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The Evolution of Digital Humanities: Challenges and Opportunities

Dr. Abinash Mohapatra^{1*}

¹Assistant professor

Abstract

One of the roots and main pillars of the digital humanities field, which aids in the development of solutions to handle enormous volumes of cultural heritage data—text being the primary data type—is the transition from studying a single book "on paper" to having the ability to browse numerous digital texts in this day and age. A survey of the literature on the prospects and problems in the field of digital humanities is presented in this article. This review reveals that digital humanities, while rich in interdisciplinary potential, face challenges including limited technical expertise among humanities scholars, inadequate theoretical grounding, and concerns over digital material authenticity and sustainability. Despite these issues, digital humanities enhance cultural preservation, access to knowledge, and collaborative global research. Libraries play a pivotal role, with changing librarian skill sets being central to implementation success. Gaps remain in exploring the roles of librarians in academic settings. Moving forward, research must focus on sustainability, training, and institutional support. Overall, digital humanities offer vast opportunities, provided challenges are actively addressed and managed collaboratively.

Keywords: *Digital Humanities, Challenges and Opportunities, Humanities Scholars, Cultural Preservation, Text Encoding Initiative (TEI).*

1 Introduction

In the context of academia and scholarly research, it is crucial to evaluate the impact of these advancements on the manner in which humans collect, exchange, and interpret information as

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technology continues to evolve. The 1940s saw the emergence of the discipline of Digital Humanities (DH), which has revolutionised the management, sharing, and presentation of knowledge [1]. A field of study at the nexus of the humanities and computers or digital technology is known as digital humanities (DH). In addition to the analysis of their application, it encompasses the systematic utilisation of digital resources in the humanities. New approaches to scholarship that include computationally involved, collaborative, and transdisciplinary research, teaching, and publication are known as DH [2]. The acknowledgement that the written word is no longer the primary medium for knowledge generation and dissemination leads to the introduction of digital tools and approaches into the study of the humanities. Through the development and deployment of new tools and methods, DH enables new forms of instruction while simultaneously examining and evaluating the effects on digital culture and cultural heritage [3]. DH is unique in that it fosters a reciprocal interaction between the digital and the humanities, using technology to further humanities study while also exposing technology to humanistic scrutiny and inquiry [4], [5].

A. Early Beginnings and the Rise of Digital Humanities

The emergence of computers and computer-based techniques for text processing and analysis are strongly related to the beginnings of digital humanities [6]. In the following section, we examine several significant early origins that facilitated the field's emergence:

- **1940s-1950s:** Early attempts at data processing and statistical techniques for biblical studies and language analysis. Father Roberto Busa's groundbreaking work emerged at this time, establishing the foundation for digital humanities by using IBM punch cards to interpret textual data.
- **1960s:** The establishment of the first humanities computer institutes and conferences encouraged global cooperation, dialogue, and creativity in the nascent sector.
- **1970s:** An important breakthrough in digital humanities studies was the creation of "databases, concordances, and bibliographies for literary and historical material".
- **1980s:** The digital humanities were cultivated by the emergence of hypertext theory and the creation of the personal computer, which gave rise to new opportunities and interest. The Text Encoding Initiative (TEI), which is still in use today, was founded in this decade with the goal of standardising electronic text markup.

B. Major Milestones in Digital Humanities Development

There were a number of pivotal events and turning points in the development of digital humanities that helped to define the field [7]. Among these significant discoveries are:

- **1990s:** The public launch of the World Wide Web sparked a surge in digital humanities activities, such as the development of online resources, academic endeavours, and the use of online, multimedia, and digital technology into humanities instruction.

- **2000s:** The area of digital humanities asserted a unique character with the release of seminal books and journal articles. The field saw the establishment of major conferences, as well as financing initiatives for research centres and projects in the digital humanities worldwide.
- **2010s:** As the academic world began to embrace digital humanities more widely, several international associations, journals, and projects were established to aid in the expansion and sharing of research in the area.

C. The role of Digital Humanities in preserving literary works

For the benefit of future generations, digital humanities are essential to the preservation of literature and cultural legacy. It is possible to digitise "rare books, manuscripts, and other" priceless items, guaranteeing their long-term preservation and making them available to a worldwide audience [8]. Important facets of digital humanities preservation include:

- **Digital imaging:** Accurate, detailed photographs of literary works and archive materials are produced using high-resolution scanning and photographic processes.
- **Metadata creation:** To facilitate discovery, access, and long-term preservation, comprehensive descriptive, structural, and technical information regarding the digital resources is generated and maintained.
- **Digital preservation:** In order to prevent the loss or deterioration of priceless literary works, strategies, guidelines, and best practices for the long-term preservation and storage of digital resources are put into place.
- **Open access:** The world's literary and cultural history is freely accessible via a number of digitisation initiatives, which facilitate the study, interaction, and appreciation of these priceless materials by academics, students, and the general public.

