

Knowledge Production Through Open Data for Digital Humanities: A Study of the Indian Landscape

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ABSTRACT

The study examines how open data can be used to generate meaningful insights into the cultural, historical, and geographical features of India and can be the best tool for digital humanities researchers, allowing them to access large datasets about the country's diverse landscape and interpret the data in meaningful and creative ways. An attempt is made to explore the potential of open data in digital humanities projects and discuss the need to create a comprehensive digital humanities platform that caters to the needs of different stakeholders as well as the advantages and challenges of open data and government initiatives in digital humanities. Additionally, the implications of open data and government initiatives in terms of improving access to digital humanities resources, increasing collaboration, and enhancing the quality of digital humanities projects and their contribution to creating a vibrant digital humanities community in India. The paper concludes that open data can be a powerful tool for digital humanities researchers in India, allowing them to access large datasets about the country's diverse landscape and to interpret the data in meaningful and creative ways.

Keywords: Open data; Digital humanities; Digital pedagogy; Digital scholarship; Library archives and museums

1. INTRODUCTION

India is one of the biggest internet consumers globally, and this usage significantly increased in the last decades. The integration of information and communication technology (ICT) into education has become increasingly common, leading to digitalisation and pedagogy in the digital humanities (DH); a recent example is IIT Jodhpur started M.Sc. in computational social science.¹ This shift has revolutionised traditional research methodologies in the humanities, creating new avenues for exploration and research into the subject matter.

Since the 1940s, scholars have been familiar with the concept of DH, initially referred to as “humanities computing,” which was coined by Father Roberto Busa.^{2,3} By the early 21st century, the term had been replaced by “digital humanities.” This has become a burgeoning field of study among humanities scholars and information services providers, i.e., Library & Information Science (LIS) professionals. McCarty⁴ described DH as a “methodological and interdisciplinary” field which looks at both the practical applications of computing in areas such as scholarship and teaching and the theoretical implications

of the shift in perspective that computing has enabled. In contrast to the traditional approach of analysing texts through manual reading and summarising, With DH, scholars may organise and analyse massive volumes of texts in a continuous temporal environment and examine connections between subjects or events from many angles.⁵

DH is an interdisciplinary area of research that uses contemporary/modern computer and network technologies to explore and expand on the traditional fields of humanities study and education.⁶⁻⁹ With the development of digital technologies, DH is now being applied to inter-disciplines, from history, literature, cultural studies to technology.¹⁰ Gao, *et al.*¹¹ argue that DH research requires digital methods and information technology to examine humanities resources, thus; information resource construction is essential. This includes making use of digital content and tools in the humanities, allowing for new pedagogy and research approaches, uncovering patterns and processes hidden in the data, and assisting humanities scholars to discover new topics and conduct research more efficiently.¹² Correll, *et al.*¹³ asserts that combining close and distant reading is a key part of DH research, as it helps to verify the potential of DH tools to provide distant readings.

Researchers in Social Sciences and Humanities (SSH) face the challenge of making sense of the immense amount of data available from digital sources today. DH is a way to address this challenge, as it provides a range of computational methods, such as data analysis, topic modelling, visualisation, network analysis, deep learning, and artificial intelligence, to turn this data into valuable insights. DH does not aim to replace SSH scholars but rather to support them in their endeavours, thus enabling new research opportunities and teaching methods.¹⁴⁻¹⁵ Note that the capacity to handle, analyse, and use such vast volumes of data, rather than a shortage of data, is now the major problem in the area of SSH research.¹⁶⁻¹⁷ In this paper, the author will explore the role of open data (OD) in DH and how OD is shaping the future of DH in India.

1.1 Data Types in Humanities

To begin, we must reflect on what type of data is being discussed when we discuss humanities. Prost, et al.¹⁸ and Edmond¹⁹ both provide taxonomies of the types of data found within social sciences and humanities, respectively. Prost, et al.'s taxonomy includes text samples, tables, images, maps, photographs, statistics, graphs, databases, timelines, and audio-visual media. In contrast, Edmond's taxonomy includes print paradigm publications, e-paradigm publications, single or collected/curated primary sources, software, patents/licenses, and ephemera, such as exhibitions and performances.

