Digital Humanities Texts from 1990-2018 --- Comparing the

Evolution of Digital Humanities in North America and East Asia.

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Table of contents

List of Figures and Tables

Abstract

This project examines the quantity of previous research in the digital humanities, which, most broadly speaking, is the study of the intersection and/or interrelation between digital research tools and the humanities field. The project seeks to understand and clarify the definition of digital humanities itself, considers trends impacting digital humanities institutions, and examines how digital humanities content and authorship has developed between Western (North America, Europe) and East Asian (China, Japan, etc.) geographies over the past two decades. The project hypothesis is that there is a distinctly East Asian sub-branch within the digital humanities field (for the purpose of this thesis, digital humanities activities in other regions such as Africa, South America, and Australia will not be considered but may present interesting areas for further examination), with unique differences from the Western lens which has traditionally dominated, and it many ways still does, dominate the discipline.

Résumé

Ce projet examine la quantité de recherches antérieures dans les humanités numériques, et plus généralement l'étude de l'intersection et / ou l'interrelation entre les outils de recherche numériques et le domaine des humanités littéraires. Le projet cherche à comprendre et à clarifier la définition même des humanités numériques, examiner les tendances qui affectent les institutions des humanités numériques et examiner l'évolution du contenu et des auteurs en sciences humaines entre l'est (la Chine, le Japon, etc.) et l'ouest (l'Amérique du Nord et l'Europe) au cours des deux dernières décennies. L'hypothèse du projet est que l'examen des données historiques et des tendances actuelles montrera l'émergence récente et croissante d'une sous-branche de l'Asie de l'Est appartenant au domaine des humanités numériques, avec des différences uniques par rapport au prisme occidental qui a toujours dominé la discipline.

Acknowledgments

I want to thank all the professors in the digital humanities committee at McGill University who supported my two-year study and helped me achieve better-quality results. I am also grateful to my supervisor, professor Sinclair, for his patience and support as I overcame numerous obstacles in my research. Moreover, I would like to thank Lynda for her constant administrative assistance.

1. Introduction

Regarding digital humanities, the study of the intersection or interrelation between digital research tools and the humanities field, my inspiration for this thesis is driven by two primary motivations. First, in conducting the necessary research, I used several databases to analyze hundreds of academic texts pertaining to the topic of digital humanities – this action is then strongly aligned to the "distant reading" theory proposed by Franco Moretti[①], which advocates that a computer can support the reading of hundreds of books and analyze them according to given aspects. As a student of digital humanities, I was very attracted to applying this concept to digital humanities itself as a subject. Specifically, is it possible to conduct a "distant reading" of digital humanities texts, generalize historical trends, and glean insights on potential futures in digital humanities as an academic field?

Secondly, with my cultural identity as a Chinese student, I am also particularly interested in how digital humanities as a subject has evolved in China, and more broadly across East Asia as compared to "traditional" Western (United States, Canada and Europe) activity in the field. Historically, much of modern academic research has developed and first gained widespread recognition from the Western world, such as in the fields of computer science, advanced engineering, and Western literature. However, in modern Eastern cultures, their representative scholars have always strived to rapidly catch up and expand upon content through the lens of their cultural context as an expression of its own beauty and uniqueness.

[①] An Italian literary critic and the founding director of the Stanford Literary Lab.

For instance, in recent years, in the science world, more and more Asian scholars' papers have been accepted by top conferences, particularly in the areas such as computer science, where Asian scholars have made outstanding contributions to natural language processing, machine learning and GIS (Geographic Information System), etc. In medicine, Yoyo Tu became the first Chinese female scientist to win the Noble Prize in Physiology or Medicine in 2017. At the same time, in the humanities, Asian literature has also gradually become more familiar in the western world – numerous translators are trying to bring Asian novels, poems and art to western audiences. Tellingly, in 2015, the Nobel Prize for Literature was awarded for the first time to a Chinese writer, Mo Yan. Layered on top of all of these developments is the advancement of information technology and online academic exchanges that increases diversity and efficiency in the academic world across all disciplines. Thus, when conceiving this thesis I could not help but think, "What, then, is the future of digital humanities in East Asia?"

Given the examples above of Eastern advancement in other fields and my belief that interconnected technology and tools will only increase global and Asian regional interest in digital humanities, it is then meaningful to analyze the Eastern acceptance of digital humanities, their methods, and their specific characteristics as a unique phenomenon. I hope that, through reviews of the literature and quantitative analyses, this thesis can help to draw a clearer picture of the development trend, authors, core journals and other aspects in the digital humanities field, and at the same time, compare Western and Eastern digital humanities scholarship – i.e. Are they in a synchronous or asynchronous development trend? How have digital humanities topics changed in

North America and East Asia? What locations were over- or under-represented in digital humanities? And where may digital humanities be headed in the future, particularly in East Asia?

2. Literature review

What are digital humanities? what kind of definitions of digital humanities are both accepted and most cited by Western and Eastern scholars? In order to explore this, I collected the 20 most-cited texts in Google Scholar in both English and Chinese and observed the citations within these texts, which allowed me to develop and discuss the conceptions of the definition of digital humanities. Through this chapter, I also want to compare the Western/North American and Eastern scholar's baseline conception of "Digital Humanities" in order to support the deeper examinations presented later.

As noted in the introduction, one of my motivations is the "distant reading" theory; thus, I will start from this popular comparison of "close reading" vs. "distant reading". In the article *Conjectures on World Literature* published in 2000, Moretti first proposed the concept of "distant reading". Moretti believes:

> There is an unequal world literature system that can be divided into centres and margins. We can't study this system with the traditional close reading method, because it treats a very small amount of text with a very serious attitude, resulting in many literary works have never been read by researchers. If we want to understand the "whole system", we must take a far-reading approach, focusing on units that are much smaller or much larger than text: tactics, themes, rhetoric - or genre and system (Moretti, 2000, p. 56).

To summarize Moretti, he proposes that to understand literature, we must stop reading books individually (as is done with close reading) and leverage technology to

read and analyze across hundreds or thousands of texts simultaneously. Additionally, computer-enabled distant reading also addresses the subjectivity inherent in close reading (where every pupil would read the same text with their own inherent set of opinions and biases) by taking a far more objective and data-driven approach and even uncovered previously hidden aspects and connections via network analysis.

In China, a scholar named Ling Yang published various research articles around Moretti's works and even translated Moretti's works to Chinese. She proposes that in China, numerous scholars generally pay more attention to Moretti's hypothesis of the famous "world literature system" but ignore the concept of "distant reading." However, she, in her view, emphasized that these two concepts are complementary: the former repositions the research object in literary history, while the latter is the research method used in this new conception of literary history.

