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The dual impact of digital humanities: evaluating the role of DH approaches in historical and cultural resource development

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Abstract

Purpose. Digital humanities (DH) approaches have irreversibly impacted historical and cultural resource development. This study critically examines the dual impact of DH approaches to highlight their contributions and limitations in resource preservation and enhancement.

Method. Based on the input-process-output (IPO) model in system theory, we proposed the source-transformation-result (STR) framework to guide our content analysis of 34 selected projects awarded and nominated for the digital humanities awards (2019-2023).

Analysis. Our content analysis reveals a paradigm shift in three critical areas: (1) source: transition from isolated individual work to integrated corpora from multiple works; (2) transformation: evolve from manual interpretative close reading to computational distant reading; (3) result: advance from primary forms to interactive visual representations.

Findings. The findings indicate that DH approaches facilitate the regeneration of new knowledge, provide structured insights into extensive datasets, and enhance user engagement. Still, DH approaches also pose risks, such as the erasure of unique details and contextual richness, reduced interpretative depth, and the oversimplification of complex data.

Value. This study underscores the necessity for a balanced approach to DH methodologies to optimize their benefits while mitigating inherent drawbacks.

Introduction

Historical and cultural resources refer to a wide range of tangible and intangible things of human creation and use that occurred in the past and continue to play an essential role in modern society (Huang & Lu, 2015). Developing these resources confers substantial value, including enhancing heritage preservation and reinforcing public cultural identity. Digital humanities (DH) approaches are a powerful suite of tools and methodologies for exploring new ways of being in a digital age (Berry & Fagerjord, 2017), which has also irreversibly impacted historical and cultural resource development. They encompass digital technologies and techniques—such as digitization, data management, machine learning, data analysis, visualization, and VR/AR—and the methodological frameworks that guide their application in historical and cultural resource development. However, the integration of DH approaches is not without its challenges. Discussions on the pros and cons of DH approaches for developing historical and cultural resources still need to continue. Current studies in DH have already included some critical considerations, such as maintaining linguistic diversity in digital contexts (Karrouche, 2019) and addressing data discrimination in technology applications (Hendery et al., 2019). James E. Dobson (2019) also emphasized the need to correct the unrestrained techno-utopian impulses of DH, urging a more reflective and balanced approach.

Yet, there remains a gap in discussions on the pros and cons of using DH for developing historical and cultural resources. This study aims to fill that gap by navigating the complex landscape of DH applications in historical and cultural resource development. By doing so, we seek to ensure that DH approaches contribute positively to preserving and enriching our shared heritage, thereby fostering a deeper understanding of the past while informing our present and future. The results of this study can advance the discourse on the ethics and effectiveness of DH practices and offer practical guidelines to help maintain cultural diversity and reduce biases when utilizing DH approaches.

Research design

Data collection

As a flagship event in the DH community, the digital humanities awards (DHA, http://dhawards.org/) features a wide range of DH projects with broad scope and diverse cases. Since its establishment in 2012, nearly 40 countries have had DH projects nominated for the DHA awards, demonstrating its global engagement. This makes DHA projects a valuable dataset for researching international practices in digital humanities. Resources in any language or format, including those focused on historical and cultural resource development, are eligible for nomination. The awards span various categories, such as best DH tool or suite of tools, best DH data visualisation, best DH blog post or series of posts, and best DH dataset. Notably, recipients of the best DH data visualization award are comprehensive DH projects implemented in real-world contexts, making them more suitable as cases for this research. Out of the 77 projects acknowledged in this category over the past five years (2019-2023), we have selected 34 that specifically focus on developing historical and cultural resources for content analysis.

The selection criteria were: (1) involvement in historical and cultural resource development; (2) ongoing project operation; (3) accessible website and publicly available project-specific information. The selected projects are highly representative in three aspects. Source-wise, they span 16 countries, including Australia, China, the United States, and Italy, and so on. Form-wise, they encompass both tangible and intangible historical and cultural resources. Content-wise, they cover a wide range of topics, such as historical sites and regional historical culture, family historical culture, folk tales, poetry, literature, religion, and historical artifacts (including antiques, maps, manuscripts, old newspapers, handicrafts, among others).

These projects provide a comprehensive overview of how DH approaches are applied to historical and cultural resource development on an international scale. They showcase a diverse range of DH

approaches across key domains, such as project management, data processing, and user interaction. Through a detailed content analysis of these initiatives, we can more effectively evaluate the role and impact of DH methodologies in advancing the development of historical and cultural resources.

We acknowledge that our selected cases consist exclusively of award-winning and nominated projects from the DHA, which are determined by public voting. This may introduce a selection bias, as the awards may not fully reflect project quality, but they do promote greater diversity.

Content analysis

To evaluate the role of DH approaches in historical and cultural resource development, it is essential to address a general methodological issue in digital humanities: How do we transition from the digital to meaning? (Rodríguez Díaz, Karines, Haber Guerra, Yamile, & Gómez Masjuán, Miguel Ernesto, 2021). In this study, we employ the input-process-output (IPO) model, a key framework in systems theory, to structure the evaluation of this transition. The IPO model is defined as '*inputs that lead to processes that in turn lead to outcomes*' (Ilgen, Hollenbeck, Johnson, & Jundt, 2005).