2. OPEN DATA IN HUMANITIES

There has been a growing trend in India towards using OD in DH in the past couple of years. This trend has been driven by various factors, including advances in technology, the increasing availability of data, Government initiatives and the recognition of the importance of data in various areas of research, Such as the Open Government Data (OGD) portal, India.²⁰ The use of OD in DH has the potential to revolutionise the way in which knowledge is produced and shared.

The key benefits of OD in DH are that it enables researchers to access a vast amount of data that would otherwise be unavailable to them. In the past, researchers would have to rely on data from limited sources, such as government reports or academic journals. However, with the advent of OD, researchers can access a much broader range of data than ever before, including government agencies, private organisations, and individuals. This can significantly increase the quality and breadth of research in DH. Another advantage is that it promotes collaboration and knowledge sharing. In the past, researchers would often work in isolation, with their findings locked away in their own databases or notebooks. However, with Open Research Data (ORD), researchers can now share their raw/primary data and findings with others, allowing for the creation of a more collaborative and interconnected research community. This benefits not only the researchers themselves but also the wider community, as the results

of the research are made more widely available and accessible to everyone.

OD also can potentially increase the transparency and accountability of research in DH. By making data openly available, researchers can demonstrate the methods and processes used to arrive at their conclusions, allowing others to verify their results and build upon their work. This can increase the credibility and reliability of research in DH, as it allows for greater scrutiny and review of research findings. This can have a profound impact on the field of DH, and OD have the potential to drive innovation in DH by making data openly available; researchers are able to use new and creative methods to analyse and interpret the data, leading to new insights and discoveries.

3. DIGITAL HUMANITIES: GLOBAL SCENARIO

The ongoing globalisation is having a profound effect on our economic, social-political, ethnographic, epidemiologic, cultural and educational environment, posing an array of questions to the social sciences, literary and historical studies. Over the last decade, DH has become an increasingly popular course at universities around the world, from Japan and Australia to America, China and Singapore. With the help of these courses and developing new methodologies, Scholars are able to look into areas such as art, literature, music and culture in greater detail. The primary focus of DH practitioners lies in areas such as text analysis and interpretation, digital archives and collections, data visualisation, digital pedagogy and digital history. Such examples are the digital humanities Centre at Berkeley²¹, Massachusetts Institute of Technology's digital humanities and Literature Research Initiatives²², the Cambridge digital humanities Centre²³, the M.Sc. in Digital Scholarship course offered by Oxford University²⁴, and King's College London²⁵ and the University of London's²⁶ scholars working on text and sentiment-mining technique. Additionally, researchers have been creating mathematical models for text analysis. To aid such research, several digital libraries, such as the Hathi Trust Digital Library²⁷, Project Gutenberg²⁸, the Early English Books Online, and the Oxford Text Archive, are providing open access to texts and data.²⁹ The European Data Portal (EDP)³⁰ also harvests the metadata of Public Sector Information from European countries.

Other milestone projects that are giving a pace to DH through OD, include the Library of Congress' Bibliographic Framework Initiative General Plan³¹, which promotes the use of linked data (LD) and Semantic Web (SW) technologies in libraries, the Smithsonian's "Building the New Open Linked Library: Theory and Practice" project³², Stanford University's initiative to publish millions of bibliographic records as Linked Open Data (LOD)³³, Emory University's focus on the creation and application of linked data sets to support health services and outcomes research and in more than twenty other fields with various features such as visualisation tools³⁴, and the University of Richmond's Digital Scholarship Lab project "Hidden Patterns of the Civil War".³⁵

