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**RESEARCH ARTICLE**

# Mapping the Digital Humanities Landscape: A Bibliometric Review of Research and Emerging Frontiers

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**ABSTRACT**

The field of digital humanities has undergone rapid transformation, integrating computational methodologies to explore and expand traditional humanities research. This study presents a comprehensive bibliometric analysis of digital humanities scholarship, utilizing data from the Scopus database to map research trends, identify key contributors, and uncover emerging thematic areas. A total of 550 original research articles published between 2001 and 2024 were analysed using bibliometric indicators, citation metrics, and network analysis techniques. The findings reveal a steady increase in digital humanities publications, with significant contributions from the United States, the United Kingdom, and China. Key research themes include digital heritage preservation, artificial intelligence applications, and big data analytics, indicating an increasing interdisciplinary convergence. Furthermore, co-occurrence analysis highlights dominant research clusters, emphasizing digital archiving, cultural heritage, and computational methodologies. This study underscores the growing significance of digital humanities in cultural preservation, knowledge dissemination, and technological advancements. The results provide valuable insights for researchers, policymakers, and institutions aiming to foster innovation and collaboration in the evolving landscape of digital humanities.

## INTRODUCTION

Digital humanities are an interdisciplinary field that merges digital technology with the humanities, fostering new forms of scholarship and research methodologies. It encompasses a wide range of activities, including the application of digital tools for the analysis and representation of evidence, scholarly communication, and knowledge sharing across humanistic disciplines (Fenlon et al., 2025). The field has evolved from its origins in 'humanities computing' to include the development of digital archives and databases for texts and artworks, reflecting its growth over the past four decades (Berry, 2019; Jam et al., 2013). Digital humanities centres, often located in libraries, serve as hubs for research and application of library and information science techniques such as metadata, semantic mapping, and digital curation (Asundi et al., 2023; Helaudho et al., 2024). The field is characterized by its collaborative, transdisciplinary, and computationally engaged research, which integrates methodologies from both the sciences and humanities (Meneses & Furuta, 2018). In developing countries, digital humanities offer significant opportunities by integrating traditional humanities

disciplines with digital technology, thus enhancing the study of literature, art, and social sciences (Vishalinromiya, 2023). The field also addresses contemporary debates around artificial intelligence, emphasizing the need to consider both the potentials and challenges posed by digital infrastructures and their impact on humanistic practices (Roy & Deshbandhu, 2024). Furthermore, digital humanities aim to increase inclusion, diversity, and global collaboration, while also engaging communities beyond academia to ensure sustainability and social justice (Fenlon et al., 2025). The field's dynamic nature is reflected in its ongoing debates and the establishment of international organizations like the Alliance of Digital Humanities Organizations, which support collaborative research and the dissemination of knowledge through journals and online projects. Overall, digital humanities represent a transformative approach to cultural knowledge production, leveraging digital tools to expand the scope and impact of humanistic inquiry (Ismail et al., 2025; Muis et al., 2018; Sintang et al., 2024).

The Digital Humanities field represents a paradigm shift in how humanities scholars engage with technology to interrogate, interpret, and disseminate knowledge. By leveraging computational tools and methodologies, digital humanities have expanded traditional boundaries, enabling novel insights into literature, history, cultural studies, and more (Wahid, 2024; (Berry, 2019; Jam et al., 2010). Despite its rapid growth, there remains a need for systematic reviews to map the field's trajectory and identify emerging areas of inquiry. This study employs bibliometric analysis to address this gap, providing an overview of the current digital humanities landscape and exploring future directions. Although digital humanities research is abundant, few studies systematically analyse its trends, patterns, and gaps. This paper aims to provide a comprehensive bibliometric analysis of the digital humanities literature, systematically mapping the scholarly landscape, uncovering the evolution of the field, identifying research frontiers, and revealing knowledge clusters and networks. The significance of this study lies not only in documenting the historical development of digital humanities research but also in illuminating the key influences and research frontiers, thereby facilitating future scholarly endeavours and industry transformations towards sustainability. In specific, the study endeavours to answer the following research questions.

1. What is the present configuration of scholarly inquiries within the domain of digital humanities?
2. What novel patterns can be discerned in the literature pertaining to digital humanities?
3. Which principal stakeholders-comprising authors, academic institutions, and nations—are facilitating progress in the field of digital humanities research?
4. Which academic journals and publications serve as the focal points for innovative studies in digital humanities?
5. What seminal articles have influenced the discourse and trajectory of research within the digital humanities?
6. What essential research themes constitute the foundation for the evolution and expansion of the digital humanities discipline?

The comprehensive nature of this study provides an opportunity to fully comprehend the level of research in digital humanities. By applying bibliometric and network analysis techniques, it builds a robust understanding of the literary landscape, key themes, and clusters within this field. Its findings are pivotal in informing the development of more effective and sustainable practices in the future, keeping pace with the ever-changing technological and regulatory landscape. Overall, this study seeks to map the intricate field of digital humanities. Through systematic analysis, it aims to sketch a coherent picture of the field's past and current state while laying the foundation for its future, all with a view to fostering a more competitive and environmentally friendly manufacturing sector.

## MATERIALS AND METHODS

### Data Collection

The present investigation adopts a bibliometric methodology, leveraging the Scopus database as of January 6, 2025. The selection of the Scopus database represents a deliberate methodological choice,

guided by its esteemed reputation as one of the largest and most comprehensive abstract and citation databases of peer-reviewed scholarship. Scopus offers an extensive and varied array of research outputs spanning multiple fields, including the sciences, technology, medicine, and the social sciences-rendering it an indispensable asset for our inquiry into digital humanities. Its broad coverage in engineering, environmental sciences, and business studies guarantees access to a thorough and precise dataset. Furthermore, Scopus upholds rigorous quality standards and possesses a wide-ranging global presence, thus positioning it as an optimal resource for conducting an exhaustive bibliometric analysis. Scopus was selected as the primary data source owing to its extensive metadata capabilities, which encompass citation metrics and authors' affiliations (Burnham, 2006; Chadegani et al., 2013). The aggregated data encompassed a variety of dimensions, including document and source typologies, linguistic distribution, subject categories, publication trends, authorship dynamics, institutional contributions, geographical publication distribution, and frequently employed keywords, among other significant factors. The search focuses on documents related to digital humanities, using a combination of keywords - "Digital Humanities", "Computational Humanities", "Digital Culture", "Digital scholarship", "Technological humanities", "Digital heritage", "E-humanities", and "Digital arts and sciences" were used to identify relevant publications from 2001 to 2024. The search was performed for accurate and relevant results pertaining to the subject of digital humanities. The query was used.

TITLE ( digital PRE/3 humanities ) OR ( computational PRE/3 human* ) ( digital PRE/3 culture ) OR ( digital PRE/3 scholarship ) OR ( technological PRE/3 humanities ) OR ( digital PRE/3 heritage ) OR ( e PRE/3 humanities ) OR ( digital PRE/3 arts and sciences )

This query, which was meticulously executed, resulted in the retrieval of a comprehensive total of 1455 documents, which collectively represent an extensive and diverse assortment of scholarly articles that delve into the multifaceted intersection of digital humanities, showcasing the rich and varied discourse that exists within this academic domain. This extensive dataset serves as the foundational basis upon which our systematic review is constructed, thereby facilitating an accurate and nuanced representation of the current state of the field while simultaneously allowing for the identification of emergent trends and prevailing challenges that are characteristic of the evolving landscape of digital humanities scholarship.

To enhance the quality and relevance of our analysis, the dataset underwent a thorough refinement process, during which specific categories of document types were deliberately excluded, thereby ensuring that our analytical focus remained exclusively on original research articles that contribute significantly to the discourse. The specific categories of documents that were systematically removed from the dataset included 480 conference papers, 233 book chapters, 78 standalone books, 74 review articles, 17 erratum notices, 16 editorials, 3 notes, 2 conference reviews, 1 retracted article, and 1 data paper, all of which were deemed extraneous to the primary research focus.

Upon the completion of this meticulous exclusion process, the resultant dataset was comprised of 550 original research articles, which collectively served as the empirical foundation for our assessment of the contemporary state of research within the realm of digital humanities, thereby facilitating the identification of salient trends, critical challenges, and potential opportunities that are inherent within this dynamic field of study. This strategic approach ensured that our analytical framework was firmly grounded in primary sources, effectively capturing recent and pertinent findings that are crucial to the ongoing discourse within the field of digital humanities. The entirety of this intricate process is visually represented in Figure 1, which serves to elucidate the steps taken in our research methodology.