Another Chinese scholar, Yingjian Guo, who is also aware of these kinds of characteristics, points out:

> Digital literary research is to use computational tools to analyze literature electronically or digitally, that is, to use computational methods for literary analysis or literary criticism, at the same time, to use critical methods or theoretical methods to analyze and criticize electronic literature, digital media and text resources (Y. Guo, 2018, p. 194).

Regardless of whether they are Western or Eastern scholars, most scholars agree that distant reading is a new approach that can be undertaken to study a large number

of literary works and read large quantities of them digitally in order to avoid the limitations of subjective literary interpretations based on the inherent bias of the "close-reading" approach.

Similarly, within the discussion of the close vs. distant reading theories, there is also a robust scholarly debate around the nature of the interaction between the "digital" and the "humanities" within the term and discipline of "digital humanities." For instance, many scholars endorse the view that digital humanities are not about the subordinate relationship between computer science and the humanities. They posit that researchers of digital humanities create new knowledge and generate novel and meaningful ideas that can be relevant sources of inspiration and understanding not only to scholars of humanities but to computer scientists as well.

For example, Anne Burdick and colleagues (2008), in their book *Digital Humanities*, insist that the digital humanities are "new modes of scholarship and institutional units for collaborative, transdisciplinary, and computationally engaged research, teaching, and publication" (p.122). She concludes that despite being inherently defined by consequences of the conjunction of the terms "digital" and "humanities", digital humanities are nevertheless a discipline separate from conventional humanities.

Contrarily, some scholars attempt to define digital humanities as more of "an umbrella for a wide array of practices" (Presner, 2010). These scholars endorse digital humanities as an outer circle of the conventional humanities discipline, and one that

interacts with and affects other fields. Presner & Johanson, in their white paper published by UCLA, note:

> Digital humanities are a natural outgrowth and expansion of the traditional scope of the humanities, not a replacement or rejection of traditional humanistic inquiry. The role of the humanist is critical at this historic moment, as our cultural legacy is migrated to digital formats and our relation to knowledge, cultural material, technology, and society is radically re-conceptualized (Presner & Johanson, 2009).

There are also some scholars who take a more negative lens to their examination of digital humanities. For instance, a scholar interested in the perspective from India points out the risk of representation bias as digital humanities establishes itself as a global literary field:

> Digital humanities have shaped the digital cultural record, by virtue of the ways it has played a role in the digital transformation of cultural inheritance. … However, this work has preserved canonical authors, traditions, and voices, reproducing and amplifying the biases of print culture. At stake here for South Asian studies is whether the influences of colonialism that have marginalized South Asian voices and cultures will be allowed to continue to thrive (Risam & Gairola, 2019, p. 146).

This concern has not only been recognized by non-Western scholars, some Western scholars have also observed and pointed out that digital humanities texts

included little discussion of traditional humanities topics such as history, immigration, race, and gender. In the article *Why Are the Digital Humanities So White?* the authors write:

> I found myself wondering why it seemed so hard to hold together my long-standing academic interests in race, gender, and certain modes of theoretical inquiry with my later (if decade- old) immersion in the world of digital production and design. The difficulties we encountered in knitting together our discussions of race (or other modes of difference) with our technological productions within the digital humanities (or in our studies of code) are actually an effect of the very designs of our technological systems, designs that emerged in the post–World War II computational culture. These origins of the digital humanities continue to haunt our scholarly engagements with computers, underwriting the ease with which we partition off considerations of race in our work in the digital humanities and digital media studies (T. McPherson, 2012, p. 132).

Having taken a look at the theories and scholarly discourse taking place within and around digital humanities, it also became relevant to ask: "Have any scholars turned their attention to the examination of key trends within the digital humanities space itself ?" In answer to this question, I found professor Melissa Terras[1], who in

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[1] Profile: https://www.ed.ac.uk/profile/professor-melissa-terras

2005 gathered statistics about Digital Humanities for the conference *Association for Computing in the Humanities/Association of Literary and Linguistic Computing (ACH/ALLC)* and turned them into an infographic. The statistical findings of the 24 participating countries in 2005 showed that research from the United States and Canada accounted for the vast majority, and the other 22 leading countries were also almost entirely from the Western world. There were no participants from Latin America, one participant from Africa, and less than 5 participants from Asia. In this analysis, it was also mentioned that China and India have experienced large-scale growth in information technology and network applications, but no relevant researcher centres participated in the then ACH/ALLC annual meeting, which deserves attention (Terras, 2012).

Figure 1 Terras's digital humanities graph in centres of digital humanities

By applying data crawling and mining technology to the 1,026,503 relevant vocabulary words contained in the ACH/ALLC conference summaries from 1996-2005,

Terras uncovered the 20 most frequently used words. From these high-frequency words, she found that from the late 1990s, the main research and practice of digital humanities was in the industries focused on text, literature, vocabulary coding and programming language, computing, and electronics. Further, the analysis involved areas mainly in the humanities and linguistics areas, including English (Terras, 2012).

There has also been some similar research, such as research on 170 kinds of digital humanities-related academic monographs collected by the Harvard University Library from 1971 to date, conducted by Chinese professor Xiaoming Wang (seen Figure 2). From his point of view, the earliest books relating to digital humanities were found in the 1970s. At that time, book contents mostly consisted of the collection of academic conference papers. The themes were basically the very newly emerging concept of digitization of humanities. After entering the 21st century, digital humanities-focused literature has also shown strong growth; the topics are more abundant and span interdisciplinary combinations with education, research, culture, and multilingual work – in this way, reflecting the general concern of the global academic community on this topic (J. Guo & Wang, 2018).
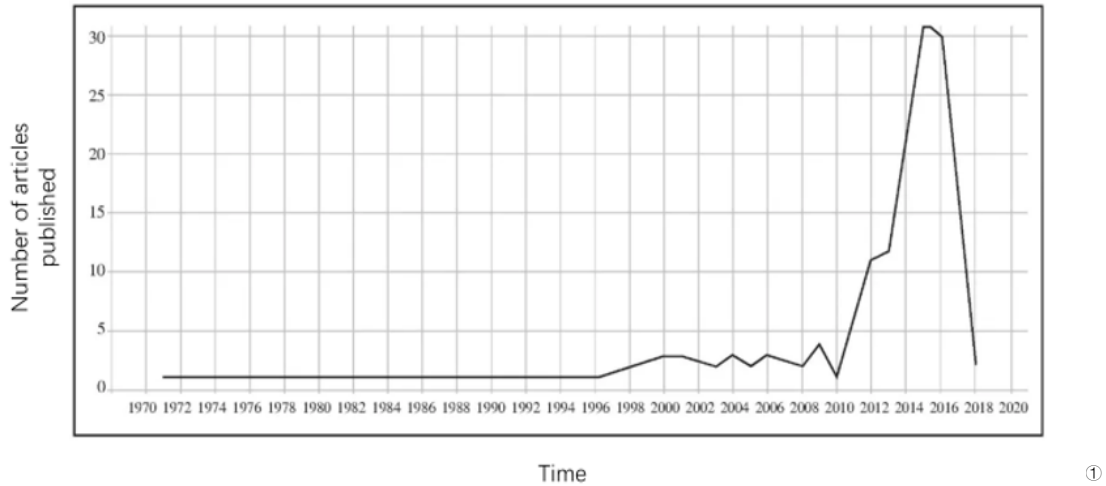
Figure 2 Harvard University library collection of digital and humanities-related works between the years 1971-2018 (x-axis: time, y-axis: number of articles published)