4. DIGITAL HUMANITIES: INDIAN SCENARIO

The DH in India is rapidly expanding, with universities and research institutions offering courses and programs related to or directly to DH. There are also numerous DH conferences and workshops held annually, enabling researchers to collaborate and stay abreast of the latest developments in the field, and scholarships (digital humanities Alliance for Research and Teaching Innovations (DHARTI)³⁶, facilitating digital practices in arts and humanities scholarship in India. Scholars and researchers are using digital tools and methods to investigate and analyse India's cultural, literary, and historical legacy. The focus of DH in India is to explore the connections between technology, social sciences and Humanities, as well as to utilise digital technology to aid research and ensure the protection and distribution of cultural heritage. The use of OD in DH research allows researchers to access and analyse large amounts of data in novel and creative ways. This section also outlines various OD datasets, digital pedagogy practices and projects which are relevant to the digital humanities and Government initiatives.

4.1 Institutions and Universities in Digital Pedagogy

Jadavpur University³⁷ (JU) in Kolkata was the first to offer a postgraduate diploma in digital humanities in 2013, and since then, several institutions and universities have followed suit. Savitribai Phule Pune University³⁸ started a certificate course in 2015, and University College for Women's³⁹, Koti, Hyderabad, began offering a BA in computer applications-digital humanities in 2016. Srishti Institute of Arts and Design and Technology⁴⁰, offering postgraduate diplomas, bachelor, and masters-level programmes, IIT Indore⁴¹ and IIT Jodhpur⁴², offering MS & M.Sc. + PhD, respectively, and BITS Pilani⁴³, which has a PhD in DH. Other universities and institutes offering DH courses include IIT Gandhinagar⁴⁴, IIT Delhi⁴⁵, Presidency University⁴⁶, Ashoka University⁴⁷ and many more. The Centre for digital humanities (CDH)⁴⁸ at the Institute of Advanced Studies in English in Pune conducts a winter school in DH every year since 2015 and provides training in using the Omeka tool for content development and "HASTAC" scholarships for undergraduate students to explore the DH field.

These courses are helping to develop digital skills and work with new technology and tools and provide employment opportunities in the digital era. However, due to its interdisciplinary nature, it is a challenge to get DH accepted in Indian university ecosystems. Additionally, other institutions that are only practising in a few fields, such as text mining and archiving, but the tools and infrastructure they have access to may need to be updated due to the fast-paced nature of technology.

4.2 Government Support in Digital Pedagogy

The Government of India implemented the New Education Policy⁴⁹ in 2020, intending to create a technology-enabled

and interoperable public infrastructure that will cultivate a digitally empowered society and facilitate the growth of a knowledge economy. Still, before this, the Ministry of Human Resource Development (MHRD) started the 'National Mission on Education through Information and Communication Technology (NMEICT)⁵⁰, to use ICT to improve the quality of education.

This mission openly provides access to digital content and aims to improve learning outcomes. The 'Study Webs of Active Learning for Young Aspiring Minds (SWAYAM)⁵¹ is an initiative that is based on three principles; access, equity and quality in education. It is a MOOCs platform that provides free online courses on almost all disciplines, with the objective of ensuring access to the best teaching and learning resources for everyone. SWAYAM is bridging the digital divide and enabling every citizen to be a part of the knowledge economy. SWAYAM offers more than 2600 courses for free, with the help of seven supporting initiatives or portals.

