndihmojë por gazetarët do të mbeten të domosdoshëm. Vetëm 15% e gazetarëve shprehen se IA do të zëvendësojë në të ardhmen një pjesë të madhe të punës së tyre. (shih Figurën 7).

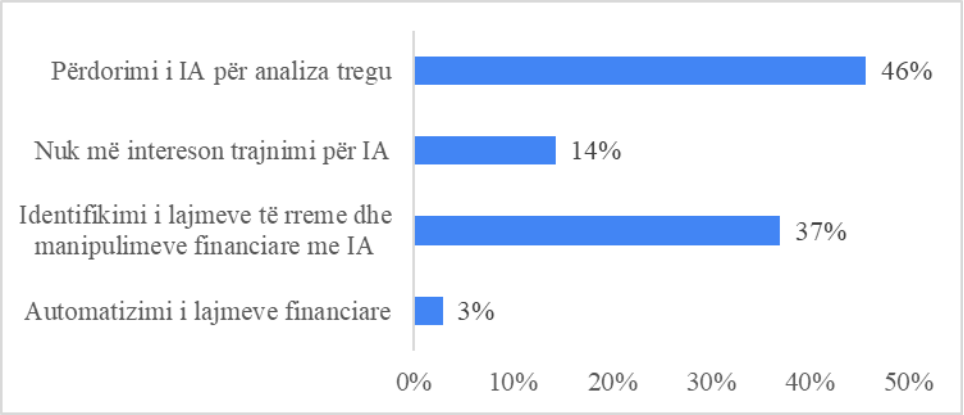
Figura 7: Opinione mbi marrëdhënien gazetari - IA në të ardhmen



Ndërsa vendet e zhvilluara kanë përparuar me integrimin e inteligjencës artificiale në proceset gazetareske, Shqipëria, vend me ekonomi në zhvillim përballet me një sërë pengesash që ndikojnë në përhapjen e inteligjencës artificiale. Sikurse shpjegon Radcliffe (2025) mungesa e trajnimeve ose mbështetja e pamjaftueshme e gazetarëve është vetëm një ndër pengesat kryesore për përhapjen e IA krahas pengesave të tjera siç janë: mungesa e aksesit në teknologjinë e nevojshme, faktit që trajnimet mbi modelet e inteligjencës artificiale mbështeten kryesisht në të dhëna në gjuhën angleze nga burime 'perëndimore', shumica e përdoruesve të inteligjencës artificiale janë autodidaktë si dhe shqetësimet në lidhje me saktësinë dhe besueshmërinë.

Bazuar në të dhënat e anketës rezulton se gazetarët shqiptarë janë të interesuar për zhvillimin e trajnimeve të cilat do të ndihmonin për përdorim më efikas të inteligjencës artificiale në realizimin e detyrave gazetareske. Pyetjes 'Çfarë trajnimesh do të dëshironit për të përdorur më mirë IA në gazetari?', 46% janë shprehur për përdorimin e inteligjencës artificiale për analiza tregu, 37% për identifikimin e lajmeve të rreme dhe manipulimeve financiare me IA si dhe 3% për automatizimin e lajmeve financiare. Vetëm një pjesë e vogël e gazetarëve të anketuar, specifikisht 14% nuk kanë shfaqur interes për zhvillimin e trajnimeve me fokus përdorimin më të mirë të inteligjencës artificiale në gazetari (shih Figurën 8).

Figura 8: Tematika e trajnimeve të nevojshme për përdorim më të mirë të IA në gazetari



Diskutime dhe Përfundime

Integrimi i inteligjencës artificiale në gazetarinë ekonomike dhe të biznesit në median shqiptare është ende në fazën fillestare diktuar nga një sërë pengesash kryesisht ekonomike e teknologjike. Një pjesë e vogël e gazetarëve përdorin rregullisht në përditshmërinë e tyre mjete të IA ndërsa shumica i përdorin në mënyrë sporadike zakonisht për kërkim/përmbledhje informacioni, hartim dhe redaktim të përmbajtjes apo për analiza financiare. Mjeti më i përdorur gjerësisht rezulton të jetë ChatGPT, i cili ndihmon gazetarët në realizimin e detyrave të ndryshme siç janë shkrimi i lajmeve dhe gjenerimi i titujve, analizimi i të dhënave për artikuj investigativ, verifikimi i fakteve, etj.