In short, on top of the foundational definition of digital humanities – the study of the intersection and or interrelation between digital research tools and the humanities field – which is broadly shared across scholars in the field, prominent Eastern and Western Scholars are further exploring a wide range of nuanced questions on how, and to what, digital humanities should be applied. It is from within this dynamic of scholars, in their drive to advance the discipline, digging deeper into questions around the application (rather than definition) of digital humanities that the divergence between Eastern and Western perspectives and approaches to digital humanities, which will be examined in detail in this thesis, begin to emerge and become clearer.

3. Methodology

3.1 Databases

To explore the evolution of digital humanities research, this thesis takes several core databases as sources for statistical analysis and content mining of digital humanities-related literature.

Databases used were the following:

(1) Web of Science Core Collection

Web of Science is a carefully selected database of the journals, books, proceedings, etc. Web of Science follows a rigorous review process that lists only the most influential, relevant, and credible information. However, it should also be noted up front that Web of Science does not currently index many potentially relevant sources of digital humanities content such as *Journal of Cultural Analytics*, *DHCOMMONS*, *Journal of Digital Humanities*, etc. Also Web of Science is an English-language oriented database, which should be noted as another key drawback as it overlooks potential content published in Asian languages.

Web of Science Core Collection includes[①]:

- Science citation index expanded (1900-present)
- Social sciences citation index (1900-present)
- Arts & humanities citation index (1975-present)
- Conference proceedings citation index- science (1990-present)
- Conference proceedings citation index- social science & humanities (1990-present)

[①] Source: https://clarivate.com/webofsciencegroup/solutions/web-of-science-core-collection/

◆ Book citation index– science (2005-present)

◆ Book citation index– social sciences & humanities (2005-present)

◆ Emerging sources citation index (2005-present)

◆ Current chemical reactions (1985-present)

◆ Index chemicus (1993-present).

(2) The China Knowledge Resource Integrated Database

The China Knowledge Resource Integrated Database (CNKI) is the most comprehensive knowledge resource in China, CNKI containing four databases:

◆ Academic journals.

◆ Theses& Dissertation.

◆ Conference Proceedings.

◆ Newspapers.

In order to map with Web of Science Core Collection, in CNKI, I will only choose the Core Journals database.

(3) CiNii

CiNii is Japan's largest comprehensive academic information database operated by the National Institute of Informatics (NII).

The platform consists of three databases:

◆ The CiNii Article includes journal articles from various academic institutions and organizations in Japan and can be used to obtain papers collected by the Japanese Library of Journals in the Japanese Journal Index Database.

- CiNii Books can search for bibliographic information of the collections of Japanese university libraries.

- CiNii Dissertations can search for dissertations awarded by doctoral degrees from Japanese universities and degree-granting institutions, including partial full-text links to papers.

In order to map the Web of Science Core Collection in CiNii, I only chose CiNii Article database.

(4) Google Scholar

Google Scholar is a web search engine that can search for journals, books, conference reports, etc., which updates every other day and covers a wide range of both published and online sources. Google Scholar results are based on the automated website information and not a human-curated database. Google Scholar offsets shortcomings of Web of Science, CNKI and CiNii: in digital humanities, print publication is no longer the sole method of publication; most digital humanities embrace open and public forms of publishing (Burdick et al., 2012). For example, among ten important digital humanities journals, nine of them are only accessible online (seen Table 1). Moreover, digital humanities also enjoy pre- and post-publication peer review of Twitter and blog posts, and interactive digital projects.

Table 1 Digital humanities journals and their forms of publishing[①]

	Journals	Format
1	*Digital Humanities Quarterly*	Open access, peer-reviewed, online-only.
2	*Digital Scholarship in the Humanities*	Peer-reviewed, print & online.
3	*Digital Studies / Le Champ Numérique*	Open access, peer-reviewed, online-only.
4	*Digital Literary Studies*	Peer-reviewed, open access, online-only.
5	*Ca: Journal of Cultural Analytics*	Peer-reviewed, open access, online-only.
6	*Journal of Interactive Technology And Pedagogy*	Partly peer-reviewed, open access, online-only.
7	*Journal of the Text Encoding Initiative*	Peer-reviewed, online-only.
8	*DHCOMMONS*	Open access, peer-reviewed, online-only.
9	*Journal of Digital Humanities*	Open access, peer-reviewed, online-only.
10	*Journal of Digital and Media Literacy*	Open access, peer-reviewed, online-only.

Online journals and blogs are not only able to be represented in a more visualized way, but also allow many digital humanities scholars, when publishing their articles, to attach their datasets and source code. With online articles, readers could easily access the code or clone from GitHub, then test and analyze in their own way. There is therefore a need to combine both print and online publications.