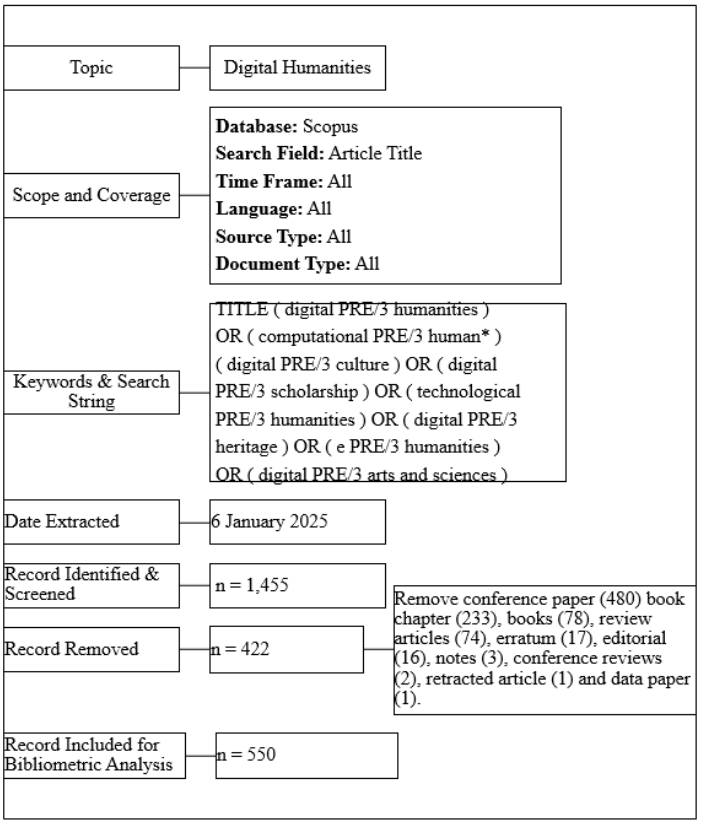


***Figure 1: Flow diagram of the search strategy***

## Analytical Framework

Data cleaning and harmonisation represent fundamental and indispensable phases within the realm of bibliometric analysis, as they are essential for guaranteeing both the precision and dependability of the resultant findings that emerge from such analytical endeavours. During this investigation, we employed two sophisticated tools, namely OpenRefine and biblioMagika (Ahmi, 2023), which have been meticulously developed and tailored for the purpose of rectifying and synchronising disordered datasets that encompass critical bibliographic elements such as author names, institutional affiliations, keywords, and other vital bibliographic details that are crucial for a comprehensive bibliometric assessment. The contributions of these tools were profoundly significant, particularly in the context of ensuring the veracity and consistency of the data, especially given the inherent heterogeneity of research outputs and the various potential discrepancies that may exist within the dataset. The initial phase of the data cleaning process commenced with the researchers undertaking the task of downloading the data from Scopus in a.csv file format, which served as the foundational step in preparing the data for subsequent cleaning procedures. Following this, the relevant files were judiciously selected for the cleaning process, and specific columns, including but not limited to keywords, author names, and affiliations, were systematically identified and meticulously edited through the application of a diverse array of methods and functions that are accessible within the clustering tools. OpenRefine emerged as an extraordinarily valuable instrument throughout this procedure, enabling us to standardise the data with remarkable efficacy and thereby enhance its overall accuracy.

In parallel, biblioMagika was utilised to execute an extensive array of bibliometric measurements, which encompassed Total Publications (TP), Number of Contributing Authors (NCA), Number of Cited Publications (NCP), Total Citations (TC), Citations per Paper (C/P), Citations per Cited Paper (C/CP), Citations per Author (C/A), Authors per Paper (A/P), Citations per Year (C/Y), Citable Year, h-index, g-index, m-index, as well as Citation Sum within h-Core across various dimensions including year, source titles, authors, institutions, and countries. Moreover, biblioMagika facilitated the

identification of any missing data, which enabled us to meticulously fill in these gaps manually, thereby ensuring a thorough and comprehensive cleaning and harmonisation process. Upon completion of the preliminary cleaning phase, every screened and edited keyword underwent meticulous manual verification to ascertain their accuracy and correctness. Multivalued cells were judiciously merged, and the separators that were originally utilised during the data splitting process were carefully re-entered to ensure the consistency and integrity of the dataset. Ultimately, the thoroughly cleaned and harmonised data was exported back into its original format, thus rendering it ready for more advanced analytical pursuits. By harnessing the robust capabilities afforded by these analytical tools, we were able to validate the integrity of our subsequent analyses and enhance the reliability of the conclusions drawn from our research endeavours. The processes of harmonisation and cleaning not only augmented the granularity and clarity of our dataset but also established a more resilient foundation for delving into the intricate and multifaceted domain of digital humanities.

Data analysis was meticulously organized and carefully designed with the explicit objective of addressing the specific research inquiries that were previously delineated in the introductory section of the study. Our methodological approach encompassed a comprehensive documentation of the contemporary landscape surrounding digital humanities research, which included a detailed examination of various dimensions such as the types of documents that were produced, the sources from which these documents originated, the languages in which they were published, the diverse subject areas they covered, and the relevant citation metrics that reflect their academic impact. The results of our analysis are systematically presented according to a multitude of parameters, including but not limited to the annual publication rates of scholarly papers, the output of the most prolific authors within the field, the institutional affiliations of these authors, the geographical distribution of research contributions across different countries, and the titles of the sources in which these papers appeared, all aimed at identifying the key contributors and dominant trends that characterize this evolving academic discipline. In addition to the aforementioned metrics, bibliometric indicators such as the total number of publications produced, the count of cited papers, the aggregate number of citations received, citations per individual paper, citations per cited paper, as well as other indices like the h-index, g-index, m-index, and the total citation sum within the h-core framework were employed to furnish a holistic assessment of the impact and relevance of the publications that were identified throughout our research. Furthermore, in order to elucidate the significant themes and conceptual frameworks that are prevalent within the field, we employed advanced visualization techniques to map the authors' keywords through co-occurrence network analysis, thematic mapping, and factorial analysis, which collectively contributed to our ability to discern clusters of related topics, unveil latent patterns, and derive valuable insights into the intricate interconnections that exist among various subdomains of research.

A diverse array of analytical tools and software applications were judiciously utilized during this study to undertake a thorough and comprehensive bibliometric analysis that would yield meaningful insights. Initially, Microsoft Excel was employed as a primary tool for the preliminary stages of data cleaning and organization, providing a foundational layer of structure to our dataset, while biblioMagika was utilized to enhance and streamline the processes of cleaning, harmonizing, and standardizing the data pertaining to authors, their institutional affiliations, and the countries associated with their research outputs. In addition, OpenRefine played a critical role in the meticulous cleaning and harmonization of the data related to the authors' keywords, ensuring consistency and accuracy in our analyses. Once the data had been meticulously prepared and refined, we proceeded to utilize Biblioshiny (Aria & Cuccurullo, 2017) to generate visually informative representations of our findings, thereby facilitating a more intuitive understanding of the data. The strategic combination of these sophisticated tools and analytical techniques served to underpin a thorough and robust examination of the multifaceted and dynamic landscape of the digital humanities field, allowing for a more nuanced interpretation of the research outputs and trends that emerged from our investigation.

## RESULTS AND DISCUSSION

In the imminent section designated for the presentation of results, we shall undertake a meticulous examination and thorough dissection of the expansive and multifaceted realm of digital humanities research, with particular emphasis on addressing the specific research questions (RQs) that were enumerated in the introductory section of this work, thereby facilitating a profound and comprehensive understanding of this dynamic field. Through the strategic alignment of our analytical framework with the aforementioned research questions, our objective is to furnish a detailed, intricate, and nuanced exploration of the digital humanities research landscape, which will, in turn, yield significant insights that will be invaluable not only for academic researchers and practitioners operating within this domain but also for policymakers who are involved in the decision-making processes relevant to this area of study.

In addressing the inaugural research question, which is fundamentally oriented towards gaining a comprehensive understanding of the contemporary landscape of digital humanities research, we will meticulously analyse the distribution of scholarly publications based on a variety of critical factors, including but not limited to document type, source type, languages utilized, and specific subject areas of inquiry. Furthermore, we shall engage in a thorough discussion of the overarching citation metrics associated with publications within the domain of digital humanities, with the intention of garnering insights into their overall impact and relevance within the broader academic discourse. To commence our investigation, the data that were collected have been systematically classified according to various document types; these document profiles or types encapsulate a diverse array of formats, which include but are not limited to scholarly articles, conference papers, book chapters, and review articles, among several others. Conference papers serve as a representation of research findings that have been presented at academic conferences, with a subset of these papers subsequently published either in the proceedings of those conferences or as chapters within edited volumes. Our comprehensive study has identified a total of seven distinct document types that are pertinent to the field of digital humanities, namely: articles, conference papers, book chapters, editorials, books, notes, and short surveys. The data presented in Table 2 elucidates the distribution of these identified document types. As illustrated in Table 2, most of the publications were classified as articles, which constituted a significant 56.16% of the total corpus of publications, followed closely by conference papers, which accounted for 36.05%. The remaining document types each represented a minimal share, constituting less than 5% of the total publications. It is particularly noteworthy that the three document types among those least frequently published, in terms of volume, were identified as books, notes, and short surveys.

Table 1 provides a detailed breakdown of the distribution of scholarly publications across three distinct source types, offering insight into the primary avenues for academic dissemination. Among these, journals dominate overwhelmingly, accounting for 99.27% of the total publications (546 publications), underscoring their central role in the dissemination of digital humanities research. In contrast, book series represent only 0.55% (3 publications), while conference proceedings contribute a mere 0.18% (1 publication), indicating a significantly lower presence of these publication types in the field. This distribution highlights the strong preference for journal publications as the primary medium for academic discourse within digital humanities.

***Table 1: Source type***

| Source Type | Total publications | Percentage (%) |
|---|---|---|
| Journal | 546 | 99.27 |
| Book Series | 3 | 0.55 |
| Conference Proceedings | 1 | 0.18 |
| Total | 550 | 100 |

Table 2 provides a thorough analysis of the distribution of publications categorized by language, revealing that all the documents retrieved for this study were composed in English, accounting for 100% of the total publications. This finding underscores the absolute dominance of English as the

principal medium for scholarly communication within the digital humanities research landscape. In contrast, Spanish-language publications accounted for 1.45% (8 publications), and French-language publications represented 0.55% (3 publications). Notably, these percentages exceed 100% due to eleven (11) documents being published in more than one language, highlighting some degree of linguistic diversity in the dataset. However, the presence of non-English publications remains minimal, indicating that research output in digital humanities is overwhelmingly concentrated in the English language.

***Table 2: Languages***

| Language | Total publications[a] | Percentage (%) |
|---|---|---|
| English | 550 | 100 |
| Spanish | 8 | 1.45 |
| French | 3 | 0.55 |

[a] Eleven (11) documents have been published in more than one language

This study also examined the distribution of documents based on their respective subject areas, providing valuable insights into the inherently interdisciplinary nature of digital humanities research. As shown in Table 3, social sciences emerged as the most dominant subject area, accounting for 62.18% of the total publications (342 publications), reflecting the central role of humanities-based methodologies in digital humanities research. In addition, computer science (42.91%) and arts and humanities (41.09%) also featured prominently, highlighting the strong technological and cultural dimensions of the field. While engineering contributes 8.36% (46 publications) to the total, its presence is notably smaller than initially assumed. The business, management, and accounting category accounts for 4.73%, reinforcing the increasing relevance of digital humanities in economic and organizational studies.

