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Artificial Intelligence and Digital Humanities in the 21st Century

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Abstract

This study examines how AI is transforming methodologies and ethical considerations in Digital Humanities in the 21st century, a field that combines traditional humanities scholarship with digital technologies. While AI offers new opportunities for analysing cultural artifacts and texts, it also raises concerns about the dehumanisation of scholarly work, bias in algorithms, and the erosion of critical, human-centered analysis. Using the framework of Technological Determinism, this research explores both the opportunities and challenges AI presents in the Digital Humanities. This study uses a mixed-methods approach, incorporating historical analysis, phenomenological inquiry, and content analysis to examine AI's influence on Digital Humanities. While AI enhances data analysis and access to knowledge, it also presents ethical concerns related to bias, privacy, and the protection of humanistic values in research. The study proposes five key recommendations: fostering collaboration between computer science and humanities scholars, providing training for researchers, encouraging ethical discussions around AI, investing in AI tools tailored for the humanities, and promoting accessible AI resources in education. It highlights the importance of balancing technological advancements with the preservation of traditional academic values in Digital Humanities.

Keywords: Digital Humanities, Artificial Intelligence, Technological Determinism, Ethical Implications, Cultural Heritage

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Introduction

Overview of Digital Humanities in the 21st Century

In the 21st century, Digital Humanities blend traditional scholarship with cutting-edge digital technologies, expanding research possibilities through innovative analysis and visualisation techniques. In the digital age, many view the humanities as outdated, assuming they are stuck in a book-centered culture, unlike fields like medicine or marketing that have embraced technological advancements, and these changes have led to the emergence of "Digital Humanities" (DH), a growing field of scholarship with vast potential and opportunities (Helmi, 2021:5). The digital world offers a dynamic flow of information creation, enrichment, editing, retrieval, analysis, and presentation, demanding a fresh perspective (Berry &Fagerjord, 2017:104). As digital tools evolve, they are transforming the study of cultural artifacts and texts, enhancing academic inquiry, and democratising access to knowledge while promoting global collaboration. Moreover, it also combines traditional humanities with digital technologies, revolutionising research methods and expanding scholarly inquiry. This field fosters innovative approaches to studying cultural and historical materials.

The Rise of Artificial Intelligence (AI) in Scholarly Research

Artificial Intelligence (AI) has become a transformative force in scholarly research, particularly within Digital Humanities, leveraging machine learning, natural language processing, and data mining. AI allows researchers to analyse large datasets and uncover insights that were previously unreachable. Artificial Intelligence in Education (AIED) focuses on creating computers that perform cognitive tasks like learning and problem-solving, traditionally associated with human minds. Significantly, the rapid progress of artificial intelligence (AI) and its vast potential for educational applications have recently captured significant attention within the education community (Koul, Wang & Yu, 2022:41-43), and as it continues to advance, the future of education will increasingly depend on these developments, driving further innovations and growth in educational practices (Chen et al., 2020:7). AI integration into humanities research, accelerates discovery and fosters interdisciplinary collaboration, highlighting its growing significance in shaping the future of scholarly inquiry. This paper aims

to fill the gap in understanding how AI is reshaping methodologies in the Digital Humanities, especially concerning ethical and philosophical issues. Additionally, it will investigate AI's potential to both improve and challenge conventional scholarly practices in the humanities.

Theoretical Framework

This study's theoretical framework is based on Technological Determinism, which argues that technology shapes cultural values and social structures. The theoretical framework of Technological Determinism was first introduced by Thorstein Veblen in the early 20th century, and this concept was later developed and widely popularised by scholars such as Marshall McLuhan, who highlighted how technology influences societal changes and shapes human behaviour (Myllyntaus, 2010:3-21). In the Digital Humanities, this framework helps explore AI as a transformative force that influences research methodologies and interpretation. By applying this lens, the study examines how AI-driven advancements are redefining scholarly practices and knowledge production in the humanities.

Statement of the Problem

The rapid integration of Artificial Intelligence (AI) into Digital Humanities raises significant concerns about its effects on research methodologies and ethical standards. Despite the potential for innovation, there is a lack of clarity regarding how AI influences traditional scholarly practices and the integrity of humanities research.
Purpose of the Study

This study aims to explore the transformative impact of AI on research methodologies within Digital Humanities, with a focus on the ethical and philosophical aspects. It also aims to assess how AI can both enhance and challenge traditional practices in humanities scholarship, offering insights into its future role in the field.