Gazetarët vlerësojnë se teknologjia ka përmirësuar disi cilësinë e raportimit por shqetësim kryesor mbetet mungesa e saktësisë së informacionit të gjeneruar nga IA, çka cënon besueshmërinë dhe ngre pikëpyetje mbi etikën e përdorimit të kësaj teknologjie në gazetari. Në këtë kontekst, ata mbështesin idenë se duhet të ketë korniza rregullatore më të qarta për përdorimin e IA në gazetari.

Integrimi gjithnjë e më i madh i inteligjencës artificiale në gazetari paraqet një sërë sfidash të karakterit etik të cilat nuk mund të injorohen. Çështje që kanë të bëjnë me besueshmërinë, përgjegjësinë, transparencën, kontrollin, vlerat e lajmit, e drejta e autorit, etj., duhet të shërbejnë jo vetëm si parime themelore në gazetari, por edhe si aspekte themelore të etikës gazetareske veçanërisht kur lajmet prodhohen nga algoritme.

Inteligjenca artificiale është si një asistent i gazetarëve, që do të thotë IA nuk mund të prodhojë këndvështrim, nuk mund të prodhojë vendim editorial, nuk mund të krijojë kontekst konjukturial, nuk mundet të vëzhgojë dhe të raportojë aktualitetin

me risitë e veta, nuk mund të bëjë *storytelling* për njerëz konkretë të jetës së përditshme por mund të bëjë kalkulime, mund të shkruajë një milion herë më mirë se njeriu po ti japësh faktet, kështu që ka një raport midis makinës dhe njeriut dhe kjo duhet të zhvillohet në fazën e sotme (Fuga, 2025). Kjo do të thotë se IA nuk do ta zhdukë profesionin e gazetarit tradicional, përfshirë edhe ata të fushës së ekonomisë dhe biznesit, por do ta transformojë, duke e zhvendosur fokusin nga raportimi rutinë i shifrave dhe fakteve tek hulumtimi, roli analitik dhe kreativ. Përsa i përket të ardhmes, përgjithësisht gazetarët shqiptarë nuk ndihen të kërcënuar nga IA pasi mendojnë se roli i IA do të jetë ndihmës dhe jo zëvendësues në punën e tyre. Ata besojnë se do të jenë të domosdoshëm në industrinë e informacionit edhe në të ardhmen ndërsa vetëm pak prej tyre shohin si kërcënim të mundshëm humbjen e vendeve të punës.

Rezultatet e studimit në tërësi tregojnë nevojën për zhvillimin e trajnimeve të vazhdueshme me gazetarët që mbulojnë sektorin e ekonomisë dhe financës me qëllim rritjen e aftësive teknologjike në dy drejtime kryesore: përdorimin e IA për analiza tregu si dhe për identifikimin e lajmeve të rreme dhe manipulimeve financiare. Trajnimet duhet të fokusohen gjithashtu në mënyrën se si mjetet e IA mund të përmirësojnë proceset gazetareske, si në aspektin e efikasitetit, kostove financiare ashtu edhe të cilësisë. Kjo do të ndikonte jo vetëm në maksimizimin e përfitimeve por edhe në identifikimin dhe zvogëlimin e rrisqeve nga përdorimi i IA në industrinë e medias.

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Aplikimi i AI-së (inteligjencës artificiale) dhe IoT (internet of things) në përpunimin e gjuhës natyrale në shërbim të komunitetit