Moreover, other subject areas contributing to digital humanities research include materials science (4.00%), mathematics (4.00%), environmental science (2.91%), decision sciences (2.36%), and energy (2.36%), among others. The inclusion of fields such as biochemistry, neuroscience, and agricultural sciences underscores the expanding interdisciplinary nature of digital humanities, as it continues to intersect with a broad range of academic disciplines. This diverse subject distribution confirms that digital humanities research is not confined solely to technology-driven approaches but extends into various academic domains, each bringing unique perspectives and methodologies. The breadth of subject areas engaged in digital humanities research emphasizes the necessity for a collaborative and interdisciplinary approach to effectively tackle the challenges and opportunities present in this evolving field.

***Table 3: Subject area***

| Subject Area | Total Publications | Percentage (%) |
|---|---|---|
| Social Sciences | 342 | 62.18% |
| Computer Science | 236 | 42.91% |
| Arts and Humanities | 226 | 41.09% |
| Engineering | 46 | 8.36% |
| Multidisciplinary | 31 | 5.64% |
| Business, Management and Accounting | 26 | 4.73% |
| Biochemistry, Genetics and Molecular Biology | 22 | 4.00% |
| Materials Science | 22 | 4.00% |
| Mathematics | 22 | 4.00% |
| Environmental Science | 16 | 2.91% |
| Physics and Astronomy | 14 | 2.55% |
| Decision Sciences | 13 | 2.36% |
| Energy | 13 | 2.36% |
| Psychology | 12 | 2.18% |

| | | |
|---|---|---|
| Economics, Econometrics and Finance | 11 | 2.00% |
| Chemistry | 10 | 1.82% |
| Chemical Engineering | 9 | 1.64% |
| Medicine | 9 | 1.64% |
| Neuroscience | 8 | 1.45% |
| Earth and Planetary Sciences | 7 | 1.27% |
| Agricultural and Biological Sciences | 6 | 1.09% |
| Health Professions | 5 | 0.91% |
| Nursing | 1 | 0.18% |
| Pharmacology, Toxicology and Pharmaceutics | 1 | 0.18% |

Table 4 presents a detailed overview of key citation metrics and bibliometric parameters, offering valuable insights into the impact and relevance of publications within the digital humanities research domain. The analysis was conducted using biblioMagika, a specialized bibliometric software that processes Scopus data into meaningful indicators, such as total publications, total citations, average citations per paper, and key indices like the h-index and g-index. As shown in Table 4, the dataset includes a total of 550 publications spanning from 2001 to 2024. These publications have collectively received 7,095 citations, averaging 12.90 citations per paper and 15.19 citations per cited paper. The h-index—which reflects the number of publications that have been cited at least that many times—was recorded at 40, while the g-index, which gives greater weight to highly cited papers, was 65. Additionally, the m-index, which measures the h-index's growth over time, stood at 1.600. The data also reveals an average of 308.48 citations per year and a citation sum within the h-core of 5,797, further underscoring the growing influence of digital humanities research. Interestingly, the analysis indicates that each paper, on average, has a single author (1.00 authors per paper), suggesting that solo authorship is a common practice in the field. However, interdisciplinary collaborations may still play a role in research dissemination through other forms of engagement.

These findings provide a well-rounded response to Research Question 1 (RQ1), revealing that digital humanities research is predominantly published in journals and articles, primarily in the English language, and spans multiple disciplines, including social sciences, computer science, and business management. The relatively high h-index and g-index values indicate that digital humanities publications have gained substantial recognition and influence within the academic community. This bibliometric review highlights the impact, growth, and collaborative nature of digital humanities research, emphasizing the need for continued interdisciplinary engagement to address the evolving challenges and opportunities within this domain.

***Table 4: Citation metrics***

| **Main Information** | **Data** |
|---|---|
| Publication Years | 2001 - 2024 |
| Total Publications | 550 |
| Citable Year | 25 |
| Number of Contributing Authors | 550 |
| Number of Cited Papers | 467 |
| Total Citations | 7,095 |
| Citation per Paper | 12.90 |
| Citation per Cited Paper | 15.19 |
| Citation per Year | 308.48 |
| Citation per Author | 12.90 |

| | |
|---|---|
| Author per Paper | 1.00 |
| Citation sum within h-Core | 5,797 |
| h-index | 40 |
| g-index | 65 |
| m-index | 1.600 |

## Publication trends

To address our second research question, "What emerging trends can be observed within the realm of digital humanities publications?", we analyzed the growth trajectory of this evolving academic field. Since its inception in 2001, research in digital humanities has witnessed significant and sustained growth, particularly from the early 2010s onward, culminating in a peak of 81 publications in 2023 (see Fig. 2 and Table 5 for reference). Figure 2 visually depicts this trend, highlighting both the steady increase in total publications and the growing number of citations accumulated over time.

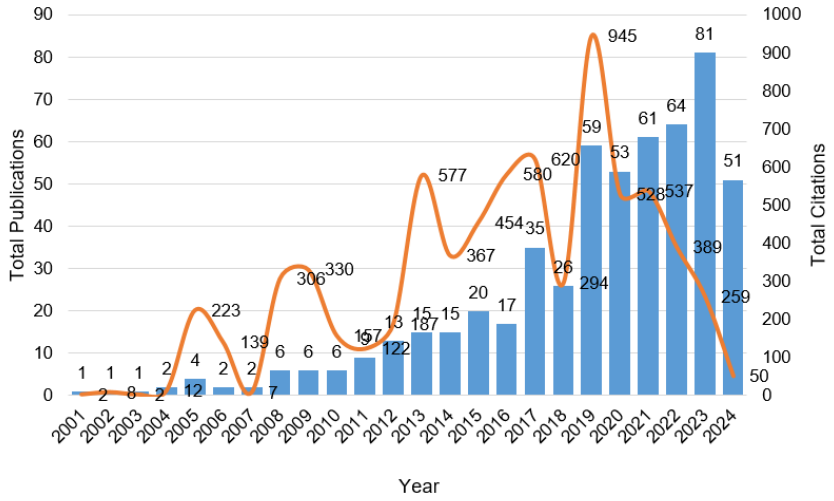


***Figure 2: Total publications and citations by year***

The number of contributing authors (NCA) has also followed an upward trajectory, reflecting the expanding and dynamic research community engaged in digital humanities. This growth underscores the interdisciplinary nature of the field, which incorporates contributions from disciplines such as computer science, social sciences, business management, environmental studies, and engineering. In terms of research impact, the h-index (40) and g-index (65), as shown in Table 5, have exhibited a consistent rise, reaffirming the increasing relevance and influence of digital humanities research within the broader academic landscape. However, the m-index, which measures the rate of highly cited publications over time, has shown some fluctuations, suggesting variability in citation rates across different periods. An analysis of citation practices reveals that the average citations per publication (C/P) and average citations per cited publication (C/CP) have varied over the years. Notably, recent years have seen a decline in citation rates, which may indicate shifting citation behaviours, evolving research priorities, or changes in publication visibility and impact.

In summary, digital humanities research is currently experiencing robust growth, marked by an increasing number of publications, a broadening base of contributing authors, and a rising impact in academia. However, the variability in citation trends warrants further investigation into citation behaviours, research quality, and evolving scholarly engagement within the field. These trends collectively underscore the growing importance of digital humanities as a critical discipline, bridging multiple fields to address complex societal challenges and sustainable development goals.

***Table 5: Total publications***

| Year | TP | NCA | NCP | TC | C/P | C/CP | *h* | *g* | *m* |
|---|---|---|---|---|---|---|---|---|---|
| 2001 | 1 | 1 | 1 | 2 | 2.00 | 2.00 | 1 | 1 | 0.040 |
| 2002 | 1 | 1 | 1 | 8 | 8.00 | 8.00 | 1 | 1 | 0.042 |
| 2003 | 1 | 1 | 1 | 2 | 2.00 | 2.00 | 1 | 1 | 0.043 |
| 2004 | 2 | 2 | 2 | 12 | 6.00 | 6.00 | 1 | 2 | 0.045 |
| 2005 | 4 | 4 | 4 | 223 | 55.75 | 55.75 | 4 | 4 | 0.190 |
| 2006 | 2 | 2 | 2 | 139 | 69.50 | 69.50 | 2 | 2 | 0.100 |
| 2007 | 2 | 2 | 2 | 7 | 3.50 | 3.50 | 2 | 2 | 0.105 |
| 2008 | 6 | 6 | 6 | 306 | 51.00 | 51.00 | 4 | 6 | 0.222 |
| 2009 | 6 | 6 | 6 | 330 | 55.00 | 55.00 | 5 | 6 | 0.294 |
| 2010 | 6 | 6 | 6 | 157 | 26.17 | 26.17 | 4 | 6 | 0.250 |
| 2011 | 9 | 9 | 9 | 122 | 13.56 | 13.56 | 6 | 9 | 0.400 |
| 2012 | 13 | 13 | 13 | 187 | 14.38 | 14.38 | 7 | 13 | 0.500 |
| 2013 | 15 | 15 | 14 | 577 | 38.47 | 41.21 | 12 | 15 | 0.923 |
| 2014 | 15 | 15 | 15 | 367 | 24.47 | 24.47 | 9 | 15 | 0.750 |
| 2015 | 20 | 20 | 20 | 454 | 22.70 | 22.70 | 11 | 20 | 1.000 |
| 2016 | 17 | 17 | 15 | 580 | 34.12 | 38.67 | 10 | 17 | 1.000 |
| 2017 | 35 | 35 | 34 | 620 | 17.71 | 18.24 | 12 | 24 | 1.333 |
| 2018 | 26 | 26 | 24 | 294 | 11.31 | 12.25 | 9 | 16 | 1.125 |
| 2019 | 59 | 59 | 53 | 945 | 16.02 | 17.83 | 17 | 29 | 2.429 |
| 2020 | 53 | 53 | 49 | 528 | 9.96 | 10.78 | 13 | 20 | 2.167 |
| 2021 | 61 | 61 | 56 | 537 | 8.80 | 9.59 | 12 | 19 | 2.400 |
| 2022 | 64 | 64 | 54 | 389 | 6.08 | 7.20 | 11 | 16 | 2.750 |
| 2023 | 81 | 81 | 56 | 259 | 3.20 | 4.63 | 9 | 12 | 3.000 |
| 2024 | 51 | 51 | 24 | 50 | 0.98 | 2.08 | 3 | 5 | 1.500 |
| Total | 550 | 550 | 467 | 7095 | 12.90 | 15.19 | 40 | 65 | 1.600 |

Notes: TP = total number of publications; NCA=Number of contributing authors; NCP = number of cited publications; TC = total citations; C/P = average citations per publication; C/CP = average citations per cited publication; *h* = h-index; *g* = g-index; *m* = m-index.