Based on this model and tailored to the context of historical and cultural resource development, we propose the source-transformation-result (STR) framework to guide our content analysis (see Fig. 1). In this framework, the source (input) refers to the raw material for development, which we analyze primarily in terms of their content, form, and quantity. The transformation (process) involves methods adopted to convert these materials into meaningful outputs, and we mainly focus on the digital technologies and techniques used in this process. The result (output) represents the outcomes generated, such as visualizations, new knowledge, or interactive experiences. Unlike traditional IPO models, the STR framework is cyclical. The knowledge generated (e.g., semantic networks or interactive timeline) can feedback into the source phase, influencing future outputs.

The STR framework enables a comprehensive evaluation of how DH approaches impact each stage of historical and cultural resource development.

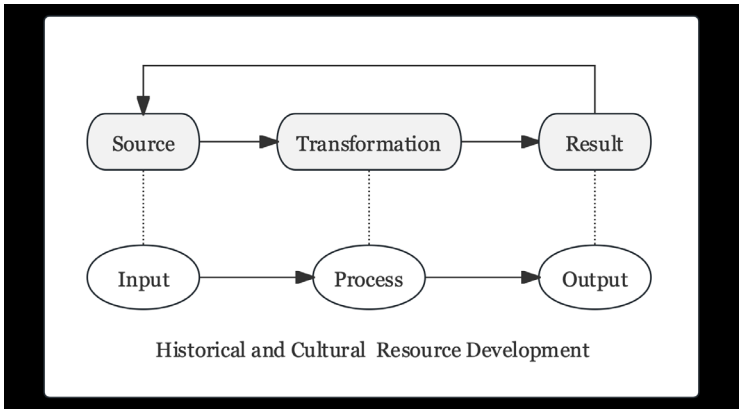

Figure 1. STR analytical framework

Findings

Through a content analysis guided by the STR framework (see Table. 1), we identified shifts in historical and cultural resource development across three dimensions attributable to the DH approaches.

(1) Source dimension: transition from isolated individual work to integrated corpora composed of data from multiple sources, which are more affluent and multi-layered. For instance, the Dong Qichang digital humanities project (P4) integrates high-definition images, work texts, and treatises

into a comprehensive digital collection. Similarly, the Gaoqian Digital Memory Website (P7) compiles diverse data types like oral interview data and architectural surveys.

(2) Transformation dimension: evolving from manual interpretative close reading to computational distant reading. Franco Moretti, who introduced distant reading, described it as a method to '*learn how not to read texts*' (Moretti, 2013), proposing employing advanced tools to manage and analyze large datasets. Projects like the Sur la piste des œuvres antiques (P2) use social network analysis and historical geographic information systems to explore historical transactions and social interactions in the French art market.

(3) Result dimension: advancing from primary forms to interactive visual representations, generating new knowledge. In this study, new knowledge is defined relatively, referring to insights and understandings that emerge from analysing and synthesizing the existing knowledge (Source). Projects such as the Moseley Homestead Digital Heritage Preservation Project (P16) employ 360 photography and high-resolution panoramic imaging for immersive exploration of historical sites, while the Surprise Machines for Harvard Art Museums (P26) leverage VR technology to create dynamic, interactive museum experiences. These advancements enhance user engagement and provide novel interpretations of the original historical and cultural resources.

No._ Project name	Source	Transformation	Result
P1 Witches – Mapping the Scottish Survey of Witchcraft Database (2019)	Different locations recorded within the Survey of Scottish Witchcraft Database	Social Network Analysis (SNA); Historical Geographic Informatisation (HGI); Chronological Analysis; Visualization	It can show a variety of different visualisations of maps to locate the places of residence for accused witches (total named accused witches: 3141)
P2 Sur la piste des œuvres antiques (2019)	Sale catalogue and various archival sources of French antiques (including auctioneers' archives), and information on works, sellers, and buyers	SNA; HGI; Visualization	Visualize the biography (origin, career, price trends), the formation and reception of antique objects, and the activities of collectors, institutions, dealers, and intermediaries
P3 Close-Up Cloud (2019)	A collection of historical glass negatives of the collections	Digitalization (Scanning, filming); Visualization	Provide the close-ups of the collections, and enable to examine a wealth of details of individual glass negatives and their depth of field
P4 Dong Qichang Digital Humanities Project (2019)	Dong Qichang's paintings, calligraphies, high-definition images, work texts and treatises	Digitalization; Text Annotation; SNA; HGI; Machine Learning; Visualization	It allows you to visually draw a chronology of Dong Qichang's major works, a network of masters, and so on
P5 Gaoqian Digital Memory Website (2020)	Architectural survey data, oral interview data, audio of family training, photos of folklore scenes, etc. (digital resources totalling 246GB)	Digitalization (Scanning, filming); SNA; 3D Modelling; Text Analysis; Video Production; Chronological Analysis; Visualization	A digital living village has been constructed with a timeline of more than 1,000 years of evolution of the ancient village
.....			
P34 Map-inc: Mapping Incunabula in Greek libraries (2023)	The information of Incunabula (or incunables, which are books printed in Europe before 1501)	Text Annotation; HGI; Visualization	It provides the digital map of the information of Incunabula