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Abstrakt
Qëllimi i këtij punimi është ndërtimi i një pajisjeje interaktive që kombinon **Raspberry Pi**, një ekran me prekje (**touchscreen**) dhe algoritme të **inteligjencës artificiale** për të ofruar funksionalitetin **text-to-speech**. Pajisja synon të sigurojë një zgjidhje për përdoruesit që kanë nevojë për ndihmë zanore dhe ndërveprim më të avancuar me teknologjinë. Për të realizuar këtë projekt, pjesa harduerike përfshin përdorimin e një **Raspberry Pi**, i cili është i përshtatshëm për integrimin e komponentëve si një **touchscreen**, një modul zanor për përmirësimin e audios, dhe sensorë opsionalë për ndërveprime më të avancuara. Nga ana softuerike, **Python** do të përdoret për zhvillimin e aplikacionit që mundëson njohjen e tekstit dhe konvertimin e tij në të folur përmes teknologjive **text-to-speech**. Integrimi i **inteligjencës artificiale** në këtë sistem mundëson personalizimin e përvojës së përdoruesit, duke analizuar të dhënat dhe përmirësuar cilësinë e përgjigjeve zanore. Për shembull, modeli i AI-së mund të përshtatë intonacionin, të njohë komandat me një saktësi më të lartë dhe të mundësojë ndërveprime më natyrale. Kjo pajisje mund të përdoret në fusha të ndryshme si ndihmë për persona me aftësi të kufizuara, edukim interaktiv, automatizim i shërbimeve në kioska dixhitale apo asistentë zanorë të personalizuar. Përmes këtij punimi, do të analizohet procesi i ndërtimit të harduerit, zhvillimi i softuerit dhe optimizimi i tij për të siguruar performancë të lartë dhe përdorim të thjeshtë.

Fjalë kyç: IoT (internet of things), text-to-speech, python, AI (inteligjenca artificiale)

1. Hyrje

Në epokën e transformimit dixhital, përdorimi i sistemeve të bazuara në zë po fiton gjithnjë e më shumë terren për shkak të aftësisë së tyre për të ofruar ndërfaqe më natyrale, të qasshme dhe miqësore për përdoruesin në fusha të ndryshme si sistemet e informacionit publik, shtëpitë inteligjente, kujdesi shëndetësor dhe automatizimi industrial. Një nga teknologjitë më të avancuara në këtë drejtim është Google Cloud Text-to-Speech (TTS), një shërbim i fuqishëm cloud që konverton tekstin në të folur njerëzor duke përdorur modele të avancuara të të mësuarit të thellë (Google Cloud, n.d.).
Në të njëjtën kohë, zhvillimi i pajisjeve kompakte dhe me efikasitet energjetik si Raspberry Pi ka revolucionarizuar ndërtimin e sistemeve të ngulitura. Modeli më i fundit, Raspberry Pi 5, me një procesor ARM Cortex-A76 me katër bërthama në frekuencë 2.4 GHz dhe përmirësime të ndjeshme në GPU, ofron performancë të

mjaftueshme për aplikacione në kohë reale me një konsum të ulët energjie dhe kosto më të ulët sesa kompjuterët tradicionalë (Murphy, 2023).
Për zhvillimin e aplikacioneve të tilla, përdorimi i gjuhës programuese Python është gjerësisht i përhapur për shkak të thjeshtësisë, lexueshmërisë dhe komunitetit të gjerë të zhvilluesve. Versioni më i ri, Python 3.12, sjell përmirësime të dukshme në performancë, trajtimin e gabimeve dhe mbështetjen për tipizim, duke e bërë atë edhe më të përshtatshëm për integrim me API-të si Google TTS (Python Software Foundation, n.d.).

2. Arkitektura e sistemit

Arkitektura e propozuar për sistemin interaktiv me funksionalitet text-to-speech është e ndarë në dy komponentë kryesorë: arkitekturën harduerike dhe arkitekturën softuerike, të cilat punojnë në mënyrë të sinkronizuar për të siguruar ndërveprim të qetë, të shpejtë dhe të personalizuar me përdoruesin.

2.1. Arkitektura harduerike

Përbërësit harduerikë janë zgjedhur me qëllim të ndërtimit të një sistemi me kosto të ulët, por me performancë të mjaftueshme për aplikacione në kohë reale. Komponentët përfshijnë:
Raspberry Pi 4 Model B: Shërben si njësia qendrore për përpunim të të dhënave. Ky mikrokompjuter mbështet lidhje me touchscreen, audio, rrjet dhe pajisje të jashtme.
Touchscreen 7”: Përdoret për ndërveprim vizual me përdoruesin dhe për të shfaqur ndërfaqen grafike (GUI). Ekrani përkrah inpute përmes prekjeve kapacitive.
Modul zanor (USB Sound Card + Altoparlant): Për shkak të kufizimeve të daljes audio në Raspberry Pi, përdoret një kartë zanore USB për të përmirësuar cilësinë e zërit të daljes.
Burim energjie stabil (5V, 3A): Për të garantuar funksionim të pandërprerë të komponentëve.
Këta komponentë integrohen fizikisht në një kasë të vetme, e dizajnuar për transportueshmëri dhe përdorim në kushte të ndryshme mjedisore.