**Publications by authors**

To address our third research question, "Which key players—including authors, institutions, and countries—are fundamentally driving advancements in digital humanities research?", we conducted a detailed analysis of the most influential authors, institutions, and countries based on their publication output, citation impact, and overall contribution to the field. From a publication output perspective, we identified the most prolific authors who have published multiple papers in esteemed conferences and academic journals. Table 6 presents a ranked list of these scholars, including their affiliations, country of origin, total publications (TP), number of cited publications (NCP), total citations (TC), average citations per paper (C/P), average citations per cited paper (C/CP), h-index, g-index, and m-index.

Among the top contributors, Julianne Nyhan (University College London, UK) has published five papers, accumulating 47 total citations, with an h-index of 4 and an average of 9.40 citations per paper. Likewise, Claire Warwick (Durham University, UK) has published four papers, achieving 107 total citations and an average of 26.75 citations per paper. Other notable scholars include Melissa Terras (University College London, UK) with four papers and 79 citations, Simon Mahony (University College London, UK) with four papers and 62 citations, and Chris Alen Sula (Pratt Institute, USA) with three papers and 49 citations. These researchers have made substantial contributions to the evolution of digital humanities, shaping the field through highly cited publications and interdisciplinary research efforts.

From an institutional perspective, University College London (UK) emerges as a dominant research hub, with multiple scholars contributing significantly to digital humanities research. Other notable

institutions include Durham University (UK), University of Leipzig (Germany), Trinity College Dublin (Ireland), and Linnaeus University (Sweden). On a country-wide scale, the United Kingdom, the United States, Germany, Sweden, and Canada are among the most active contributors, reflecting the global reach and impact of digital humanities research. The data from Table 6 provides critical insights into the productivity, citation impact, and scholarly influence of researchers in digital humanities. The h-index and g-index values of these scholars further underscore their lasting impact on the field. Additionally, the presence of authors from diverse institutions and geographic locations highlights the interdisciplinary and international nature of digital humanities research. While most high-impact authors are affiliated with institutions in Europe and North America, the evolving landscape suggests increasing participation from Asia and other regions. This trend underscores the growing recognition of digital humanities as an essential discipline that bridges technology, humanities, and computational methodologies.

***Table 6: Most Productive Authors***

| **Full Name** | **Current Affiliation** | **Country** | **TP** | **NCP** | **TC** | **C/P** | **C/CP** | ***h*** | ***g*** | ***m*** |
|---|---|---|---|---|---|---|---|---|---|---|
| Nyhan, Julianne | University College London | United Kingdom | 5 | 5 | 47 | 9.40 | 9.40 | 4 | 5 | 0.333 |
| Warwick, Claire | Durham University | United Kingdom | 4 | 4 | 107 | 26.75 | 26.75 | 4 | 4 | 0.222 |
| Duke-Williams, Oliver | University College London | United Kingdom | 4 | 4 | 48 | 12.00 | 12.00 | 3 | 4 | 0.250 |
| Mahony, Simon | University College London | United Kingdom | 4 | 4 | 62 | 15.50 | 15.50 | 3 | 4 | 0.375 |
| Terras, Melissa | University College London | United Kingdom | 4 | 4 | 79 | 19.75 | 19.75 | 4 | 4 | 0.222 |
| Golub, Koraljka | Linnaeus University | Sweden | 3 | 3 | 24 | 8.00 | 8.00 | 2 | 3 | 0.333 |
| Burghardt, Manuel | University of Leipzig | Germany | 3 | 3 | 35 | 11.67 | 11.67 | 2 | 3 | 0.500 |
| Edmond, Jennifer | Trinity College Dublin | Ireland | 3 | 3 | 28 | 9.33 | 9.33 | 3 | 3 | 0.500 |
| Sula, Chris Alen | Pratt Institute | United States | 3 | 3 | 49 | 16.33 | 16.33 | 3 | 3 | 0.429 |
| Estill, Laura | St Francis Xavier University | Canada | 3 | 3 | 15 | 5.00 | 5.00 | 1 | 3 | 0.143 |
| Blanke, Tobias | University of Amsterdam | Netherlands | 3 | 3 | 17 | 5.67 | 5.67 | 1 | 3 | 0.056 |
| De Luca, Livio | Campus CNRS Joseph-Aiguier | France | 2 | 2 | 18 | 9.00 | 9.00 | 2 | 2 | 0.667 |
| Gonzalez-Perez, Cesar | Institute of Heritage Sciences | Spain | 2 | 2 | 26 | 13.00 | 13.00 | 2 | 2 | 0.286 |
| Rimmer, Jon | University College London | United Kingdom | 2 | 2 | 65 | 32.50 | 32.50 | 2 | 2 | 0.111 |
| Gooch, Megan | Centre for Digital Scholarship | United Kingdom | 2 | 1 | 4 | 2.00 | 4.00 | 1 | 2 | 0.333 |

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|---|---|---|---|---|---|---|---|---|---|---|
| Marcondes, Carlos H. | UFMG- Minas Gerais Federal University | Brazil | 2 | 1 | 7 | 3.50 | 7.00 | 1 | 2 | 0.167 |
| Strange, Damon | University of Oxford | United Kingdom | 2 | 1 | 4 | 2.00 | 4.00 | 1 | 2 | 0.333 |
| Capurro, Carlotta | Utrecht University | Netherlands | 2 | 2 | 9 | 4.50 | 4.50 | 2 | 2 | 0.667 |
| Blandford, Ann | University College London | United Kingdom | 2 | 2 | 65 | 32.50 | 32.50 | 2 | 2 | 0.111 |
| Arikan, Okan | University of Texas | United States | 2 | 2 | 145 | 72.50 | 72.50 | 2 | 2 | 0.095 |

**Note:** TP=total number of publications; NCA=number oc contributing authos; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; g=g-index, m=m-index.

**Publications by institutions**

Table 7 presents a detailed analysis of research productivity at the institutional level, specifically highlighting academic institutions that have produced a minimum of 20 publications in the field of digital humanities. The data reveals significant institutional contributions, reflecting the global landscape of digital humanities research. Among the leading institutions, University College London (UCL) in the United Kingdom stands out as the most prolific, with a total of 59 publications, an h-index of 20, and a total citation count of 1,114, underscoring its dominant role in shaping research within this domain. UCL's impressive g-index of 33 and a citation per publication (C/P) ratio of 18.88 further solidify its standing as a hub for high-impact research.

In the United States, the University of California follows closely with 43 publications and 944 total citations, demonstrating substantial research influence with an h-index of 13 and a g-index of 30. Additionally, Duke University exhibits a remarkable total citation count of 2,668, with an exceptionally high C/P ratio of 177.87, indicating the significant impact of its research output despite having only 15 total publications. Other notable institutions include Shanghai Jiao Tong University (China) with 29 publications, King's College London (UK) with 25 publications, and KU Leuven (Belgium) with 21 publications. Interestingly, KU Leuven has the highest C/P ratio of 37.33, showcasing the high impact of its research despite a lower publication count.

From a geographic perspective, the data highlights the United Kingdom, the United States, China, Germany, and Switzerland as the most active contributors to digital humanities research. Universities in Switzerland, such as the University of Basel and Philip Morris Products S.A., exhibit strong research impact with h-indices of 14 and 11, respectively, demonstrating a notable presence in the field. Additionally, emerging contributions from Malaysia, Portugal, and Brazil suggest a growing international interest in digital humanities research. Institutions like Universiti Sultan Zainal Abidin (Malaysia) and NOVA University Lisbon (Portugal) have begun making their mark, albeit with relatively lower publication and citation counts.

The data in Table 7 provides crucial insights into the productivity, impact, and influence of academic institutions in digital humanities research. The h-index and g-index values highlight the sustained contributions of these institutions, while the C/P and C/CP ratios provide a deeper understanding of research influence and citation impact. Despite UCL and the University of California leading in total publications, institutions such as Duke University and KU Leuven exhibit significantly higher citation-per-publication ratios, indicating a strong focus on high-impact research. This underscores the importance of both research quantity and quality in assessing institutional contributions. Moving forward, collaborations between high-performing institutions across different regions could further enhance the growth and visibility of digital humanities research. The increasing presence of institutions from Asia, Latin America, and Africa highlights the expanding global nature of digital

humanities scholarship, paving the way for future interdisciplinary and cross-regional research partnerships.