Table 1. Content analysis of the 34 selected cases (partial)

Discussion

In this study, we aim to underscore the dual impact—encompassing both contributions and limitations—of DH approaches on historical and cultural resource development. By adapting the input-process-output (IPO) model from systems theory into the source-transformation-result (STR) framework, we systematically analyzed how raw materials (Source) are transformed through technologies and techniques (transformation) into meaningful outcomes (Result). The STR framework facilitates a comprehensive evaluation of how DH approaches influence each stage of historical and cultural resource development, thereby enabling a nuanced understanding of their overall impact.

Contributions and benefits

DH approaches transcend mere technical advancements, embodying a paradigm shift in how we perceive, analyse, and engage with historical and cultural resources. By analysing DH projects through the STR framework, we elucidate several key advantages these approaches offer:

Firstly, at the source end, DH methodologies integrate data from multiple sources, facilitating the regeneration of rich, multifaceted knowledge. This shift from individual to collective analysis enables sophisticated techniques such as cross-textual comparisons and thematic studies, deepening our understanding of historical and cultural dynamics (Champion, 2016; Pacheco, 2022). Additionally, collective analysis dismantles traditional resource silos, promoting a more inclusive and comprehensive historical narrative.

Secondly, the computational techniques central to DH approaches, such as remote reading, empower scholars to analyse vast datasets with unprecedented scale and precision. Utilizing these techniques allows for identifying historical trends, simulating cultural shifts, and reconstructing incomplete datasets, thereby providing new perspectives and insights into previously inaccessible historical phenomena.

Thirdly, interactive, and visual presentations revolutionize the experience and comprehension of history and culture. Tools like dynamic maps, timelines, network diagrams, and 3D models enhance user engagement by enabling interactive exploration of complex historical and cultural contexts. These visualizations transform data presentation into immersive narratives and offer novel interpretations of original resources.

Limitations and challenges

While DH approaches offer numerous benefits for the development of historical and cultural resources, they also bring about some limitations and challenges:

Firstly, the deconstruction and reorganization of corpora through DH methodologies may strip away historical and cultural resources' unique details and contextual richness. For instance, analysing historical letters or diaries for thematic frequency may result in losing emotional depth and personal context embedded within individual documents. The shift from a nuanced perspective to a generalized one can lead to homogenization, overshadowing the rich diversity of cultural expressions and the voices of minority communities. Such processes raise ethical concerns about representation and the preservation of cultural heritage, as the unique stories of underrepresented groups may be subsumed within dominant narratives.

Secondly, although computational technologies and techniques help generate new knowledge due to their unpredictable behavior when handling large datasets (Rodighiero, Derry, Duhaime, et al., 2022), they have limitations regarding depth of interpretation. Historical and cultural resource development often requires understanding subtleties like linguistic style, cultural references, and historical context — areas where computational tools are not yet adept. This limitation is particularly pronounced when dealing with non-English or indigenous texts, where cultural nuances and linguistic intricacies are critical for meaningful interpretation.

Thirdly, while interactive visual representations enhance user engagement, they may oversimplify complex data for ease of use, leading to reductive interpretations of historical and cultural narratives. Visual tools often prioritize clarity and accessibility, which can result in omitting critical details that are less visually striking or harder to quantify. Furthermore, the emphasis on visual engagement may inadvertently prioritize form over substance, where the aesthetic appeal of visualizations takes precedence over their analytical rigor. This challenge underscores the importance of balancing accessibility with accuracy, ensuring that interactive tools serve as gateways to deeper exploration rather than mere endpoints.

Conclusion

The convergence of DH approaches with traditional humanities scholarship presents an unprecedented opportunity for generating new insights into historical and cultural resources. However, it must be pursued cautiously and ethically to ensure that technological advancements do not overshadow the human elements central to historical and cultural studies. In conclusion, finding a balanced approach that optimizes the advantages of DH methodologies while addressing their limitations is vital. Achieving this balance requires interdisciplinary collaboration, fostering dialogue between technologists and humanities scholars to develop hybrid DH tools that blend computational power with humanistic insight. Furthermore, it is crucial to cultivate a reflective DH practice that not only leverages technologies and techniques for resource development but also critically examines the assumptions and biases embedded within these technologies and techniques.

Ultimately, the future of DH lies in its ability to evolve alongside technological progress and humanistic inquiry. By maintaining a commitment to ethical considerations and preserving the integrity of historical and cultural narratives, DH approaches will continue to shape how we engage with the past, understand the present, and imagine the future. Through this ongoing evolution, DH approaches can fulfil their potential as a transformative force in preserving and enhancing human culture and history.

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