3.2 Indexes

Basic data were retrieved by using the keywords on full texts with "digital humanities" or "humanities computing" to create the query: ts=(digital humanities) or ts=(humanities computing) or ts = (digital near humanities) or ts = (humanities near

computing). I only chose texts from 1990 to 2018, because from 1900 to 1989 very few texts in the field of digital humanities were collected by all databases. In deciding to use these keywords, I also considered "digital history", "computing linguistics", "computational literary studies", "digital art", "digital media", "digital archaeology", etc., which are terms that could be closely related to digital humanities but are also separate fields / disciplines in their own right. As such, I have chosen to omit these items from the keyword search as their inclusion results in a considerable expansion of overall "results" without a corresponding increase in results specifically relevant to digital humanities. Without omitting these terms, the keyword search would result in a proliferation of irrelevant or misaligned "noise," and would risk obscuring the clarity of the research.
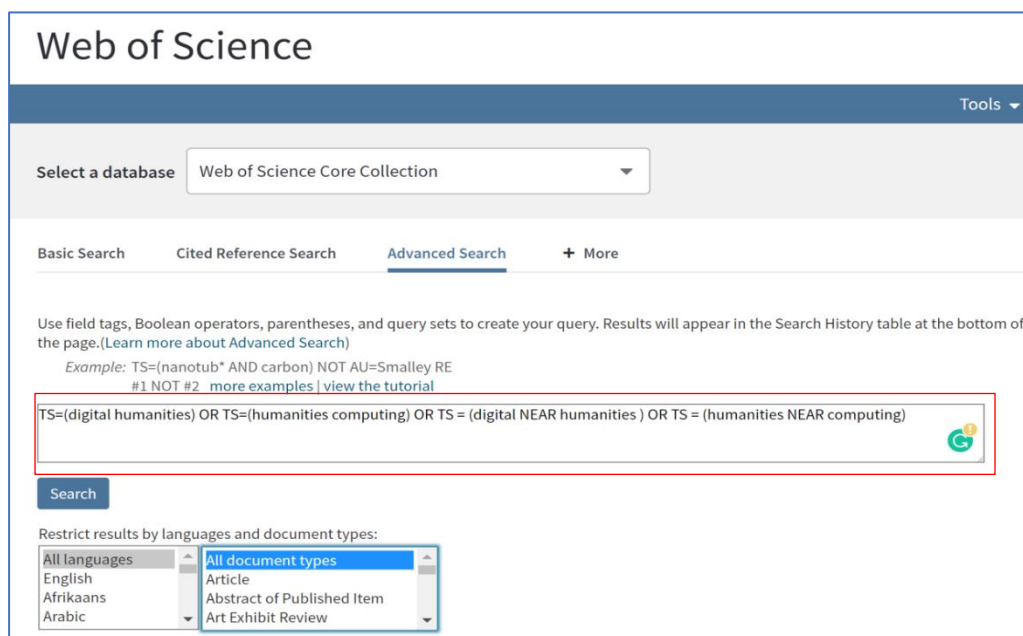
Figure 3 Search Query in Web of Science.
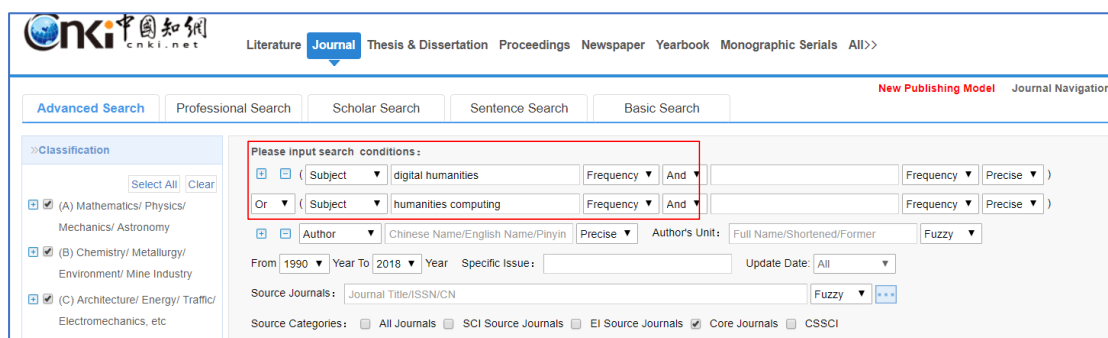
Figure 4 Search Query in CNKI
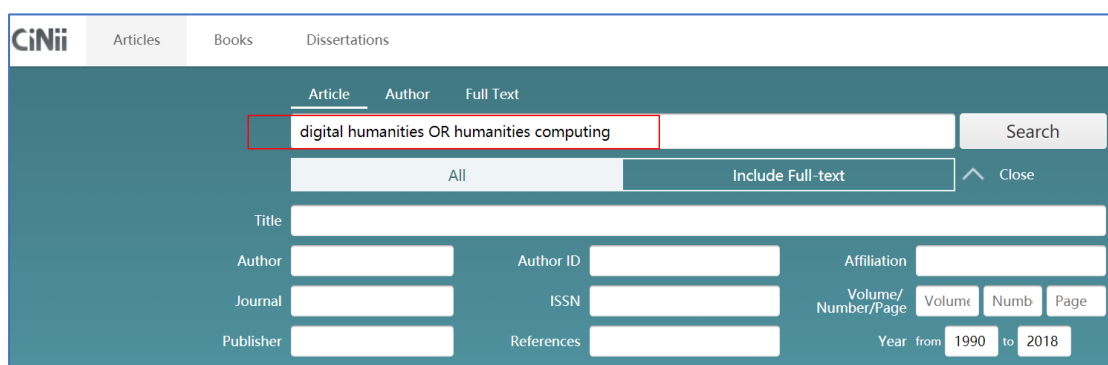
Figure 5 Search Query in CiNii

3.3 Results

After examining the texts drawn by the Web of Science-core from 1990 to 2018, I found that among them 2869 results were concerned with "digital humanities" or "humanities computing" (seen Figure 6).

Figure 6 Search results in Web of Science (search date:02/2019)

After examining the texts drawn by CNKI from 1990 to 2018, I found that among them 111 results were concerned with "digital humanities" or "humanities computing" (seen Figure 7).

Figure 7 Search results in CNKI (search date:02/2019)

In CiNii, 379 articles specifically reference "digital humanities" and "humanities computing" (seen Figure 8).

Figure 8 Search results in CiNii (search date:02/2019)

Along with the count of hits, Table 2 indicates the percentage of titles. Though digital humanities articles in these three databases make up a fairly small percentage of all articles, Web of Science as an English-language oriented database still makes up the largest percentage, which shows that most of the publications in digital humanities field

still come from the US, Canada, and Europe. However, the percentage of Web of Science and CiNii is very close, which indicates that East Asian countries such as Japan may be catching up with the overall digital humanities interest worldwide.

Table 2 Number of digital humanities articles in Web of Science, CNKI, CiNii.

	DH Articles	Total	Percentage
Web of Science	2869	54,031,692	0.00531%
CNKI	111	11,874,887	0.00094%
CiNii	379	16,377,442	0.00231%

3.4 Data Verification

After randomly picking 30 articles from each database, I examined the abstracts of those articles to evaluate whether these articles truly reflect the topics of digital humanities or humanities computing. The criteria to decide whether the article belongs to digital humanities papers or not is based on the report *Humanities World Report 2015*.