***Table 7: Most Productive Institutions***

| Institution Name | Country | TP | NCA | NCP | TC | C/P | C/CP | *h* | *g* | *m* |
|---|---|---|---|---|---|---|---|---|---|---|
| University College London | United Kingdom | 59 | 59 | 59 | 1114 | 18.88 | 18.88 | 20 | 33 | 1.111 |
| University of California | United States | 43 | 43 | 43 | 944 | 21.95 | 21.95 | 13 | 30 | 0.619 |
| Shanghai Jiao Tong University | China | 29 | 29 | 29 | 263 | 9.07 | 9.07 | 11 | 16 | 1.375 |
| King's College London | United Kingdom | 25 | 25 | 21 | 105 | 4.20 | 5.00 | 7 | 10 | 0.389 |
| Jilin University | China | 24 | 24 | 24 | 246 | 10.25 | 10.25 | 6 | 15 | 0.462 |
| Weizmann Institute of Science | Israel | 24 | 24 | 24 | 264 | 11.00 | 11.00 | 11 | 16 | 5.500 |
| KU Leuven | Belgium | 21 | 21 | 19 | 784 | 37.33 | 41.26 | 9 | 21 | 0.900 |
| National University of Singapore | Singapore | 21 | 21 | 19 | 222 | 10.57 | 11.68 | 9 | 14 | 1.500 |
| Affiliation NA | Country NA | 20 | 20 | 14 | 82 | 4.10 | 5.86 | 6 | 9 | 0.353 |
| University of Basel | Switzerland | 18 | 18 | 18 | 329 | 18.28 | 18.28 | 14 | 18 | 1.273 |
| University of Latvia | Latvia | 18 | 18 | 18 | 26 | 1.44 | 1.44 | 3 | 5 | 1.500 |
| University of Bologna | Italy | 18 | 18 | 18 | 40 | 2.22 | 2.22 | 4 | 6 | 0.571 |
| University of Oxford | United Kingdom | 16 | 16 | 16 | 100 | 6.25 | 6.25 | 4 | 10 | 0.500 |
| Philip Morris Products S.A. | Switzerland | 16 | 16 | 16 | 176 | 11.00 | 11.00 | 11 | 13 | 1.375 |
| University of Illinois | United States | 16 | 16 | 16 | 290 | 18.13 | 18.13 | 8 | 16 | 0.333 |
| Universidade Federal de Santa Catarina | Brazil | 16 | 16 | 6 | 12 | 0.75 | 2.00 | 2 | 3 | 0.500 |
| University of Leipzig | Germany | 16 | 16 | 16 | 234 | 14.63 | 14.63 | 10 | 15 | 0.667 |
| Utrecht University | Netherlands | 16 | 16 | 16 | 110 | 6.88 | 6.88 | 7 | 10 | 1.000 |
| Duke University | United States | 15 | 15 | 13 | 2668 | 177.87 | 205.23 | 13 | 15 | 1.182 |
| University of Texas | United States | 15 | 15 | 13 | 201 | 13.40 | 15.46 | 5 | 14 | 0.238 |
| Johns Hopkins University | United States | 15 | 15 | 15 | 189 | 12.60 | 12.60 | 11 | 13 | 0.917 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| University Complutense of Madrid | Spain | 14 | 14 | 12 | 88 | 6.29 | 7.33 | 8 | 9 | 1.143 |
| NOVA University Lisbon | Portugal | 14 | 14 | 14 | 56 | 4.00 | 4.00 | 4 | 7 | 1.000 |
| Universiti Sultan Zainal Abidin | Malaysia | 14 | 14 | 2 | 8 | 0.57 | 4.00 | 2 | 2 | 0.286 |
| Helmholtz Center Munich | Germany | 14 | 14 | 14 | 56 | 4.00 | 4.00 | 4 | 7 | 1.333 |

**Note:** TP=total number of publications; NCA=number of contribution authors; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; g=g-index, m=m-index.

**Publications by countries**

Table 8 provides a comprehensive overview of research productivity by country, focusing on nations that have contributed at least 20 publications to the field of digital humanities. This analysis offers valuable insights into the global distribution of research efforts, highlighting key players and emerging contributors. At the forefront of digital humanities research, the United States leads the field with 140 total publications, 2,349 total citations, and an h-index of 27, underscoring its dominance in both research output and scholarly impact. Additionally, the United States maintains a g-index of 48, reinforcing the high citation impact of its research contributions and solidifying its role as a global leader in digital humanities scholarship.

Following closely behind, the United Kingdom ranks second with 88 publications and 1,237 total citations, demonstrating its strong presence in the field. The h-index (20) and g-index (35) reflect the sustained high quality of research output, while the citation per publication (C/P) ratio of 14.06 highlights its substantial academic influence. Other notable contributors include Germany and China, both with 41 publications each. Germany exhibits a total citation count of 780 and an h-index of 13, signifying a moderate but impactful research presence. Meanwhile, China has accumulated 453 total citations and an h-index of 10, highlighting its growing role and increasing research contributions to digital humanities scholarship. Countries such as Italy and Spain have also demonstrated steady engagement in digital humanities research, producing 31 and 30 publications, respectively. Their citation counts indicate moderate research influence, with Italy showing an h-index of 10 and Spain an h-index of 9. Similarly, Australia and the Netherlands each contributed 29 publications, with the Netherlands demonstrating a slightly higher citation impact (304 total citations compared to Australia's 257 total citations).

Interestingly, some countries exhibit high citation-per-publication (C/P) ratios despite lower total publication counts. For example, Belgium boasts the highest C/P ratio at 31.50, followed by Japan at 29.00 and Greece at 35.57, suggesting that while these countries publish fewer papers, their research is highly influential within the academic community. South Korea and Israel also demonstrate strong citation impact, with C/P ratios of 25.14 and 15.83, respectively. Several emerging contributors in digital humanities research include Brazil, Greece, South Korea, Indonesia, Singapore, and Hong Kong. While these countries have relatively lower total publication counts, their high citation-per-publication ratios indicate increasing recognition and impact. Notably, India has produced 12 publications with a total of 30 citations and an h-index of 3, reflecting an expanding research environment with considerable potential for growth in digital humanities scholarship.

The data from Table 8 provides essential insights into the global trends shaping digital humanities research. North America and Europe remain dominant in terms of publication volume and impact, with the United States, the United Kingdom, and Germany leading in both citation influence and scholarly output. However, China and India are rapidly increasing their research contributions,

signaling an upward trend in academic investment within digital humanities. Countries with high citation-per-publication ratios, such as Belgium, Greece, and South Korea, demonstrate the presence of highly impactful yet selective research outputs. Additionally, smaller research hubs in Asia, Latin America, and the Middle East are beginning to make notable contributions, paving the way for greater international collaborations and cross-disciplinary research efforts in digital humanities.

In conclusion, the growing international nature of digital humanities research is evident from the data, with new contributors entering the field and established leaders continuing to influence the discourse. Moving forward, increased international partnerships and collaborative research efforts will be crucial to further advancing digital humanities as a dynamic, interdisciplinary, and globally inclusive academic discipline.

***Table 8: Most Productive Countries***

| Country | TP | NCA | NCP | TC | C/P | C/CP | *h* | *g* | *m* |
|---|---|---|---|---|---|---|---|---|---|
| United States | 140 | 500 | 127 | 2349 | 16.78 | 18.50 | 27 | 48 | 1.125 |
| United Kingdom | 88 | 324 | 76 | 1237 | 14.06 | 16.28 | 20 | 35 | 0.870 |
| Germany | 41 | 152 | 39 | 780 | 19.02 | 20.00 | 13 | 27 | 0.722 |
| China | 41 | 236 | 34 | 453 | 11.05 | 13.32 | 10 | 21 | 0.769 |
| Italy | 31 | 141 | 23 | 242 | 7.81 | 10.52 | 10 | 15 | 0.667 |
| Spain | 30 | 111 | 26 | 276 | 9.20 | 10.62 | 9 | 16 | 0.563 |
| Australia | 29 | 96 | 25 | 257 | 8.86 | 10.28 | 8 | 16 | 0.500 |
| Netherlands | 29 | 78 | 25 | 304 | 10.48 | 12.16 | 10 | 17 | 0.588 |
| Canada | 21 | 68 | 20 | 255 | 12.14 | 12.75 | 8 | 15 | 0.381 |
| France | 19 | 80 | 17 | 108 | 5.68 | 6.35 | 7 | 10 | 0.467 |
| Sweden | 14 | 30 | 12 | 109 | 7.79 | 9.08 | 5 | 10 | 0.417 |
| India | 12 | 64 | 7 | 30 | 2.50 | 4.29 | 3 | 5 | 0.375 |
| Switzerland | 12 | 58 | 10 | 200 | 16.67 | 20.00 | 5 | 12 | 0.455 |
| Country NA | 9 | 18 | 6 | 39 | 4.33 | 6.50 | 3 | 6 | 0.176 |
| Finland | 9 | 31 | 9 | 138 | 15.33 | 15.33 | 7 | 9 | 0.412 |
| Ireland | 8 | 15 | 8 | 108 | 13.50 | 13.50 | 6 | 8 | 0.462 |
| Belgium | 8 | 30 | 7 | 252 | 31.50 | 36.00 | 5 | 8 | 0.385 |
| Japan | 7 | 19 | 6 | 203 | 29.00 | 33.83 | 4 | 7 | 0.190 |
| Brazil | 7 | 30 | 4 | 15 | 2.14 | 3.75 | 2 | 3 | 0.333 |
| Greece | 7 | 39 | 7 | 249 | 35.57 | 35.57 | 7 | 7 | 0.583 |
| South Korea | 7 | 23 | 5 | 176 | 25.14 | 35.20 | 4 | 7 | 0.400 |
| Israel | 6 | 39 | 5 | 95 | 15.83 | 19.00 | 4 | 6 | 0.364 |
| Indonesia | 6 | 35 | 5 | 51 | 8.50 | 10.20 | 4 | 6 | 0.667 |
| Singapore | 6 | 39 | 4 | 47 | 7.83 | 11.75 | 3 | 6 | 0.120 |
| Hong Kong | 6 | 21 | 5 | 36 | 6.00 | 7.20 | 4 | 6 | 0.182 |

**Note:** TP=total number of publications; NCA=number of contribution authors; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; g=g-index, m=m-index.

## Publications by source titles

To comprehensively address the fourth research question regarding the most influential publications in digital humanities, Table 9 provides a detailed overview of the most prolific source titles, each of which has contributed a minimum of 20 scholarly documents. This analysis evaluates their impact factors, quantifies the volume of digital humanities articles published, and examines their influence within the broader academic landscape. Among the leading journals, Digital Scholarship in the Humanities stands out as the most prolific publication source, with 25 total publications (TP), 278 total citations (TC), and an h-index of 11, highlighting its significant role in advancing digital humanities research. PLoS ONE follows with 12 publications and an impressive total citation count of 517, resulting in a citation per publication (C/P) ratio of 43.08, indicating that its articles receive considerable attention and impact. Sustainability (Switzerland) and the Journal on Computing and

Cultural Heritage also make notable contributions, with 11 publications each and respectable citation counts (125 and 133, respectively).