Figura 1: Pajisja e kompletuar

2.2. Arkitektura softuerike

Përbërësit softuerikë janë ndërtuar me gjuhën programuese Python 3 dhe përfshijnë:
Ndërfaqja përdoruesit (GUI): Zhvillohet përmes bibliotekës Tkinter, duke ofruar një ndërfaqe të thjeshtë dhe të qasshme për përdoruesin.
Moduli për text-to-speech (TTS):
gTTS (Google Text-to-Speech) për përdorim në ambiente me lidhje interneti.
ESpeak për përdorim offline, duke mbështetur motorët e integruar të sistemit si ESpeak.

2.3. Arkitektura funksionale (Workflow)

Përdoruesi jep hyrje përmes tastierës, ekranit me prekje apo zërit.
Sistemi përpunon hyrjen, nëse është zë e konverton në tekst.
Teksti analizohet për qëllimin dhe tonin e përshtatshëm.
Teksti konvertohet në të folur përmes modulit TTS.
Zëri riprodhohet përmes altoparlantëve.
Të dhënat e ndërveprimit ruhen për personalizime të ardhshme.

2.4. Përdorimi i AI-së: Natural Language Processing (NLP)

Natural Language Processing (NLP) është një fushë e inteligjencës artificiale që merret me ndërveprimin midis kompjuterëve dhe gjuhës njerëzore. Qëllimi i saj është të kuptojë, analizojë, interpretojë dhe gjenerojë gjuhën natyrore në një mënyrë të kuptueshme për kompjuterët.

2.4.1. Preprocessing (Parapërpunim i tekstit)

Teksti i dhënë përpunohet për ta bërë të kuptueshëm për algoritmin:

Tokenization: Ndahen fjalitë në fjalë të veçanta (tokens)

Lowercasing: Të gjitha fjalët kthehen në të vogla

Stopword Removal: Fshihen fjalët e zakonshme pa domethënie (p.sh. "dhe", "është")

Stemming / Lemmatization: Fjalët kthehen në formën e tyre bazë ("punuar" → "pun")

2.4.2. Feature Extraction (Nxjerrja e karakteristikave)

Bag of Words (BoW) ose TF-IDF përdoren për të shndërruar tekstin në vektorë numerikë që një model machine learning mund t'i përdorë.
Në sistemet moderne, përdoren embedding si Word2Vec, GloVe, ose transformer embeddings si BERT.

2.4.3. Modelimi (Modeling)

Në këtë fazë përdoren algoritme të AI për të mësuar nga teksti:
Klasifikimi: Për të kuptuar qëllimin (intent), si në chatbot ose TTS
Analiza sentimenti: Për të përcaktuar tonin (pozitiv/negativ)
Përgjigje automatike / përkthim: Si në Google Translate ose asistentë virtualë

3. Rezultatet eksperimentale dhe analiza

Pas përfundimit të fazës së zhvillimit dhe integrimit, prototipi i pajisjes u testua në një mjedis kontrolluar për të vlerësuar performancën funksionale, efikasitetin në

kohë reale dhe përvojën e përdoruesit. Qëllimi i testimit ishte të verifikohen karakteristikat kyçe të sistemit: saktësia në njohjen e të folurit, cilësia e të folurit të gjeneruar, koha e përgjigjes dhe stabiliteti i sistemit në përdorim të vazhdueshëm.

3.1 Mjedisi eksperimental

Testimi u realizua në laborator të informatikës në AAB dhe më pas në ambient zyre me zhurmë mesatare (35–45 dB). U përdorën 10 përdorues vullnetarë të ndarë në dy grupe:
Grupi A – përdorues me përvojë në teknologji,
Grupi B – përdorues me përvojë minimale ose pa përvojë.
Çdo përdorues ndërveproi me sistemin për rreth 15 minuta duke dhënë komanda tekstuale.