4.2.1 Other Programmes Supporting OD in Digital Pedagogy

There are also other GOI programmes that are helping in pedagogy and providing content without any restrictions, Such as SWAYAM Prabha⁵² uses 32 educational channels through DTH to deliver content. The National Digital Library (NDL)⁵³, an IIT Kharagpur project, provides single-window access to learners for e-resources with a vision of becoming a National Knowledge Asset. It features almost 50 million e-resources. IIT Bombay's e-Yantra⁵⁴ project integrates robotics into engineering education, benefitting more than 250 engineering colleges. Virtual Labs⁵⁵ gives remote access to undergrads, postgrads, and scholars in the science and technology field to carry out experiments. IIT Bombay's Free/Libre and Open-Source Software in Education (FOSSEE)⁵⁶ project provides the latest FOSSEE resources to enhance teaching and research quality in India. National Academic Depository (NAD)⁵⁷ allows users to access their academic credentials (degrees and certificates) 24*7 from anywhere and helps verify authenticity, safe storage, and easy retrieval. E-PG Pathshala offers high-quality e-content in 70 subjects. Other initiatives include the National Commission for Higher Education and Research (NCHER)⁵⁸, National Knowledge Network (NKN)⁵⁹, National Mission on Manuscripts (NMM)⁶⁰ seeks to unearth and preserve the vast manuscript wealth of India, INFLIBNET's – SodhGangotri⁶¹ for depositing synopses and Shodhganga⁶² for depositing theses, Vidwan⁶³ database for field experts, E-Acharya⁶⁴, E-Kalpa is an Android App which was developed for farmers by ICAR⁶⁵, Badal (Cloud service for academics)⁶⁶, and Impacting Research Innovation and Technology (IMPRINT)⁶⁷ to address the challenges in S&T.

All these initiatives have been implemented to provide openly accessible e-content, video lectures, and digital infrastructure for distance learning. These initiatives promote research collaboration in DH and offer a wide

range of e-resources free of charge. The e-content was created by prominent scientists and faculty members from the IITs, IIMs, and Universities. Students have the advantage of accessing all study material online, including pre-recorded video lessons, rather than being required to attend an institution in person, which offers convenience and flexibility.

4.3 Cultural Heritage and Patriotism

Researchers in India are working on digitising and preserving significant cultural heritage items, such as manuscripts, maps, photographs, and audio recordings, to make them available to the public. This initiative is intended to promote a greater understanding and appreciation of India's unique cultural heritage. Through various programs, GOI is making these artefacts openly accessible to the world, such as the Archaeological Survey of India (ASI) open data⁶⁸, India Cultural Heritage (ICH)⁶⁹, India Historical Maps, the Indian Epigraphy Project (IEP)⁷⁰, and India's National Digital Repository Museums.⁷¹ Each of these projects focuses on digitising and preserving cultural artefacts, as well as providing access to them in the form of images, descriptions, and other relevant information, allowing anyone to search, analyse and study India's rich and diverse cultural heritage, but these are only a few examples. GOI is also taking many initiatives to support and increase patriotism in citizens and giving them a chance to know our heroes, such as- War Memorials and projects and Unsung Heroes of India.

It is important to remember those who gave their lives so that we might live in a free India. The Azadi Ka Amrit Mahotsav provides a wonderful chance to educate both the young and the old about both the freedom warriors and the independence struggle. Sadly, we only know of a handful of well-known liberation warriors; hundreds more perished in the shadows, and some of their efforts went unrecognised. One is left to wonder how these patriots, who bravely spoke for an independent India while staring the British ruler in the face, managed to stay unnoticed by the general public.

4.3.1 *Unsung Heroes of India's Freedom Struggle*

This project involves remembering and creating awareness about forgotten revolutionaries and has documented 5890 freedom fighters from every state of India and their biographies by January 2023. The initiative also includes a subtheme called "Stories of Change", which aims to inspire generations to march towards a new Aatmanirbhar Bharat while also paying tribute to the brave hearts of our nation. Additionally, GOI has created a Digital District Repository⁷³ to document stories, people, events, and places linked to India's freedom struggle and is also promoting it through podcasts and events held across India. The Indian Culture website⁷⁴ was also launched, containing rare books, images, archival records, museum collections, newspaper clippings, historical maps, textiles, fort details, and more.