Other key sources, such as Digital Studies/Le Champ Numérique (9 publications) and the Journal of Cultural Analytics (9 publications), continue to play a crucial role in facilitating discourse within digital humanities. While these journals exhibit lower total citations than leading publications, their presence signifies the diversification of research dissemination platforms in the field. Meanwhile, Heritage (8 publications) and Studies in Digital Heritage (7 publications) emphasize historical and archival perspectives, underscoring the interdisciplinary nature of digital humanities research. Furthermore, D-Lib Magazine (7 publications, 76 citations) and the Journal of Documentation (6 publications, 86 citations) showcase a steady contribution to discussions surrounding digital libraries, cultural heritage, and digital archiving. The Journal of the Association for Information Science and Technology (5 publications, 100 citations) exhibits a particularly strong citation impact, with an h-index of 4, highlighting its high-quality research output. Similarly, Scientific Reports, though contributing only 5 publications, boasts 331 citations, reflecting its high research visibility and impact within the digital humanities field.

Notably, some journals maintain a lower publication count but demonstrate strong citation-per-publication (C/P) ratios. For instance, Virtual Archaeology Review (4 publications) achieves a C/P ratio of 22.00, while ISPRS International Journal of Geo-Information (4 publications) has a C/P ratio of 42.50, suggesting that their articles are highly influential despite their relatively low volume. In conclusion, Table 9 provides critical insights into the central publication venues for digital humanities research. While Digital Scholarship in the Humanities, PLoS ONE, and Sustainability (Switzerland) emerge as key sources for high-impact scholarly work, other journals such as the Journal of Cultural Analytics, Heritage, and D-Lib Magazine continue to shape discussions within the field. Understanding these primary publication platforms is essential for researchers aiming to stay updated on groundbreaking findings and identify suitable venues for disseminating their work. As digital humanities continue to expand, these journals and conference proceedings will remain vital in fostering innovation and interdisciplinary collaboration.

***Table 9: Source title***

| Source Title | TP | NCA | NCP | TC | C/P | C/CP | *h* | *g* | *m* |
|---|---|---|---|---|---|---|---|---|---|
| Digital Scholarship in the Humanities | 25 | 25 | 25 | 278 | 11.12 | 11.12 | 11 | 15 | 1.000 |
| PLoS ONE | 12 | 12 | 12 | 517 | 43.08 | 43.08 | 9 | 12 | 0.529 |
| Sustainability (Switzerland) | 11 | 11 | 11 | 125 | 11.36 | 11.36 | 5 | 11 | 0.500 |
| Journal on Computing and Cultural Heritage | 11 | 11 | 9 | 133 | 12.09 | 14.78 | 6 | 11 | 0.400 |
| Digital Studies/ Le Champ Numerique | 9 | 9 | 7 | 36 | 4.00 | 5.14 | 3 | 5 | 0.429 |
| Journal of Cultural Analytics | 9 | 9 | 6 | 16 | 1.78 | 2.67 | 2 | 3 | 0.400 |
| Heritage | 8 | 8 | 8 | 45 | 5.63 | 5.63 | 4 | 6 | 0.571 |
| Studies in Digital Heritage | 7 | 7 | 5 | 13 | 1.86 | 2.60 | 3 | 3 | 0.333 |
| College and Undergraduate Libraries | 7 | 7 | 7 | 61 | 8.71 | 8.71 | 6 | 7 | 0.500 |
| D-Lib Magazine | 7 | 7 | 7 | 76 | 10.86 | 10.86 | 4 | 7 | 0.167 |
| Journal of Documentation | 6 | 6 | 6 | 86 | 14.33 | 14.33 | 4 | 6 | 0.235 |
| Magazen | 6 | 6 | 5 | 20 | 3.33 | 4.00 | 3 | 4 | 0.500 |
| Humanities and Social Sciences Communications | 5 | 5 | 2 | 9 | 1.80 | 4.50 | 2 | 3 | 0.500 |
| Applied Sciences (Switzerland) | 5 | 5 | 4 | 92 | 18.40 | 23.00 | 4 | 5 | 0.571 |
| Journal of the Association for Information Science and Technology | 5 | 5 | 5 | 100 | 20.00 | 20.00 | 4 | 5 | 1.000 |
| Scientific Reports | 5 | 5 | 4 | 331 | 66.20 | 82.75 | 3 | 5 | 0.333 |
| College and Research Libraries | 5 | 5 | 5 | 31 | 6.20 | 6.20 | 3 | 5 | 0.250 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Virtual Archaeology Review | 4 | 4 | 4 | 88 | 22.00 | 22.00 | 3 | 4 | 0.333 |
| ISPRS International Journal of Geo-Information | 4 | 4 | 3 | 170 | 42.50 | 56.67 | 2 | 4 | 0.222 |
| College and Research Libraries News | 4 | 4 | 4 | 49 | 12.25 | 12.25 | 4 | 4 | 0.250 |

**Note:** TP=total number of publications; NCA=number of contributing authors; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; g=g-index; m=m-index.

## Highly cited documents

To address the fifth research question, "Which scholarly works have had the most significant impact on digital humanities research?", Table 10 presents a comprehensive list of the 20 most highly cited articles that have substantially shaped discussions within the field. These papers have played a pivotal role in advancing digital humanities research, as evidenced by their high citation counts, which serve as a quantifiable measure of their influence and scholarly impact. Leading the list is the 2009 article by Makuuchi, Bahlmann, Anwander, and Friederici, titled "Segregating the core computational faculty of human language from working memory." This seminal work has accumulated 281 citations, with an average of 16.53 citations per year, reflecting its sustained relevance and influence. Similarly, the 2017 study by Gollub et al., "Large Metasurface Aperture for Millimeter Wave Computational Imaging at the Human-Scale," has garnered 221 citations, with a notably high citation rate of 24.56 per year. This underscores its significant impact in computational imaging within digital humanities research.

Other key contributions include Kubilius et al.'s (2016) study on deep neural networks as a model for human shape sensitivity, which has amassed 194 citations, averaging 19.40 citations per year. Meanwhile, Pan et al.'s (2005) computational redesign of human butyrylcholinesterase for anticocaine medication has received 168 citations, highlighting its cross-disciplinary impact. Additionally, Jepsen, Ewert, and Dau's (2008) computational model of human auditory signal processing has been cited 154 times, demonstrating its broad applicability in digital humanities and cognitive sciences. A particularly noteworthy study in digital humanities research is Grandjean's (2016) "A Social Network Analysis of Twitter: Mapping the Digital Humanities Community," which has earned 126 citations with an annual average of 12.60. This paper exemplifies the increasing use of computational methods in analyzing social media and online engagement within the digital humanities community. Similarly, Liu et al.'s (2014) work on a computational framework for human disease-associated long noncoding RNAs has garnered 121 citations, further reflecting the interdisciplinary reach of digital humanities research.

Several other articles exhibit high citation counts despite being relatively recent. For example, Dagdag et al.'s (2019) research on epoxy pre-polymers for corrosion inhibition has accumulated 101 citations in a short period, averaging 14.43 citations per year. Additionally, King, Stark, and Cooke's (2016) study on digital engagement with heritage has reached 102 citations, illustrating the growing importance of digital preservation and cultural heritage studies within digital humanities. It is also crucial to acknowledge foundational works such as Alan Liu's (2013) "The Meaning of the Digital Humanities" and Miriam Posner's (2013) "No Half Measures: Overcoming Common Challenges to Doing Digital Humanities in the Library." These papers, despite being slightly older, continue to be widely referenced, with citation counts of 99 and 93, respectively. Similarly, Vinopal and McCormick's (2013) work on supporting digital scholarship in research libraries has achieved 78 citations, reinforcing the essential role of libraries in digital humanities initiatives.

The articles listed in Table 10 collectively represent some of the most impactful contributions to digital humanities research, covering topics such as computational modeling, digital heritage, social media analytics, neural networks, and interdisciplinary methodologies. The citation patterns indicate that studies incorporating advanced computational techniques, digital preservation strategies, and interdisciplinary approaches are particularly influential. Moreover, recent works, such as those

published in the last five to ten years, are gaining traction at an accelerated rate, suggesting that the field of digital humanities is rapidly evolving with emerging technologies and methodologies. These citation trends highlight the shifting focus toward artificial intelligence, deep learning, and digital engagement in cultural studies, paving the way for future research directions and innovative collaborations.

In conclusion, the highly cited documents in Table 10 provide a valuable roadmap for researchers looking to explore influential works in digital humanities. These papers not only establish foundational knowledge but also signal emerging trends that will shape the field in the coming years. Understanding these landmark contributions is essential for scholars seeking to engage with cutting-edge research and build upon the existing body of knowledge in digital humanities.

***Table 10: 20 most highly cited articles***

| No. | Author(s) | Title | Cites | Cites Per Year |
|---|---|---|---|---|
| 1 | Makuuchi et al. (2009) | Segregating the core computational faculty of human language from working memory | 281 | 16.53 |
| 2 | Gollub et al. (2017) | Large metasurface aperture for millimeter wave computational imaging at the human-scale | 221 | 24.56 |
| 3 | Kubilius et al. (2016) | Deep neural networks as a computational model for human shape sensitivity | 194 | 19.40 |
| 4 | Pan et al. (2005) | Computational redesign of human butyrylcholinesterase for anticocaine medication | 168 | 8.00 |
| 5 | Jepsen et al. (2008) | A computational model of human auditory signal processing and perception | 154 | 8.56 |
| 6 | Jo & Hong (2019) | Three-dimensional digital documentation of cultural heritage site based on the convergence of terrestrial laser scanning and unmanned aerial vehicle photogrammetry | 137 | 19.57 |
| 7 | Grandjean (2016) | A social network analysis of Twitter: Mapping the digital humanities community | 126 | 12.60 |
| 8 | M.-X. Liu et al. (2014) | A computational framework to infer human disease-associated long noncoding RNAs | 121 | 10.08 |
| 9 | Khatri et al. (2015) | Social media and internet driven study recruitment: Evaluating a new model for promoting collaborator engagement and participation | 110 | 10.00 |
| 10 | Forsyth et al. (2005) | Computational studies of human motion: Part 1, tracking and motion synthesis | 104 | 5.20 |
| 11 | King et al. (2016) | Experiencing the digital world: The cultural value of digital engagement with heritage | 102 | 10.20 |
| 12 | Dagdag et al. (2019) | Epoxy pre-polymers as new and effective materials for corrosion | 101 | 14.43 |

| | | | | |
|---|---|---|---|---|
| | | inhibition of carbon steel in acidic medium: Computational and experimental studies | | |
| 13 | A. Liu (2013) | The meaning of the digital humanities | 99 | 7.62 |
| 14 | Posner (2013) | No half measures: Overcoming common challenges to doing digital humanities in the library | 93 | 7.15 |
| 15 | Adra et al. (2010) | Development of a three dimensional multiscale computational model of the human epidermis | 88 | 5.50 |
| 16 | Vinopal & McCormick (2013) | Supporting digital scholarship in research libraries: Scalability and sustainability | 78 | 6.00 |
| 17 | Vandegrift & Varner (2013) | Evolving in common: Creating mutually supportive relationships between libraries and the digital humanities | 73 | 5.62 |
| 18 | Sheikh et al. (2016) | Endocrine disruption: Computational perspectives on human sex hormone-binding globulin and phthalate plasticizers | 68 | 6.80 |
| 19 | Paliokas et al. (2020) | A gamified augmented reality application for digital heritage and tourism | 68 | 11.33 |
| 20 | Burman et al. (2015) | On the meanings of self-regulation: Digital humanities in service of conceptual clarity | 66 | 6.00 |