3.2 Parametrat e matur

Parametri	Vlera mesatare	Komente
Koha e përgjigjes (TTS offline)	0.8 sekonda	Me pyttsx3 dhe zë lokal
Koha e përgjigjes (TTS online)	1.2 sekonda	Me gTTS, varet nga lidhja internet
Cilësia e zërit (vlerësim 1-5)	4.3	Vlerësuar nga përdoruesit
Stabiliteti (pas 3h përdorimi)	100% funksionalitet	Pa ngadalësim apo bllokim

Tabela 1: Parametrat e testuar

3.3. Vlerësimi i përdoruesit
Pas testimit, përdoruesit plotësuan një pyetësor që vlerësonte:
lehtësinë në përdorim,
qartësinë e ndërfaqes,
kuptueshmërinë e zërit,
perceptimin për inteligjencën e sistemit.
Rezultatet treguan që 80% e përdoruesve e konsideruan sistemin shumë të lehtë për t'u përdorur, ndërsa 90% u shprehën të kënaqur me cilësinë e të folurit. Grupi B u shfaq veçanërisht i impresionuar nga ndërfaqja intuitive dhe përkthimi i menjëhershëm i zërit në tekst.
3.4. Analiza e rezultateve
Rezultatet tregojnë që prototipi përmbush qëllimet funksionale dhe operon me efikasitet të lartë në kushte reale. Dallimi mes përdorimit të TTS offline dhe online ishte minimal, por preferenca e përdoruesve shkonte drejt versionit lokal për shkak

të shpejtësisë dhe privatësisë. Integrimi i AI-së për personalizimin e intonacionit ndikoi pozitivisht në perceptimin e sistemit si më "i natyrshëm".

4. Përparësitë dhe mangësitë e sistemit

4.1 Përparësitë

4.1.1 Kosto e ulët dhe pajisje kompakte

Raspberry Pi dhe komponentët e tij periferikë janë relativisht të lirë dhe nuk zënë shumë hapësirë, çka e bën sistemin të përshtatshëm për përdorime mobile dhe vendosje në mjedise të ndryshme.

4.1.2 Mbështetje për shumë gjuhë

Google Cloud Text-to-Speech mbështet mbi 40 gjuhë dhe dialekte, duke përfshirë edhe gjuhën shqipe, që e bën sistemin të përdorshëm në mjedise multikulturore.

4.1.3 Ndërfaqe e thjeshtë dhe miqësore për përdoruesin

Touchscreen-i ofron një mënyrë intuitive për ndërveprim, veçanërisht për persona me aftësi të kufizuara ose fëmijë.

4.1.4 Zgjerueshmëri dhe modularitet

Sistemi mund të zgjerohet me komponentë të tjerë si sensorë ose modula GSM/GPS për përdorime në fushën e IoT dhe sistemet e kujdesit të personalizuar.

4.1.5 Inteligjencë në kohë reale

Duke përdorur Natural Language Processing - NLP

4.1.6 Open-source dhe fleksibil për zhvilluesit

Kodi i ndërtuar në Python është i hapur dhe i përshtatshëm për personalizime të mëtejshme sipas nevojave të aplikacionit.

4.2 Mangësitë

4.2.1 Varësia nga interneti për TTS cloud

Nëse përdoret Google Cloud TTS, një lidhje e qëndrueshme në internet është e domosdoshme, për një zë më cilësor.

4.2.2 Performancë e kufizuar për AI intensive

Raspberry Pi, ndonëse i fuqishëm për shumë detyra, ka kufizime në përpunime intensive të AI-së, veçanërisht për modele të mëdha ose shumë të trajnuara.

4.2.3 Cilësia e zërit varet nga altoparlanti

Nëse përdoret një altoparlant i dobët ose pa amplifikator, cilësia e zërit mund të mos jetë e kënaqshme për ambiente publike apo industriale.

4.2.4 Siguria dhe privatësia

Nëse përdoret cloud TTS, tekstet që dërgohen për konvertim ruhen dhe përpunohen në serverë të jashtëm, gjë që mund të sjellë shqetësime për privatësinë në aplikacione sensitive.