4.3.2 *War Memorials*

These are just a few examples of how India commemorates its war heroes and the bravery and sacrifice of its soldiers. War memorials⁷⁵ such as the National War Memorial in New Delhi, the Kargil War Memorial, the Darjeeling War Memorial, Chandigarh War Memorial, Sea War Memorial in Vizag, Tawang War Memorial in Arunachal Pradesh, and Siachen War Memorial all serve to remind us of the courage and valour of our soldiers who put their lives on the line to protect our country. These memorials are a humbling reminder that no matter the place or time, we can never take the courage and dedication of our soldiers for granted. By digitising and making available a wealth of data, these projects have the potential to significantly enhance our understanding of India's heroes and their sacrifice for the nation to preserve it for future generations.

4.4 Archives/Databases/Datasets

Government data portals such as OGD⁷⁶ and citizen-led initiatives like open data Meets enable the creation of independent databases and repositories, which often supplement or continue the digital datasets of official governance⁷⁷. Similarly, in public history, digital media allows citizens to create and populate public records in addition to officially sanctioned preservation projects. Examples of such initiatives include the People's Archive of Rural India (PARI)⁷⁸, the Indian Memory Project (IMP)⁷⁹, the Indian Census Data (ICD)⁸⁰, the Memories of Delhi Archive (MDA)⁸¹, which is a repository of the Centre for Community Knowledge, Ambedkar University, started in 2013 and designed to hold the collections of photographs, audio and video recordings, transcripts of interviews collected from Delhi residents. The Centre's digitised vast amount of collection has 3,854 images and almost 700 photographs in its physical collection on Delhi and its outskirts from 1880 to the 1990s, and the Digital India Project.⁸² These initiatives range from providing demographic information to collecting photographs and audio/video recordings and aim to empower citizens by making data openly accessible and providing a platform for the growth of the digital economy, and also seek to empower the communities to maintain, share, and trade their digital history in culturally and morally meaningful ways.

4.5 Media and Music

Another aspect of digital humanities in India is media and music, where numerous projects have been completed, and many more are underway. Two digital archives, Indiancine.ma⁸³ and Pad.ma⁸⁴, provide access to users with a wide range of Indian films, found footage, images, sound clips, and unfinished films. These platforms offer an openly searchable database and allow users to view, listen, download, and embed material in multiple video and audio formats. Indiancine.ma offers a collection of more than 60,000 links to films, and Pad.ma

has approximately 4000 published “events” and around 2000 hours of video available. Additionally, Cinemaazi⁸⁵ is a digital repository and open encyclopaedic resource (14669) for regional vintage cinema from India in more than 20 languages. From a gender perspective, Sound and Picture Archives for Research on Women (SPARROW)⁸⁶, founded by C.S. Lakshmi in 1988, is an archive in Dahisar, Mumbai, which documents Indian women’s history. It contains a wide range of resources relating to the history of women, including written, visual, photographic, and cinematic materials, oral history recordings, personal documents, speeches, photos, posters, songs, and other works of art. It also creates documentaries about women who have sparked change in various industries, making it India’s largest repository of women’s history. The Indian Music Project⁸⁷ is another DH project in India which works to preserve and make openly available India’s musical heritage, including classical music, folk music, and devotional music. It digitises recordings, creating a database of Indian music, and makes this data available to researchers and the public. The South Asian Music Archive⁸⁸ is another project aimed at preserving South Asia’s musical heritage by digitising and making openly available recordings of traditional music from the region. It includes recordings of classical, folk, and devotional music, and recordings of musical instruments and performances and Digital Music Archives and Library⁸⁹ for music by IGNC.