In this report, the authors propose that Digital humanists are concerned with the following five major categories (Holm, Jarrick, & Scott, 2014, p. 68):

◆ Digital collections, archiving, and text encoding

◆ Reading and analyzing electronic texts

◆ Geospatial and critical discursive mapping technologies

◆ 'Big Data,' social computing, crowdsourcing, and networking

◆ 3D immersive visualization environments

According to the above categories, I got the following results:

Table 3 Verification Results showing whether or not each article belongs to the field of digital humanities.

Sample\Exam Fact	Yes	No	Total
Web of Science	28	2	30
CNKI	30	0	30
CiNii	25	5	30

$$\text{Accuracy(Web of Science)} = \frac{\text{number of correctly classifed records}}{\text{total number of records}} = 28/30 = 93.33\%$$

$$\text{Accuracy(CNKI)} = \frac{\text{number of correctly classifed records}}{\text{total number of records}} = 30/30 = 100\%$$

$$\text{Accuracy(CiNii)} = \frac{\text{number of correctly classifed records}}{\text{total number of records}} = 25/30 = 83.33\%$$

The accuracy in Web of Science and CNKI was fairly high, proving that articles which use "digital humanities" as keywords in both databases reflect valid cultural and intersectional content. However, the key observation from the above analysis is that CiNii is less accurate in comparison to Web of Science and CNKI. The main reason is that due to cultural influences, CiNii contains many articles that overlap with other separate fields such as digital design and multimedia. As such, I have chosen to omit these articles from the keyword search.

4. Analysis

4.1 Time Distribution

From 1990 to 2018, with the advent of the internet and broad adoption of digital technologies and tools, a correlated remarkable increase in interest in the digital humanities as a topic was also observed. By searching for "digital humanities" in Google Scholar I can find fewer than 1,090 results prior to the year 2000 but over

10,300 prior to 2018. The past 20 years have seen an around tenfold increase in the number of articles contributing to the field.

Figure 9 Google Search "Digital humanities" or "Humanities computing" before 2000

Figure 10 Google Search "Digital humanities" before 2018

Figure 11 Google Search "Digital humanities" in Japanese

Figure 12 Google Search "Digital humanities" in Chinese

In conducting this analysis, I first used Google Trends[②] to look at the time distribution of digital humanities internet searches between East Asia and North America. Following that, I then used several human-curated databases to have more concise and comprehensive results.

In Figure 13, the graph depicts the "digital humanities" search term recorded by Google Trends as it fluctuates with time. The x-axis indicates the date. In the y-axis, each number indicates the relative popularity of the search term, according to the explanation from Google Trends Help Center[③]: "the relative popularity is calculated as a ratio of the query's search volume to the total number of searches. Google Trends then scales these values proportionally so that the maximum value is 100". The blue line represents the USA "digital humanities" search trends, showing that from 2004 to 2018, interest in the digital humanities term increased from a value of 0 to around 60. Trends in the United Kingdom (orange line) and Canada (gray line) also developed in similar ways. However, outside of these large Western centres, East Asian countries do not closely map to this trend; most Asian countries, with the exceptions of India (yellow line), don't have enough data to show up in Google trends. However, India still largely deviates from the overall trend.

Figure 13 Google Trends in "digital humanities" in the United States (blue), Canada (gray), India (yellow), and the UK (orange).

So what reason may account for the spike in searches?

One possible reason is that before 2004, the digital humanities field had many other alternative terminologies to search and represent, such as "humanities computing", "computing linguistics", etc. However, after 2004, it seems that "digital humanities" gradually became the prominent word to represent things related to the digital humanities, though other terminologies still exist. I also compared the Google trends in "humanities computing" with "digital humanities"; searches in "humanities computing" decreased dramatically in 2004 and never increased again, while searches in "digital humanities" continuously rose.
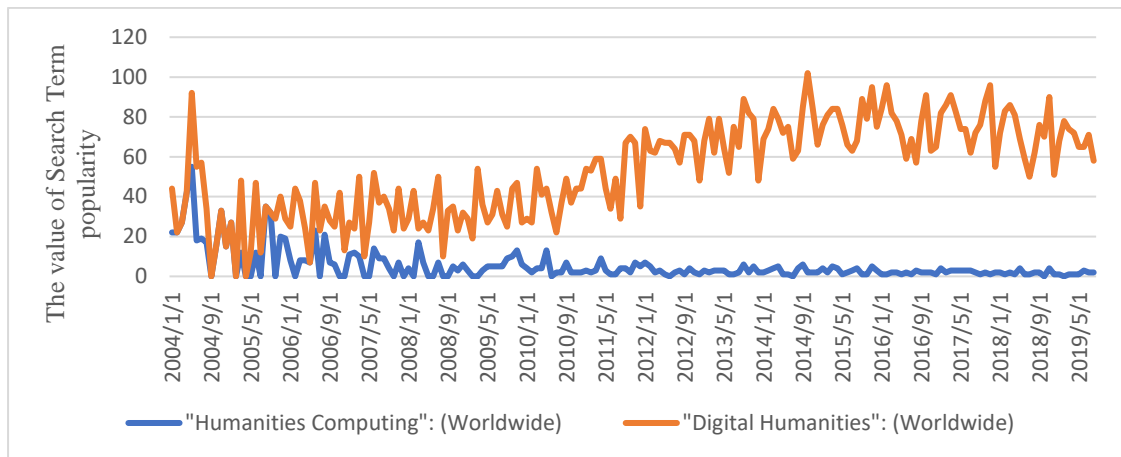
Figure 14 Google Trends in "digital humanities" (orange) and "humanities computing" (blue) in worldwide

Another potential reason is that around 2000 to 2010, there was a trend in "organizing the information". Countries, institutions and universities emphasized the need to build modernized and searchable information systems and databases. The typical example is Google's 2009 book project for the largest online library. During that period, Google scanned more than 10 million books from libraries in America and Europe[④]. Due to these digital legacies, after 2011, with the information explosion, these developed databases better supported the needs of interdisciplinary humanities research; scholars have increasingly focused on the analysis of interdisciplinary research and this consequently led to the increase of digital humanities searches in Google websites.