Methodology

This research utilises a mixed-methods research methodology, incorporating historical, phenomenological, and content analysis to investigate the role of Artificial Intelligence in Digital Humanities. This approach allows for a critical exploration of AI's impact on research practices, ethical implications, and the evolving landscape of humanities scholarship.

Evolution of the Digital Humanities: From Early Computing to Modern AI

The evolution of Digital Humanities began with early computing efforts in the mid-20th century, where scholars first used computers for tasks like text analysis and data processing in humanities research. AI technologies enable personalised learning by allowing educators to tailor instruction to each learner's unique needs. Unlike traditional methods, which often struggle to accommodate diverse learning styles, AI allows for individualised educational approaches (Della Ventura, 2017:36-45). This approach enhances learners' motivation, engagement, and independence in their educational journey (Della Ventura, 2018:81-88; Wang, 2017:79-91). Moreover, AI technologies also provide valuable support for learners with disabilities. Over time, advancements in technology expanded the scope of Digital Humanities, incorporating more sophisticated tools such as databases, digital archives, and multimedia resources.

The emergence of AI has been a pivotal development, bringing advanced tools like machine learning and natural language processing that have further revolutionized the field. This progression from basic computing to modern AI reflects the increasing integration of technology in humanities research, reshaping how scholars' approach and interpret cultural and historical materials. The 21st century has seen significant growth in artificial intelligence (AI), with advancements between 2000 and 2015 driving major societal developments through revolutionary theories and techniques (Liu et al, 2018:34403-34421). This evolution underscores the profound impact of technological advancements on the methodologies and practices within the Digital Humanities.

Applications of AI in Digital Humanities

Textual Analysis and Natural Language Processing (NLP)

AI-driven textual analysis and Natural Language Processing (NLP) have revolutionised research in the Digital Humanities by facilitating the automated analysis of large text datasets. NLP, a branch of computer science and linguistics, concentrates on algorithms and tools for analysing the grammatical, syntactic, and semantic structures of text. It also enhances the ability to search text, catching details human readers might miss, while adding minimal processing time (Guetterman et al., 2018:231). These technologies help researchers uncover patterns, themes, and linguistic details that would be challenging to identify manually, thereby offering new opportunities for interpreting historical documents, literature, and other textual

materials with greater accuracy. Natural language processing (NLP) offers a potential solution to ease resource constraints in qualitative analysis by using automated algorithms to comprehend and manipulate natural language text for meaningful tasks (Chowdhury, 2005:51-89). The incorporation of AI, particularly through Textual Analysis and NLP, has significantly improved the depth and accuracy of humanities research, setting these technologies up to play a vital role in the field's future.

Data Mining and Digital Archiving

AI-driven data mining and digital archiving have revolutionised how scholars in the Digital Humanities gather, organise, and analyse large datasets. These technologies automate the extraction of key information from extensive digital collections, uncovering new patterns and connections within historical and cultural records. By boosting the efficiency and depth of archival research, AI tools are enabling the preservation and reinterpretation of cultural heritage in unprecedented ways. However, archival collections differ in content, type, quantity, and organisation, with each institution having unique processing policies. As digital archives grow, using computational methods to efficiently manage these large and complex collections is increasingly essential (Esteva et al., 2013: 1-10). Invariably, the use of AI in these areas has greatly advanced the preservation and analysis of cultural heritage, providing new insights and efficiencies in humanities research.

AI in Visual and Media Studies

AI has transformed Visual and Media Studies by enabling advanced image and video analysis, allowing researchers to explore visual data with unprecedented scale and precision. Using techniques like computer vision and pattern recognition, AI can detect trends, themes, and visual elements across extensive media collections, providing fresh insights into visual culture. In the 1990s and early 2000s, digital technologies replaced analog ones, and faster internet speeds increased the circulation of digital images. Today, AI, particularly machine learning, is once again transforming how images are created, modified, and shared (Somaini, 2021:49-57). These technological advancements not only deepen the study of art, film, and media but also enhance the preservation and interpretation of visual content within the Digital Humanities. As AI continues to evolve, its role in visual and media studies will further expand, enriching our understanding and preservation of visual culture in the field.