**Co-Occurrence Analysis**

The co-occurrence network analysis conducted in this study provides a comprehensive understanding of key research themes and trends in digital humanities by examining the relationships between frequently used keywords. Utilizing Author Keyword analysis in VOSViewer, a total of 3,273 unique keywords were identified from the dataset. The top 15 most frequently occurring keywords, as outlined in Table 11, illustrate the dominant research directions in digital humanities. The most prominent keyword, "digital humanities" (122 occurrences, 5.84%), underscores the central focus of the field, while other frequently occurring terms such as "digital heritage" (40 occurrences, 1.91%), "cultural heritage" (36 occurrences, 1.72%), and "digital scholarship" (23 occurrences, 1.10%) highlight the growing emphasis on cultural preservation, archival research, and digital methodologies in humanities scholarship. Additionally, keywords such as "big data," "digitization," and "photogrammetry" indicate the increasing reliance on computational tools and data-driven approaches in the humanities, reflecting a broader trend towards interdisciplinary research that incorporates digital technologies.

To visualize the interconnections between frequently occurring keywords, VOSViewer's co-occurrence analysis was applied to construct a network representation of the relationships between terms. A thesaurus was utilized to standardize spelling variations (e.g., behavior vs. behaviour) while maintaining distinctions between singular and plural forms (e.g., network vs. networks) and conceptually similar terms (e.g., inclusion vs. social inclusion) to preserve the original intent of the authors. To enhance clarity and interpretability, only keywords with at least 20 occurrences were included in the final network, leading to 90 high-frequency keywords categorized into three primary clusters, as depicted in Figures 3 and 4. The association strength method was applied to form these clusters, ensuring that each contained a minimum of 12 keywords, thus preventing fragmentation and allowing for a more structured thematic representation. These clusters illustrate distinct

research areas within digital humanities, grouping together frequently co-occurring terms that reflect similar research priorities.

The keyword distribution within the dataset is classified into two key categories: Author Keywords and Index Keywords, as detailed in Table 11 and Table 12. Author Keywords are terms specifically chosen by researchers to describe their studies, with "digital humanities" emerging as the most frequently used term, followed closely by "digital heritage" and "cultural heritage." These findings confirm the significant emphasis on digitization, preservation, and archival research within the field of digital humanities. Moreover, keywords such as "big data," "digital preservation," and "new media" demonstrate the increasing influence of technology and computational methodologies in humanities research. In contrast, Index Keywords, which are assigned by indexing databases, display a slightly different pattern, with frequently occurring terms such as "human" (61 occurrences), "article" (50 occurrences), "computer simulation" (28 occurrences), and "cultural heritages" (20 occurrences) reflecting a growing interest in computational modelling, artificial intelligence, and digital simulations in humanities studies. These differences suggest that while researchers are primarily focused on cultural preservation and digital archiving, indexing databases highlight the increasing application of computational techniques in humanities research.

The co-occurrence network visualization, as shown in Figures 3 and 4, reveals three major thematic clusters that represent the primary research directions within digital humanities. The first cluster, labelled in red, focuses on digital humanities and cultural heritage preservation, emphasizing themes related to museums, archives, and digitization. Keywords such as "cultural heritage," "digital archives," and "digitization" demonstrate the use of digital tools for the preservation and conservation of historical and cultural artifacts. This cluster reflects the growing importance of digitization efforts in libraries, museums, and cultural institutions worldwide, highlighting the role of digital humanities in ensuring long-term access to historical materials. The second cluster, represented in green, revolves around computational approaches and artificial intelligence-driven methodologies, which are increasingly being incorporated into humanities research. Keywords such as "computer simulation," "human," "digital cultural heritages," and "deep learning" illustrate the integration of AI-driven technologies, machine learning, and data analytics into cultural research and historical studies. This cluster suggests that digital humanities are evolving beyond traditional archival methods, incorporating advanced computational techniques to analyse vast amounts of historical data and cultural artifacts. The third cluster, marked in blue, highlights emerging digital tools and interactive technologies that are transforming humanities research. Keywords like "big data," "virtual reality," and "social media" indicate the expanding role of immersive technologies and digital platforms in education, public engagement, and humanities scholarship. This cluster reflects the shift towards more interactive and accessible digital humanities applications, where virtual environments, AI-powered simulations, and digital engagement strategies are being utilized to enhance research and public understanding.

The findings from this co-occurrence analysis provide valuable insights into the evolving landscape of digital humanities research, showcasing the field's increasing interdisciplinary nature. The dominance of digital heritage and cultural preservation themes indicates the continuing significance of archival digitization and historical conservation within digital humanities. At the same time, the strong presence of AI-driven methodologies, big data analytics, and computational modelling suggests a growing emphasis on data-driven research approaches. These results highlight the field's shift towards a fusion of traditional humanities scholarship with modern technological advancements, positioning digital humanities as a key area for interdisciplinary innovation. Understanding these keyword trends and thematic clusters is crucial for fostering collaboration between humanities scholars and computational researchers, guiding future research directions, and strengthening interdisciplinary partnerships in the digital age. The intersection of digital heritage, artificial intelligence, and interactive digital engagement presents exciting new opportunities for researchers, encouraging them to explore computational methodologies and digital tools to enhance cultural research, knowledge dissemination, and public engagement. As digital humanities continue to expand, integrating emerging digital platforms, AI applications, and preservation technologies will

play an increasingly central role in shaping the future of the field, ensuring greater accessibility, sustainability, and innovation in humanities research.

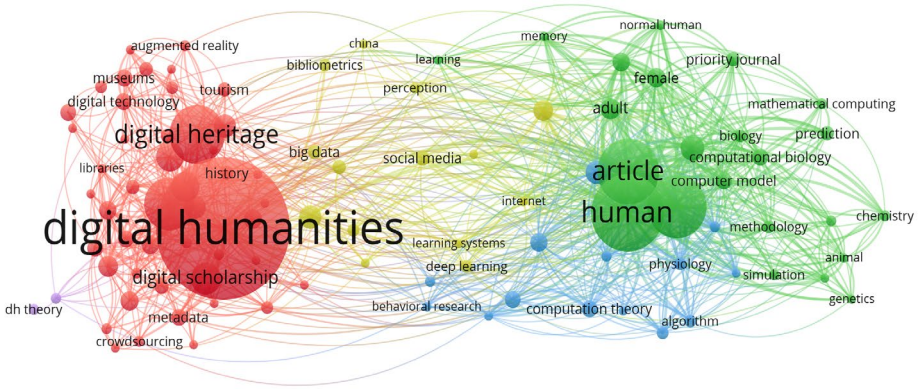


***Figure 3: Author keyword co-occurrence network for "digital humanities."***

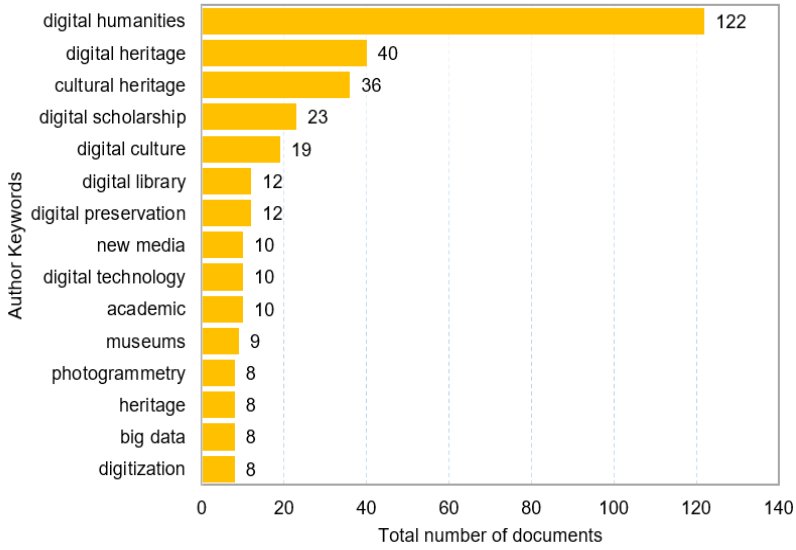


***Figure 4: Author keywords***

***Table 11: Author Keywords***

| Author Keywords | Count | Percentage |
|---|---|---|
| digital humanities | 122 | 5.84% |
| digital heritage | 40 | 1.91% |
| cultural heritage | 36 | 1.72% |
| digital scholarship | 23 | 1.10% |
| digital culture | 19 | 0.91% |
| digital library | 12 | 0.57% |
| digital preservation | 12 | 0.57% |
| new media | 10 | 0.48% |
| digital technology | 10 | 0.48% |
| academic | 10 | 0.48% |
| museums | 9 | 0.43% |
| photogrammetry | 8 | 0.38% |
| heritage | 8 | 0.38% |
| big data | 8 | 0.38% |
| digitization | 8 | 0.38% |