The time series of the number of academic papers is another useful indicator for measuring the development and popularity of a research field. In Figure 15, a trend emerging starting from 2008. The number of digital humanities papers in Web of Science increased dramatically, especially in the USA, from below 20 to above 100

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④ Source: https://www.theguardian.com/technology/2009/aug/30/google-library-project-books-settlement

annually. For China and Japan, in Web of Science, a similar visible increase was not observed.
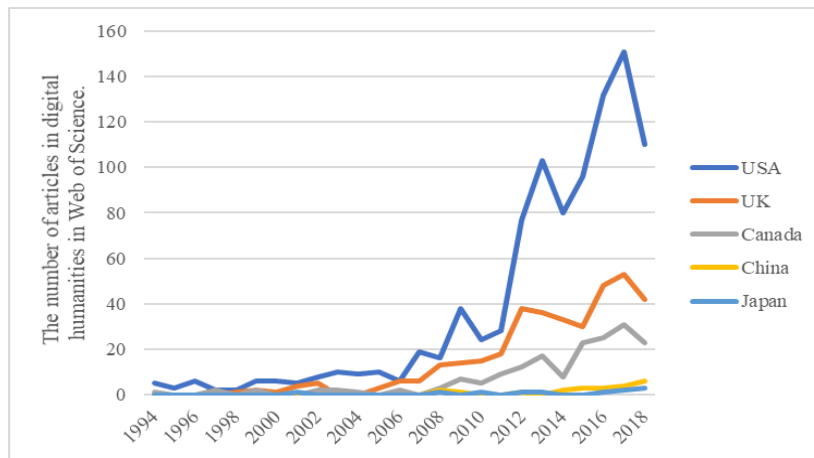
Figure 15 The time distribution curve of the number of papers in digital humanities in Web of Science (x-axis: time, y-axis: published articles in Web of Science).

Table 4 Relative increase rate in the number of papers in Web of Science

Sample\Exam Fact	1994	2018	Relative increase rate
USA	5	110	21
UK	0	42	42
Canada	1	23	22
China	0	6	6
Japan	0	3	3

In Figure 16, considering that Web of Science is English-language oriented and does not include many Chinese-language journals, I analyzed the digital humanities term in the largest Chinese academic database CNKI to provide a more detailed comparison. In the CNKI data, the increase in published papers still starts later than in Western countries: in 2012, rather than in 2008. However, the number of digital humanities papers published annually does show a similarly dramatic increase, ramping from 2 to 65, increasing by over 32 times over 2012, which is an even greater relative

increase than the current observed rate of publishing for the US, Canada in Web of Science.
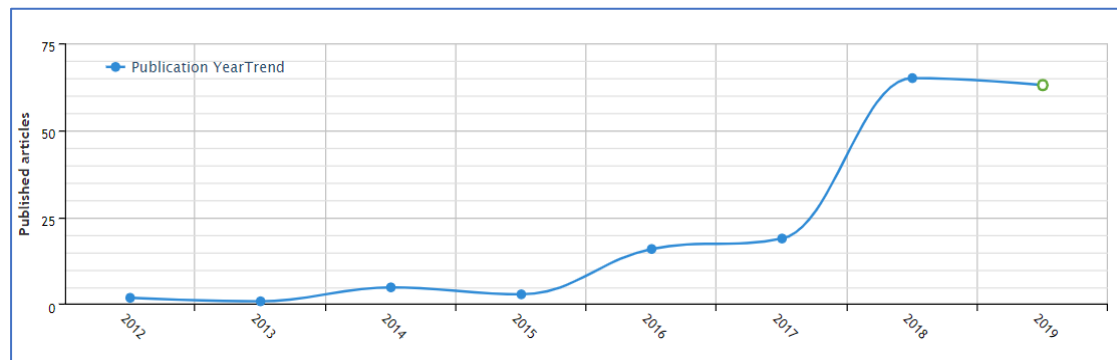
Figure 16 The number of publications in digital humanities in the China National Knowledge Infrastructure (CNKI) Core Journals database. (x-axis: time, y-axis: published articles in CNKI)

In short, in this chapter, the presented evidence shows that digital humanities research has become more and more popular regardless of geographic location. However, it is critical to note that the prevailing digital humanities databases are still largely English-language centric and appear to be missing a considerable amount of digital humanities activity in China such as CNKI publications and in other East Asian countries. As such, examining digital humanities under a global lens may require a still broader and more inclusive approach to arrive to a better-shared understanding of trends and activity in the field.

4.2 Institutions and Communities

In the article *The Function of Digital Humanities Centres at the Present Time*, Neil Fraistat describes digital centres as:

> Key sites for bridging the daunting gap between new technology
> and humanities scholars, serving as the crosswalks between
> cyberinfrastructure and users, where scholars learn how to introduce

into their research computational methods, encoding practices, and tools and where users of digital resources can be transformed into producers. Centres not only model the kind of collaborative and interdisciplinary work that will increasingly come to define humanities scholarship; they also enable graduate students and faculty to learn from each other while working on projects of common intellectual interest. The lectures, symposia, and workshops hosted by centres benefit those at other institutions without centres themselves but who are able to attend in person or virtually. Centres, in short, can be invaluable community resources (Fraistat, 2012, p. 281).

In keeping with the description presented above, I manually tallied the digital humanities centre list based on information provided by centerNet[5].

Table 5 The number of digital humanities centres sorted by region (search date: 02/2019)

Region	Numbers
Latin America	3
USA	80
Canada	22
Europe	65
South Africa	3
Australia and New Zealand	10
East Asia	8
South Asia	1
In Total	189

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[5] An international network of digital humanities research centres: https://dhcenternet.org/centers.

The stark variance in the number of digital humanities centres in North America (US and Canada, which host 102 centres in total from Table 5) and East Asia, which has only 8, is readily apparent. So, to compare East Asia and North America, what factors might account for this difference in the number of regional digital humanities centres?

In examining this question, my findings suggest that the development of digital humanities centres between the West and East appears to be affected by three main factors: 1) time; 2) language and cultural differences; 3) funding and institutional support.

First, time - as mentioned in chapter one, the evolution of digital humanities started first in the West and then emerged and developed later in the East, so this timeline head-start (which also grows in parallel with western leadership in the first round of computer hardware and digital technology from the 1980s-2000s) easily contributes to a higher number of institutions in the West versus the East. From the year 2005 until 2013, many centres were established in the West, whereas the first digital humanities centre in East Asia was not established until 2011 at Wuhan University in China.

Second, the uniqueness of Asian languages in relation to each other (different structures, different characters / alphabets, etc.) has resulted in digital humanities developing as a far more inward, country-specific practice than in the West, with digital humanities centres in East Asia mainly focusing on unique content within each specific country rather than a broader cross-country content focus. For instance, Japanese and Chinese, among several other East Asian languages, are non-alphabetic languages.