4.6 Literature and Linguistics

Researchers in India are investigating the use of digital tools and techniques to analyse and understand the country’s abundant literary and linguistic heritage, including traditional texts, regional languages, and dialects. Many projects are devoted to safeguarding and making available India’s heritage, including texts in Sanskrit, Pali, and other native tongues. These works are being digitalised and made available in a searchable online database, such as the Bichitra⁹⁰ Project at Jadavpur University, which was initiated in 2004 to conserve and share the region’s cultural legacy. The School of Cultural Texts and Records has also established a complete compilation of Rabindranath Tagore’s writings, including all published works, manuscripts, photographs, and audio-visual recordings. This collection is divided into sections such as “Poetry”, “Essays”, “Fiction”, and “Travelogues”. The Sahitya Akademi⁹¹ is carrying out several projects, such as the History of Indian Literature, the Archives of Indian Literature, the Centre for Translation in Bangalore, and the Encyclopedia of Indian Poetics, which are aimed at providing comprehensive information on concepts, authors, and texts in Indian poetics, both ancient and modern. Project Madurai⁹² is a volunteer project initiated to collect and publish ancient Tamil literary works in digital form. It is a non-commercial, non-profit initiative started in 2000 by a group of volunteers interested in Tamil literature. The project has made over 1500 Tamil literary works available, including Sangam literature,

epics, theological works, and classical works in digital form. Project Madurai has been instrumental in making available and preserving many ancient Tamil literary works which would have otherwise been lost in time. It is a great initiative for the preservation and promotion of Tamil literature and culture.

These projects cover a wide range of topics, including literature, music, art, archaeology, and cultural heritage. These projects have the potential to significantly enhance our understanding of India’s rich cultural heritage and to preserve it for future generations.

5. DISCUSSION

The field of digital humanities in India is rapidly growing and gaining recognition for its innovative and interdisciplinary approach to studying humanities. To fully achieve the promise of DH in India, however, a number of obstacles and constraints still need to be overcome.

One of the main challenges is the lack of sufficient funding and resources for DH projects in India. This has resulted in limited research capacity and the inability to undertake larger, more complex projects. In addition, to successfully implement digital humanities in India, we must first provide training to our professionals. The process of digitisation is tricky, as it involves preserving the original material, dealing with copyright issues, and establishing metadata standards.

The scarcity of involvement from humanities scholars in digital humanities (DH) projects is another issue that needs to be addressed. While there is a growing interest in this subject, more humanities scholars must be engaged and encouraged to take part in DH initiatives. To make this possible, new skills and training programs must be created to make humanities scholars aware of the tools and strategies used in DH. DH has produced a wide range of inferences available, resulting in abundant research in the field. However, digital humanities in India are still in their infancy and need more infrastructure, funding, and professionals with expertise. Additionally, most of the research in this area is conducted in English, limiting its accessibility to certain demographics.

We must create cutting-edge tools and infrastructure to understand better the role of big data and cultural analytics in literary criticism, and ensuring the reliability of the internet is fundamental. The Digital India initiative is the latest effort to address these concerns in the past few years, aiming to improve digital infrastructure, governance and services on demand and empower citizens through enhanced digital literacy. We also need citizen’s support to develop DH in India with such diversity, such as The Indian Memory Project is an illustration of how objects such as family photographs can be studied as texts for both historiography and ethnography.

Data Should be interlinked and processed by computer programs. Linked open data (LOD) provides an opportunity for publishing the research output and also re-using the same. India lacks linked open data, and proper efforts need to be taken in this regard.

6. CONCLUSION

In conclusion, the use of open data in digital humanities in India is rapidly gaining momentum. It has the potential to greatly enhance the production and dissemination of knowledge in this field. Open data can shape the future of digital humanities in India by providing researchers with access to vast data, promoting collaboration and the sharing of knowledge, increasing transparency and accountability, and driving innovation. Overall, DH in India are making a significant contribution to the study and preservation of the country's cultural heritage and is helping to promote interdisciplinary research and collaboration between the humanities, technology, and social sciences. These open data sets can be used to support research in areas such as literary studies, history, cultural heritage, and many others. By analysing and visualising this data, digital humanities scholars can gain new insights into the cultural, social, and historical contexts in which they were created. Although the area of DH in India has much potential, there are still a lot of issues that need to be resolved before that potential can be completely realised. The development of new infrastructure and funding and the involvement of humanities scholars will be critical to the growth and success of DH projects in India.

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