Enhancing Cultural Heritage through AI

AI is crucial in enhancing cultural heritage by offering innovative tools for preserving, restoring, and interpreting historical artifacts and sites. Using techniques like 3D modeling, machine learning, and data analytics, AI can reconstruct damaged or lost cultural items and create more engaging, interactive experiences for audiences. During the United Nations Decade for Education and Development (1988–1997), the relationship between culture and development was emphasised, reinforcing the connection between sustainable development and culture (Vrdoljak, 2008, 41-78). Cultural sustainability, which was once primarily regarded as a social issue, has transformed into the fourth dimension of sustainability, emphasizing the essential role of culture in planning (Hawkes, 2001:15-33). As a result, safeguarding and promoting the sustainable development of intangible cultural heritage has become a global priority. Integrating AI enhances access to cultural heritage while fostering a greater appreciation and understanding of various histories and traditions. Its application in preserving cultural heritage offers transformative opportunities for experiencing and protecting historical artifacts and sites. As AI technology advances, it will become even more essential in revitalizing and protecting cultural heritage for future generations.

Case Studies of AI in Humanities Research

Case studies in humanities research reveal how AI technologies have been effectively utilized to analyse complex datasets, including digitized manuscripts, historical records, and linguistic corpora. These examples demonstrate AI's capacity to uncover hidden patterns, enable new interpretations, and accelerate research in disciplines such as literature, history, and archaeology. Advancements in generative large language models (LLMs) have expanded their use in research, particularly in the humanities and social sciences, where they serve as on-demand classifiers and inference tools (Karjus, 2023:1). Through these applications, case studies provide valuable insights into AI's transformative impact on the Digital Humanities. They emphasise AI's crucial role in enhancing humanities research by offering innovative tools and methods for analysing complex data. As AI becomes more integrated into humanities research, it will continue to enhance scholarly inquiry and push the boundaries of traditional academic practices.

Challenges and Criticisms

Ethical Consequences of AI in Humanities Research

The ethical consequences of AI in humanities research pose significant concerns, particularly regarding bias, privacy, and the risk of dehumanization. AI algorithms can unintentionally perpetuate existing biases in data, resulting in skewed or misleading outcomes that compromise the integrity of research. Ethical considerations for trustworthy AI must be integrated into every stage of AI development, from research and design to testing, deployment, and practical use (Hauer, 2022:1-8). Moreover, the growing dependence on AI raises important questions about the diminishing role of human judgment and the ethical obligations of researchers to ensure the fair and transparent use of AI tools. Addressing these ethical implications is vital for preserving the integrity and fairness of scholarly work in the humanities. As AI becomes increasingly integrated into research practices, it is essential for scholars to critically examine these challenges and apply AI responsibly and ethically in their investigations.

Technical Challenges: Limitations and Bias in AI Algorithms

AI algorithms in humanities research encounter substantial technical challenges, particularly in their ability to accurately interpret intricate cultural and historical contexts. These algorithms often depend on biased datasets, which can result in flawed analyses and perpetuate existing prejudices. Furthermore, the complexity of humanistic subjects may surpass the current capabilities of AI technologies, raising concerns about the reliability and validity of insights generated by AI. Artificial intelligence has exposed considerable biases in health data, presenting ethical dilemmas for the application of machine learning in medicine (Char et al., 2018:981-983; Obermeyer et al., 2019:447-453). In response, strategies for algorithmic fairness have been implemented to develop neutral models designed to deliver non-discriminatory predictions by tackling biases associated with protected identities such as race and gender (Corbett-Davies, 2023:14730-14846). These technical challenges underscore the importance of caution and critical oversight when applying AI in humanities research.

The Human Element: Risks of Dehumanisation and Loss of Context

The growing reliance on AI in humanities research risks dehumanising the study of culture, history, and literature by simplifying complex human experiences into mere data points. AI-driven analyses may fail to capture the nuanced and subjective dimensions of human expression, resulting in a loss of context and depth in scholarly interpretations. This shift away from human-centered research raises concerns about the erosion of critical thinking and the richness of

humanistic inquiry in the digital era. The violations identified in the empirical material were categorised into animalistic and mechanistic forms of dehumanisation, which were associated with perceived integrity and benevolence, respectively (Väyrynen&Laari-Salmela, 2018:95-113). To maintain the integrity of humanities research, it is crucial to balance the use of AI with human insight and contextual understanding. Also, it is vital that AI enhances, rather than undermines, the human aspect of scholarship to preserve the depth and richness of academic inquiry.