Thus, building specific databases takes a longer amount of time and produces less cooperation with other scholars, which may lead East Asian digital humanities scholars to focus more inward and become more isolated. Conversely, in the West, shared linguistic traits (i.e. Romance and Germanic language families), common alphabets, deeper cultural similarities, and prevalence of Western cultures globally have allowed Western digital humanities to take a "broader" (if not also principally western-centric) view with a far higher rate of cross-country focus. This broadening and western-centric homogenization of the research base can also help to explain the higher number of centres in the West as a wider pool of participants across the Western world. However, in the East, in addition to being a comparatively less mature region for research and activity in the field, research is likely to be more fragmented and insular along with country / cultural lines. Digital humanities focused on traditional Chinese texts, for instance, would not necessarily be seen as immediately relevant or accessible to other East Asian researches, such as an Indian or Japanese digital humanities projects. These scholars would also be more likely to be focused on their own language-culture's works, thus resulting in a lower number of formalized centres overall in East Asia.

Third, funding and institutional support. In the report *Building Capacity for Digital Humanities*, the authors point out: "Institutional support is particularly helpful when scholars want to apply well-established techniques within a new discipline or to a new set of research questions or courses" (Anne et al., 2017, p. 5). Currently, institutions like the University of London and the University of California system, which have unparalleled financial advantages to support cyber infrastructure, also have an outsized

influence on what counts as digital humanities knowledge. In Asia, only a few top universities may have the resources and funding to explore this interdisciplinary subject. Further, in East Asia, overall institutional funding for the humanities appears to be gradually decreasing (thus not boding well for digital humanities in East Asia at an institutional level). For example, in 2015, the Ministry of Education, Culture, Sports, Science & Technology (MEXT) in Japan claimed that universities should modify their social science and humanities departments to "benefit" the Japanese society on a larger scale. Following this news, at least 26 Japanese universities announced either a significant reduction or complete elimination of courses relating to the affected disciplines, and it is estimated that at least 1.3 thousand humanities professorial positions were cut from the higher education system (N. J. T. M. Jenkins, 2015). Additionally, in March 2019, in China, more than 40 universities, including Peking University and Tsinghua University, reduced or canceled their independent enrollment of liberal arts students.

Taken together, these reasons summarize why there are currently significantly fewer digital humanities centres in East Asia compared to the West. While there are few strong digital humanities institutions in East Asia, digital humanities scholarship in the region is ongoing – so, it then becomes worthwhile to ask – "What about the digital humanities scholars who are still engaging in active research without strong or formal institutional support?"

According to *Humanities World Report 2015*: "In many parts of the world, there are many independent digital humanists, despite there being few unified centres. The

absence of digital humanities centres is not always indicative of the number of scholars participating in the field" (Holm, Jarrick, & Scott, 2014, p. 66). These scholars are likely to independently seek out and find a community through online methods.

So, what do the communities look like between Eastern scholars and Western scholars?

For North American and European scholars, Twitter is widely used within the international scholar community in addition to also monitoring active mailing lists and the many volunteer-curated sites that aggregate information (seen Figure 17). Martin Grandjean, in his article A social network analysis of Twitter: Mapping the digital humanities community, identified 2,500 users which belong to members of digital humanities groups; based on the visualization of the "who's following who?", he concludes: "each digital humanities groups are highly clustering within a network whose characteristics look similar to a small world" (Grandjean, 2016). In East Asia, independently organized digital humanities communities are also leveraging virtual tools to connect and flourish, though perhaps using different tools from their Western counterparts. For instance, in China, there are robust digital humanities activity on WeChat[7] (seen Figure 18) or Sina[8] blogs as well other social media and blogs. So, in this regard, the independent digital humanities communities in both the West and East appear to be operating quite similarly.

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[7] WeChat is an instant messaging software launched by Tencent on 2011. Users can share text, pictures and textures with friends through the client, and support group chat and voice, video intercom, broadcast (one-to-many) messages, photo/video sharing, location sharing, messaging.

[8] Sina Weibo is a service website launched by Sina.com that provides microblogging. Users can post information through web pages, WAP pages, external programs and SMS or MMS, and upload images and link videos for instant sharing.

Figure 17 Official Twitter accounts for North American digital humanities labs and individual scholars.
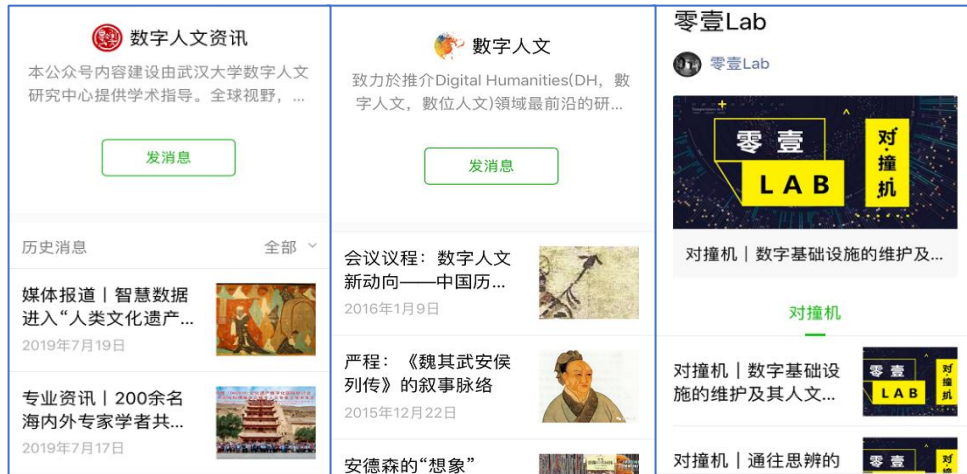
Figure 18 Chinese digital humanities scholars' blogs in WeChat

In conclusion, digital humanities centres are highly influenced by time, language, and funding; when institutions are not present, digital humanities scholars also work with virtual tools to create their own communities and bring together dispersed digital humanities resources for collaboration and expansion of results. These informal groups

may operate like something akin to "centres" but lack the ability to nurture development of the discipline in a sustained, centralized fashion over time, and may also lack the ability to effectively project out contents into the wider digital humanities journals and academic community.

4.3 Publications and Citations

In this chapter, I would like to examine which institution contributes more to the number of publications in the field of digital humanities and then further examine which kind of categories achieve the highest citations.

From Table 6, the output of digital humanities publications is especially prevalent in some prestigious universities such as the University of California System and the University of London. I examined publication data in the Web of Science in the digital humanities, over 2,000 articles, and the top 3 institutions, which account for over 10% of all articles published.