4.2.5 Kufizim në përpunim zanor dykahësh (input/output)

Sistemi aktual është njëkahësh (text → speech). Për një sistem të plotë interaktiv (si asistent virtual), do të duhej integrim i teknologjive për njohjen e të folurit (speech-to-text), që kërkon më shumë burime.

5. Puna e ardhshme (Future Work)

Megjithëse sistemi i ndërtuar ofron një zgjidhje funksionale dhe efikase për sintezën zanore me bazë në Raspberry Pi dhe Google TTS, disa përmirësime mund të bëhen në të ardhmen për ta rritur funksionalitetin, pavarësinë dhe përshtatshmërinë e tij në aplikacione më të gjera. Pikat më të rëndësishme për zhvillime të ardhshme janë si më poshtë:

5.1. Përmirësimi i cilësisë audio

Zëvendësimi i altoparlantit bazë me një modul audio me amplifikator ose me altoparlantë të jashtëm Bluetooth/Wi-Fi do të përmirësonte cilësinë e zërit dhe do ta bënte sistemin të përshtatshëm edhe për ambiente më të zhurmshme.

5.2. Shtimi i input-it zanor (Speech-to-Text)

Zhvillimi i një komponenti shtesë për **njohjen e të folurit** do ta kthente sistemin në një platformë të plotë interaktive. Kjo mund të realizohet me teknologji si **Vosk**, **Whisper** nga OpenAI, ose shërbimet e Google Cloud Speech-to-Text (Bahdanau, Cho, & Bengio, 2015). Zhvillimi i një komponenti shtesë për **njohjen e të folurit** do ta kthente sistemin në një platformë të plotë interaktive. Kjo mund të realizohet me teknologji si **Vosk**, **Whisper** nga OpenAI, ose shërbimet e Google Cloud Speech-to-Text.

5.3. Ruajtja dhe analiza e të dhënave

Integrimi i një sistemi të logimit lokal (p.sh., me SQLite) ose cloud për të regjistruar komandat, përdorimet dhe kohën e përgjigjes do të ndihmonte në analizën e performancës dhe personalizimin e sistemit (Jadhav, 2025). Integrimi i një sistemi të logimit lokal (p.sh., me SQLite) ose cloud për të regjistruar komandat, përdorimet dhe kohën e përgjigjes do të ndihmonte në analizën e performancës dhe personalizimin e sistemit.

5.4. Zgjerimi me sensorë dhe ndërveprim të zgjuar

Për aplikacione në ambient shtëpiak apo mjekësor, mund të integrohen sensorë të afërsisë, temperaturës, ose lëvizjes për të gjeneruar mesazhe zanore automatike në bazë të situatës.

5.5. Siguria dhe privatësia

Për përdorime në fushën e kujdesit shëndetësor ose të dhëna të ndjeshme, mund të implementohen masa si **kriptimi i të dhënave**, përdorimi i rrjeteve private lokale dhe kontrolle të aksesit (Liu, 2012). Për përdorime në fushën e kujdesit shëndetësor ose të dhëna të ndjeshme, mund të implementohen masa si **kriptimi i të dhënave**, përdorimi i rrjeteve private lokale dhe kontrolle të aksesit.

6. Kontributi shkencor:

Aplikimet potenciale të kësaj pajisjeje janë të shumta, duke përfshirë:
Asistencë për persona me vështirësi në të folur apo dëgjim; Pajisje edukative për shkolla dhe institucione arsimore; Zëvendësim i shërbimeve manuale në kioska elektronike; Asistentë zanorë për përdorim në shtëpi apo mjedise profesionale.
Kontributi kryesor i këtij punimi qëndron në ofrimin e një zgjidhjeje të qasshme, me kosto të ulët dhe të personalizueshme që mund të përshtatet lehtësisht për nevoja të ndryshme sociale dhe teknologjike. Gjithashtu, trajtohet mënyra se si mund të optimizohet performanca e sistemit në kushte të kufizuara harduerike, duke u

fokusuar në efikasitetin e algoritmeve dhe thjeshtësinë e ndërfaqes për përdoruesin përfundimtar.

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