Critiques from Humanities Scholars: Resistance and Skepticism

Many humanities scholars exhibit resistance and skepticism toward the integration of AI, fearing that it may compromise the traditional interpretative approaches that are fundamental to the discipline. Critics contend that AI, with its emphasis on quantitative methods, could reduce intricate cultural phenomena to oversimplified data models, potentially resulting in superficial analyses. This skepticism underscores broader concerns about the possible erosion of the critical, reflective, and humanistic elements that characterize humanities scholarship. The digital humanities are increasingly integrating with the broader humanities, garnering interest from administrators and funding bodies while collaborating with science and engineering fields. They utilise new technologies to enable the humanities to engage with and adapt to modern society (Liu, 2012: 490-509).

The apprehension expressed by humanities scholars highlights the necessity for a critical dialogue regarding the role of AI in the field, stressing the importance of preserving traditional methodologies. As AI evolves, it is essential to maintain a balance that honours the intricacies of human experience while also embracing the innovative possibilities presented by technological advancements.

Balancing Innovation with Tradition in Humanities Research

Balancing innovation and tradition in humanities research entails managing the tension between adopting new technologies and upholding the foundational principles of critical inquiry and interpretation. While AI presents exciting opportunities for data analysis and novel forms of engagement, it is crucial to ensure that these advancements do not eclipse the qualitative dimensions of humanities scholarship. Computer scientists require insights from the humanities, which excel in transforming information into knowledge through critical interpretation and contextualization (Porsdam, 2013:3).

Achieving this balance necessitates a careful integration of AI tools while preserving the rich methodologies and ethical considerations that are essential to the humanities.

Effectively balancing innovation with tradition in humanities research is essential for promoting meaningful scholarship that honors the core values of the field. By thoughtfully incorporating AI technologies, researchers can enhance their work while remaining committed to the depth and richness that define humanities inquiry.

Future Directions and Potential Impact

New Developments in AI and Digital Humanities

The new developments in AI and Digital Humanities highlight an increasing emphasis on interdisciplinary collaboration, where technologists and humanities scholars collaborate to create innovative tools and methodologies. Furthermore, advancements in AI, such as generative models and improved natural language processing, are poised to revolutionise the ways researchers analyse and interpret cultural artifacts. AI significantly contributes to new and deeper interpretations across various fields, particularly as the vast amounts of digitized heritage data provide a solid foundation for developing AI-based interpretation and restoration applications (Pavlidis, 2022: 026-034). As these trends progress, they are likely to broaden the scope of inquiry within the humanities, allowing for deeper insights and wider engagement with diverse cultural narratives.

These emerging trends in AI and Digital Humanities offer exciting opportunities to enrich research and promote interdisciplinary collaboration. As these advancements continue to develop, they have the potential to transform the landscape of humanities scholarship, paving new pathways for exploring and understanding cultural phenomena.

AI and the Democratisation of Knowledge

AI has the potential to democratize knowledge by making scholarly resources more accessible to a broader audience through advanced tools such as automated translation and improved search functionalities. This increased accessibility empowers individuals from diverse backgrounds to engage with humanities research and cultural heritage, dismantling traditional barriers to information. A data

democratisation framework for intelligent energy management emphasises the importance of making data and analytics accessible in the energy sector, enabling timely decision-making and promoting decentralised, decarbonised energy business models (Marinakis et al., 2021:4341). Additionally, as AI technologies continue to progress, they can support collaborative projects that encourage inclusivity and collective knowledge creation, thereby enriching our understanding of cultural narratives.