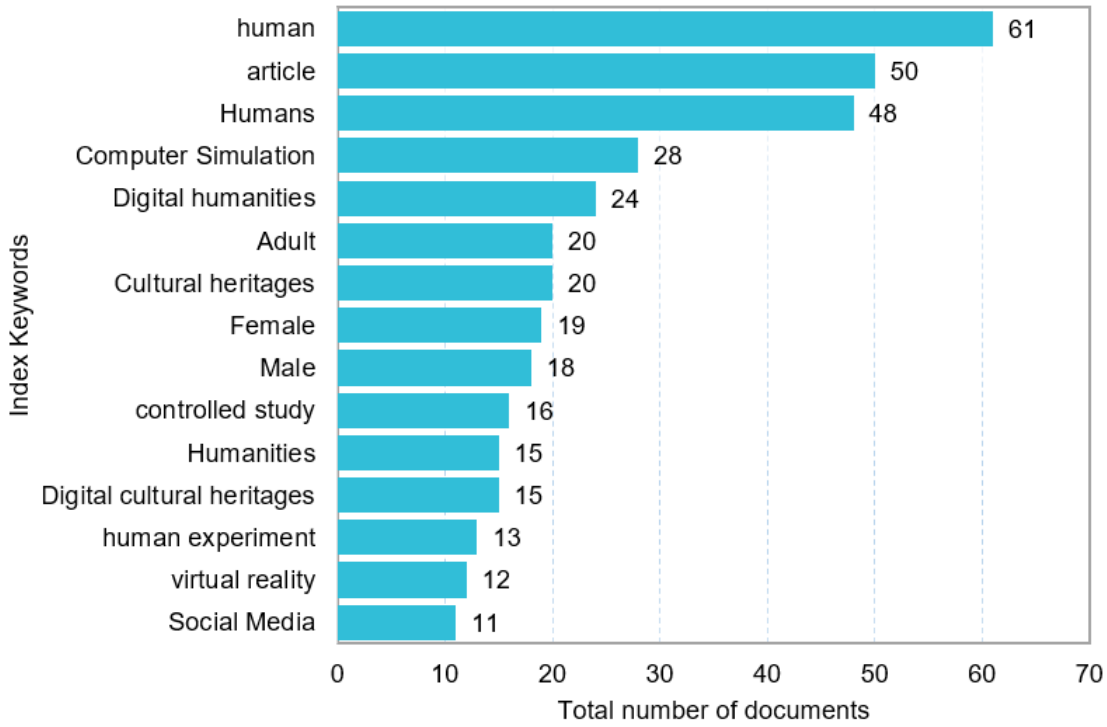


***Figure 5: Index Keywords***

***Table 12: Index Keywords***

| Index Keywords | Count | Percentage |
|---|---|---|
| human | 61 | 2.14% |
| article | 50 | 1.75% |
| humans | 48 | 1.68% |
| computer simulation | 28 | 0.98% |
| digital humanities | 24 | 0.84% |
| adult | 20 | 0.70% |
| cultural heritages | 20 | 0.70% |
| female | 19 | 0.67% |
| male | 18 | 0.63% |
| controlled study | 16 | 0.56% |
| humanities | 15 | 0.53% |
| digital cultural heritages | 15 | 0.53% |
| human experiment | 13 | 0.46% |
| virtual reality | 12 | 0.42% |
| social media | 11 | 0.39% |

## Recommendations for Future Research

This bibliometric analysis has provided comprehensive insights into the dynamic and evolving landscape of digital humanities research. The study has effectively mapped key research trends, emerging themes, and influential contributions, offering a valuable resource for scholars and practitioners in the field. However, as with any scholarly inquiry, certain limitations exist, which in turn highlight promising directions for future research. One of the most pressing areas for future exploration is the geographical diversification of digital humanities research. Our findings indicate that China and the United States dominate scholarly contributions in this domain. While these nations have undoubtedly shaped the field's trajectory, the global challenges addressed by digital humanities necessitate a broader, more inclusive perspective. Future research should therefore focus on expanding digital humanities studies beyond these dominant contributors, particularly by exploring research initiatives in developing regions. Investigating how different countries approach digital

humanities, their challenges, and best practices will not only enrich the current knowledge base but also foster international collaborations that address global digital heritage concerns.

Additionally, the factorial analysis in this study has highlighted key emerging themes, including digital archives, artificial intelligence, machine learning, and big data analytics in humanities research. While these themes reflect the current state of research, they also suggest future avenues of scholarly exploration. One particularly promising research direction is the integration of advanced technologies—such as artificial intelligence, blockchain, and the Internet of Things (IoT)—within digital humanities applications. Future studies should investigate how these technologies can enhance digital heritage preservation, improve accessibility, and contribute to long-term sustainability in humanities research. Moreover, our analysis has revealed a significant focus on sustainability assessment tools within digital humanities, particularly life cycle assessment methodologies. While life cycle assessment is a widely recognized framework for evaluating environmental impact, alternative methodologies warrant further investigation. Future research could compare various sustainability assessment frameworks within digital heritage projects, identifying more comprehensive and reliable metrics that better capture the long-term sustainability of digital humanities initiatives.

Another important avenue for future research is the intersection of digital humanities and supply chain management. This study found only limited exploration of how supply chain optimization strategies align with digital humanities. Given the increasing role of digital archives, data curation, and open-access initiatives, a more in-depth examination of supply chain challenges in digital preservation, including data ownership, ethical concerns, and digital infrastructure would be beneficial. Future research could investigate green supply chain practices in digital humanities projects, as well as the barriers and enablers of sustainable digital archiving. While this bibliometric analysis provides a quantitative overview of the evolution and key themes in digital humanities, there is ample opportunity to complement these findings with qualitative research. Future studies should incorporate qualitative methodologies—such as case studies, interviews, and ethnographic research—to provide deeper insights into the challenges, ethical considerations, and decision-making processes in digital humanities projects. Such an approach would allow researchers to capture the complexities of real-world digital humanities applications and better understand how different institutions and communities engage with digital heritage preservation.

## Implications of the Study

This research has significant theoretical, methodological, practical, and societal implications, contributing to the broader discourse on digital humanities. From a theoretical perspective, this study enriches scholarly understanding of digital humanities by systematically mapping key research themes and trends. The identification of core thematic areas, such as digital heritage preservation, computational humanities, and AI-driven humanities research, provides a strong theoretical foundation for future studies. Methodologically, this study demonstrates the effectiveness of bibliometric analysis as a tool for mapping research landscapes. By utilizing VOSViewer, Biblioshiny, and BiblioMagika, this study provides a replicable methodological framework for future bibliometric analyses in digital humanities and related fields. Practically, the findings have direct implications for researchers, policymakers, and industry practitioners. Scholars can use these insights to identify gaps in digital humanities research, while policymakers can develop frameworks that support open-access initiatives, digital heritage funding, and cross-disciplinary collaboration. Industry practitioners, especially those involved in digital archiving, AI development, and museum digitization, can leverage these findings to enhance the impact and sustainability of digital humanities projects. At the societal level, this study highlights the critical role of digital humanities in cultural preservation and knowledge dissemination. The increasing adoption of digital tools, artificial intelligence, and open-access platforms underscores the importance of making cultural and historical knowledge accessible to broader audiences. Future research should further explore how digital humanities can contribute to public engagement, education, and heritage conservation.

### Limitations and Future Directions

Despite its valuable contributions, this study is not without limitations. One major constraint is its reliance on Scopus as the primary data source. While Scopus provides comprehensive coverage of high-impact research, incorporating other databases (e.g., Web of Science, Google Scholar) could further diversify and enrich the findings. Future bibliometric studies should explore multi-database approaches to obtain a more inclusive representation of global digital humanities research. Additionally, keyword-based bibliometric searches have inherent limitations, as they may not capture all relevant studies due to variations in terminology. Expanding search strategies to include alternative keywords and controlled vocabulary searches could enhance coverage. Moreover, thematic classifications and network clustering techniques are subject to interpretative bias, highlighting the need for triangulation with qualitative methods in future research. In conclusion, this bibliometric analysis provides a comprehensive and structured overview of the current state of digital humanities research, identifying emerging themes, influential contributors, and potential research gaps. By addressing the limitations outlined above and pursuing new research directions, future studies can further enrich the theoretical and practical understanding of digital humanities, ensuring its continued relevance and impact in preserving cultural heritage and advancing digital scholarship.

## CONCLUSION

This comprehensive bibliometric analysis has provided a detailed and structured overview of the research landscape in digital humanities, highlighting key trends, influential contributors, and emerging themes that define the evolution of this interdisciplinary field. Drawing on an extensive dataset comprising 550 scholarly publications, this study reveals a steady increase in academic interest in digital humanities, particularly in the 21st century, demonstrating the growing recognition of digital methodologies in cultural preservation, computational analysis, and humanities research. The United States and China have emerged as leading contributors in this domain, reflecting their strong institutional presence, research funding, and technological advancements. However, the disproportionate representation of research from these two nations underscores the need for greater geographical diversity in digital humanities scholarship. Future research should expand its focus to developing regions, ensuring a more inclusive and comprehensive understanding of digital humanities applications across diverse cultural and institutional contexts. Several dominant research themes have been identified in this analysis, including digital heritage preservation, artificial intelligence in humanities research, big data analytics, and computational text analysis. These themes reflect the increasing intersection of digital technologies with traditional humanities disciplines, shaping new methodologies, tools, and frameworks for scholarly inquiry. The findings also emphasize the role of digital humanities in knowledge dissemination, historical archiving, and public engagement, demonstrating its broader societal impact beyond academia. Despite the valuable insights provided by this bibliometric analysis, certain limitations must be acknowledged. The study primarily relies on Scopus as its primary data source, which, while comprehensive, may not fully capture relevant publications indexed in other databases. Additionally, thematic classifications and keyword-based analyses are inherently limited by variations in terminology, suggesting the need for further refinement in search methodologies. To address these limitations, future research should adopt a multi-database approach, incorporating qualitative methodologies such as case studies and expert interviews to provide deeper contextual insights into digital humanities research and practice. As digital humanities continue to evolve, its role in bridging technology and the humanities will become increasingly vital. This bibliometric study serves as a foundation for future research, offering a systematic roadmap for scholars, practitioners, and policymakers to navigate the expanding digital humanities landscape. By fostering collaborative research efforts and interdisciplinary approaches, the field can continue to drive innovative methodologies, enhance cultural heritage preservation, and contribute to global knowledge accessibility.

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