Literary studies can guarantee that unique and invaluable works remain relevant and accessible across cultural and temporal boundaries by adopting Digital Humanities preservation strategies [9].

D. Challenges in digital humanities

Among the many obstacles that digital research and digital humanities must overcome are the digital divide, technical know-how, sustainability, technological access, copyright and intellectual property concerns, preservation and archiving, diversity, and inclusion. Collaboration and creative initiatives may be hampered by the availability of digital tools and resources [10]. Scholars' capacity to work with programming, data analysis, and digital design is sometimes restricted by the need for technical skills in these areas. To fully realise the promise of digital research and digital humanities, academics must be aware of these issues and strive to solve them in their initiatives [11]. It might also be difficult to maintain over time since digital scholarship and digital humanities initiatives need constant financing and upkeep to guarantee long-term accessibility and functioning. These sectors may improve and change research across disciplines by fostering diversity, preservation, intellectual property rights, accessibility, technological skill, and sustainability [12].

E. Opportunities in digital humanities

In an effort to investigate, preserve, and disseminate knowledge in the arts and humanities, Digital Humanities encourages collaboration among academicians, technologists, librarians, and other professionals who collaborate on interdisciplinary projects [13]. Beyond institutional and geographic borders, these cooperative initiatives support a thriving and interwoven research environment. Digital Humanities initiatives offer a variety of collaborative opportunities, such as:

- **International partnerships:** Global exposure and knowledge exchange are facilitated by the collaboration of researchers from various countries, who share their expertise, resources, and perspectives in collaborative initiatives.
- **Interdisciplinary teams:** Using their varied backgrounds and specialities, academics from a range of disciplines—including computer science, linguistics, literature, and history—cooperate to tackle challenging research problems and provide original answers.
- **Community engagement:** Digital humanists can contribute to the objectives of public humanities by integrating local communities, which allows them to access a plethora of cultural insights and local knowledge. This fosters mutual understanding and appreciation.
- **Open-source resources and tools:** In order to foster cooperation and knowledge exchange among academics, digital humanities initiatives often provide open-source materials, instruments, and techniques that are simple for others to share, modify, and enhance.

A genuinely global, linked, and varied academic community is fostered by these collaboration possibilities in Digital Humanities initiatives, which also improve the general research environment in literary studies and provide researchers with chances for both professional and personal improvement [14].

2 Literature Review

(J. Jeffrin, 2023) [13] uses modern trends and advancements to examine the changing field of digital humanities with an emphasis on language and literature. Digital technology integration has had a big influence on human culture research, allowing academics to do more in-depth literary and linguistic examination. This study attempts to provide a thorough review of the present status of the discipline and its consequences for literary analysis by looking at the junction of language studies, literature, and Digital Humanities. In order to demonstrate how these tendencies might be used practically in a tangible literary setting, the selected work is used as a case study.

(Raslin et al., 2023) [15] Librarians that specialise in digital humanities (DH) assist scholars, students, and researchers in interacting with digital resources and cultural artefacts. There are some difficulties in this specialised function within librarianship. A thorough assessment of the literature has been conducted in order to identify the obstacles that must be overcome, including collaboration and the evaluation of digital scholarship. Only 28 percent of the 50 papers that were identified—or 14 publications—were eventually selected as suitable for the analysis stage. Finding the difficulties in putting Digital Humanities Librarianship into practice is the aim of this literature study.

(Strange et al., 2023) [10] It is customary in academia, especially in the humanities, to need to preserve data and results from research projects long after they were first supported by grants. Institutions must be prepared to provide researchers with the resources and platforms they need to comply with the growing demands for data transparency and the expanding timeframes and standards set by research funding organisations. One perspective on this issue is compliance; another is that organisations should be inspired by the research they do, as well as the ongoing academic advantages and influence that come from being housed and disseminated for as long as feasible. This article provides a useful overview of the strategies being used at the University of Oxford to help researchers (and anyone) studying digital humanities preserve their digital heritage for future generations.

(Yuting et al., 2023) [16] Examine the state of research on digital humanities theory, methods, and practice in Taiwan at the moment. According to the findings of the statistical analysis, there are the most practical articles, the most tools and procedures, and the fewest theoretical articles. In Taiwan, the main focused areas of digital humanities study are text tools and literary research. Further comparison with the state of digital humanities research in Mainland China is still necessary. In order to create its own distinctive research features, Taiwanese digital humanities emphasises the creation of instruments and methods, as well as the real-world applications of literature and history.