The democratization of knowledge through AI signifies a substantial change in how humanities research is disseminated and engaged with by the public. As these technologies develop, they will not only enhance accessibility but also promote a more inclusive and collaborative environment for exploring and understanding cultural heritage

Partnership Between Computer Science and the Humanities

The partnership between computer science and the humanities is becoming increasingly essential as researchers aim to utilize advanced technologies to tackle complex cultural and historical issues. By merging computational techniques with humanistic inquiry, scholars can create innovative tools that enhance data analysis, visualisation, and interpretation in the humanities. Humanities computing originated in Italy in the late 1940s with Roberto Busa's Index Thomisticus, establishing the basis for philological, linguistic, and literary computing. This paved the way for applications in the late 1950s, museological efforts in the 1960s, and the creation of the Museum Computer Network. The metalinguistic branch arose to overcome computing systems' limitations by creating metalanguages for tagging complex artifacts (McCarty, 2003:1224,30).

This interdisciplinary partnership not only enriches the research process but also promotes the development of new methodologies that blend technical expertise with critical thinking and contextual awareness. Also, the collaboration between computer science and the humanities is set to transform research practices by combining technological innovation with humanistic inquiry. As this partnership evolves, it will encourage a more comprehensive approach to understanding intricate cultural phenomena, ultimately enriching both disciplines.

Potential for AI to Revolutionise Humanities Education and Scholarship
AI has the potential to revolutionise humanities education and scholarship by providing personalised learning experiences that cater

to each student's unique needs and learning styles. Advanced AI tools can create interactive and immersive learning environments, allowing students to engage with cultural artifacts and texts in innovative ways. Moreover, AI can improve scholarly research by streamlining data analysis and facilitating collaborative projects, ultimately changing how knowledge is produced and disseminated in the humanities. AI has long been used for tasks such as voice recognition, handwriting analysis, image recognition, and natural language processing.

Today, it's prevalent in self-driving cars, smart homes, and voice assistants, fundamentally transforming our interactions with the world. AI is a reality we live with now, not just a future possibility (Cantú-Ortiz et al., 2020:1195-1209). AI's transformative potential in humanities education and scholarship offers promising opportunities to enhance teaching and research methods. As these technologies become more embedded in academic settings, they will enrich the learning experience and reshape the landscape of humanities scholarship.

Anticipated Developments and Long-Term Implications

Anticipated advancements in AI are expected to deepen its integration into the humanities, leading to the development of more sophisticated tools for analyzing, interpreting, and preserving cultural heritage. These innovations may result in new research methodologies and a redefinition of traditional academic practices, potentially expanding the boundaries of the humanities. The potential of AI is immense, with computers and robots expected to achieve or approach human-level intelligence within the next 20 years, posing a major threat to human-held jobs and casting uncertainty on the future of human dominance (Makridakis, 2017:46-60). Clearly, the stakes in predicting AI's impact are significant, as intelligent machines might become our "final invention," potentially ending human dominance (Barrat, 2013:35-50). In the long run, the ongoing evolution of AI could fundamentally transform the field, prompting continuous discussions about the role of technology in humanistic inquiry and its implications for the future of scholarship.

These anticipated developments in AI indicate a transformative shift in the humanities, where technology increasingly influences research and scholarship. As these changes take shape, they will encourage critical reflection on the future of the discipline, ensuring that the integration of AI enhances rather than diminishes the humanistic core of academic inquiry.

Conclusion

This study highlights the transformative impact of AI on Digital Humanities, revealing both its potential to enhance research methodologies and the ethical challenges it introduces. Reflecting on the role of AI, it is clear that while it offers powerful tools for analysis and interpretation, however, careful consideration is needed to ensure it complements rather than replace humanistic inquiry. The implications for future research are profound, suggesting that the thoughtful integration of AI will be essential for advancing scholarship while preserving the core values of the humanities.

Recommendations

Based on this study's findings, the following five recommendations are proposed to advance AI integration in the Digital Humanities while maintaining the discipline's core values.

I. Foster interdisciplinary collaboration between computer science and humanities scholars to develop AI tools that enhance, rather than overshadow, traditional humanistic methods.

II. Implement comprehensive training programs for humanities researchers to effectively use AI technologies while maintaining critical and ethical standards in their work.

III. Encourage ongoing dialogue about the ethical implications of AI in humanities research, focusing on issues of bias, privacy, and the preservation of human-centered analysis.

IV. Invest in the development of AI tools that are specifically designed to address the complexities of cultural and historical research, ensuring that these technologies are well-suited to the unique demands of the humanities.

V. Promote the democratisation of AI in humanities education by making advanced AI resources accessible to a broader range of institutions and scholars, particularly those in underrepresented regions.

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