(Tucker, 2022) [17] Researchers in the humanities are becoming more and more concerned about the sustainability of digital materials in the long run. Digital editions, databases, and online research tools are now essential components of our work. As a result of "mass digitisation" initiatives being carried out by libraries and archives, our primary materials are now accessible online as digital pictures. For academics in the humanities, this article offers an overview of the current state of digital research as well as ideas for its future. It examines four dimensions of sustainability—technological, financial, environmental, and human—and provides a novel definition of digital sustainability within this context. This focusses on sustainability as a complex endeavour in which humanities academics may play a significant part, rather than only as a technological problem.

(De & Kr Kirtania, 2021) [18] Digital Humanities research trends in India are the focus of this investigation. This study has taken into account every kind of research output that has been published in India that is included in the Scopus database. The current quantitative analysis examines a number of these publications' various qualities, including their topic, citation, degree of cooperation, author pattern, year-by-year growth, and publishing source. The study examines 35 studies based on a number of criteria and concludes that research in the field of digital humanities is becoming more and more popular in India. Research trends with quality source journals are on the rise, as evidenced by the results of this investigation.

(Chouchene, 2019) [19] The possibilities and difficulties of using digital methods for historical research are discussed in this study. Online publications have included manuscripts, letters, pictures, magazines, novels, artefacts, diaries, travelogues, and newspapers. There is a growing concern among researchers that they may produce a decontextualised and invaluable analysis by relying on digitised fragments of archival material. The process of digitisation is not neutral as it involves selection. Archival material

transcriptions are often subpar and insufficient. In an ever-evolving digital age, there are also growing worries over the lifespan and validity of digitised archives, as well as disparities in access to sources. Part of the historian's craft is searching through dusty papers in archives, a process that is directly challenged by the growing dependence on digital technologies. There are still numerous historians who are not proficient in sophisticated digital search techniques.

3 Research Gap

Despite growing interest in digital humanities, significant research gaps remain in understanding its theoretical foundations, practical implementation, and long-term sustainability. Much of the existing literature emphasizes technological advancements, often neglecting the underlying humanities frameworks and the role of interdisciplinary collaboration. There is limited focus on the challenges faced by academic institutions, particularly libraries and educators, in adopting and supporting digital humanities initiatives. Furthermore, the roles of local communities and non-Western perspectives are underexplored. Addressing these gaps is essential to ensure inclusive, context-sensitive, and sustainable development in digital humanities, fostering both innovation and deeper cultural engagement across diverse academic environments.

4 Research Objective

- Study the challenges and opportunity in digital humanities.
- Study the digital humanities and its evolution.
- Review the various literature's study on challenges and opportunity in digital humanities.

5 Research Methodology

This review paper employs a qualitative research methodology, utilizing secondary data and an in-depth literature analysis to examine the evolution, challenges, and opportunities in digital humanities. The study draws from academic journals, scholarly articles, reports, and case studies published between 2014 and 2025 to ensure a comprehensive and current understanding of the field. By synthesizing insights from disciplines such as literature, history, linguistics, computer science, and library science, the paper critically explores the interdisciplinary nature of digital humanities. This approach enables the identification of key themes, gaps, and emerging trends, providing valuable insights for future research and implementation strategies.

6 Conclusion

This review highlights the interdisciplinary nature of digital humanities (DH), emphasizing both the opportunities and challenges faced in its evolution. While DH allows scholars to explore new knowledge, enhance access to cultural content, and foster global collaboration, it also exposes critical issues. Key benefits include increased accessibility to digitized historical sources and the promotion of cultural dissemination. However, concerns arise over the loss of contextual integrity, digital material quality, and

unequal access. Many humanities scholars lack technical expertise, and theoretical foundations in DH remain underdeveloped, potentially weakening its long-term impact. The implementation of DH faces challenges at multiple levels—individual, technological, organizational, and service-based. The changing role of librarians and inadequate training are particularly significant barriers. Additionally, issues of sustainability, especially regarding digital resource management, demand attention. A notable gap exists in studies focusing on the role of academic libraries and institutions in DH adoption. The future of DH depends on strengthening foundational theories, fostering interdisciplinary collaboration, and addressing skill gaps. By involving local communities and developing open-source tools, DH projects can expand their reach and impact. Ultimately, with strategic development and thoughtful implementation, DH holds immense potential to enrich cultural understanding and advance scholarly research across disciplines.

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