Table 6 The number of digital humanities texts sorted by the university

Record	Record Count	Percentage
University of London	159	5.45%
University of California System	74	2.54%
Kings College London	67	2.30%
University College London	66	2.26%
University of Texas System	35	1.20%
State University System of Florida	33	1.13%
University of Illinois System	32	1.10%
University of Oxford	32	1.10%

What might be the reason behind this? First, as I mentioned before, universities that have formal digital humanities programs (centres, labs, degree programs) generally tend to contribute more in terms of digital humanities publications. I can also observe a similar effect from the Eastern point of view. For instance, the CNKI database shows the top three organizations with the highest number of publications in digital humanities are Nanjing University, Wuhan University and the Shanghai Libray, which are notably all organizations with dedicated digital humanities programs or infrastructure. Nanjing University and Wuhan University built their Digital Humanities Innovation Research Centres in 2018 and 2011, respectively; these two centres hold digital humanities seminars and conferences every year, translate text, and conduct a range of teaching and research activities. Additionally, the Nanjing University Digital Humanities Innovation Research Centre cooperates with the Nanjing University Press to publish digital humanities research series such as *Introduction to Digital Humanities*.

Second, I believe universities that offer degrees in digital humanities are good catalysts for the publications and research in the field. First, student tuition brings financial advantages for supporting cyber infrastructure and digital humanities spaces; second, due to the digital humanities teaching staff, their publications and books are easier to access and distribute.

Now, taking a deeper look, I want to examine which branches of digital humanities receive the highest citations. I used Google Scholar to examine which scholars obtained large citation counts. The ranking of citations can be easily accessed from Google Scholar by using the search term: "digital humanities". Digital humanities scholar Todd

Presner had the highest citation count, with a total of 2772 citations; a large number of

his highly cited publications related to digital humanities were actually methodological

articles, such as *Digital_Humanities* (568 counts), *Digital Humanities Manifesto 2.0*

(76 counts), *Digital Humanities 2.0: A Report On Knowledge* (58 counts), *HyperCities:*

Thick Mapping in the Digital Humanities (69 counts). Why do methodology

publications tend to attract much higher citation counts than other publications? The

first potential reason is that in the digital humanities field, methodology publications

include not only present history, concepts and debates, but also statistics as well as

qualitative methodologies in the digital humanities field. Second, methodology

publications tend to be cited as textbooks. There are numerous articles that define

digital humanities and refer back to those definitions, which can thus attract much

higher citation counts than other publications.

Figure 19 Google Scholar search results using the search term: digital_humanities⑨

Most of the most cited scholars of digital humanities are still North American authors. However, in recent years, more and more digital humanities books have been translated into Chinese; these books, in particular, are usually co-translated by scholars from different universities, which represent a similar kind of cooperation in the field of digital humanities. Such examples are: *Digital_Humanities* by Anne Burdick and other

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⑨Source:https://scholar.google.com/citations?hl=en&view_op=search_authors&mauthors=+digital+humanities& btnG=

authors and *Digital Humanities: Knowledge and Critique in a Digital Age* by DM Berry, A Fagerjord. At the same time, various academic forums were held to discuss the development of digital humanities in China; it would not be unreasonable to assume that more formalized digital humanities programs may eventually emerge in China.
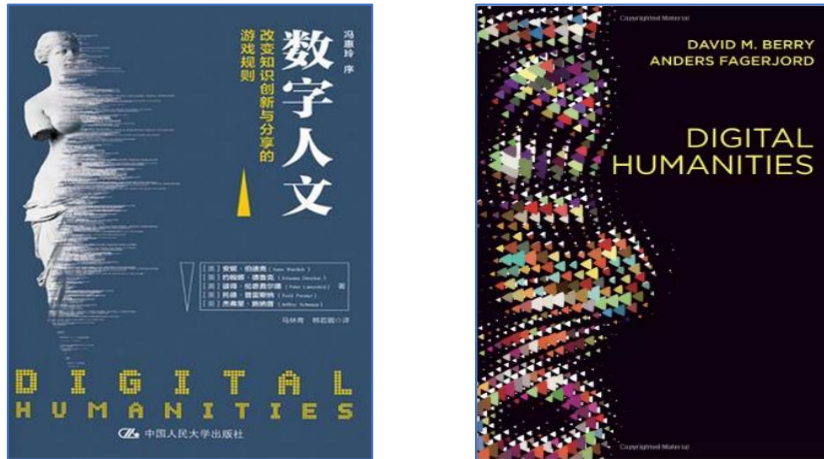
Figure 20   Digital_Humanitites English version (left) Chinese version (right)

Figure 21   Digital Humanities: Knowledge and Critique in a Digital Age English version (left) Chinese version (right)

In conclusion, for this chapter, the number of publications is influenced by digital humanities degrees, and citations cluster around specific categories, especially methodology publications that seek to define digital humanities. Based on the most

recent research in September 2019, from the website of the Ministry of Education in China and Japan, both countries do not yet offer any degree programs in the field of digital humanities, but academic activities such as co-translating books are active and increasing.

4.4 Topics and Projects

Based on previous research, in this chapter, I investigated a new question: what are the major topics of digital humanities papers, and how does this variable differ between Eastern scholars and Western scholars and overtime?

My first finding was that after examining the papers drawn from the core collection of Web of Science[10] from 1990 to 2018, of the 2869 digital humanities papers, there are more than ten topic categories (categories are built-in categories in Web of Science). Among them, information science/library science topics were the most popular topic regardless of the geographic location before 2015, which shows that in both regions there is a need to accumulate data and build information infrastructures in order to prepare further digital humanities research. However, divergent trends can be observed between the West and East starting from 2015. As of 2015, in North America, these established digital humanities databases gradually supported the needs of more interdisciplinary humanities research; as such, North American scholars have increasingly focused on the analysis of interdisciplinary research, so the category "humanities multidisciplinary" has therefore risen to the number 1 topic in North America. In contrast, when looking at the publications by East Asian researchers, after

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[10] In total there are 73,314,899 papers in the Web of Science Core Collection.

2015, information science/library science still remains the most popular topic, suggesting that up until now, East Asian digital humanities practices have still focused on building the foundational infrastructure, and have yet to shift to an interdisciplinary focus.

The pie chart (see Figure 21) comes from China's biggest academic database CNKI, when searching for the keyword "digital humanities" in Chinese, these statistics collect digital humanities related articles in local databases up until 2018. This result clearly shows that most Chinese scholars' digital humanities articles pertain to library science and digital library systems (125 counts, 57.08%) compared with the second category computer software and application of computer (29 counts, 13.24%).
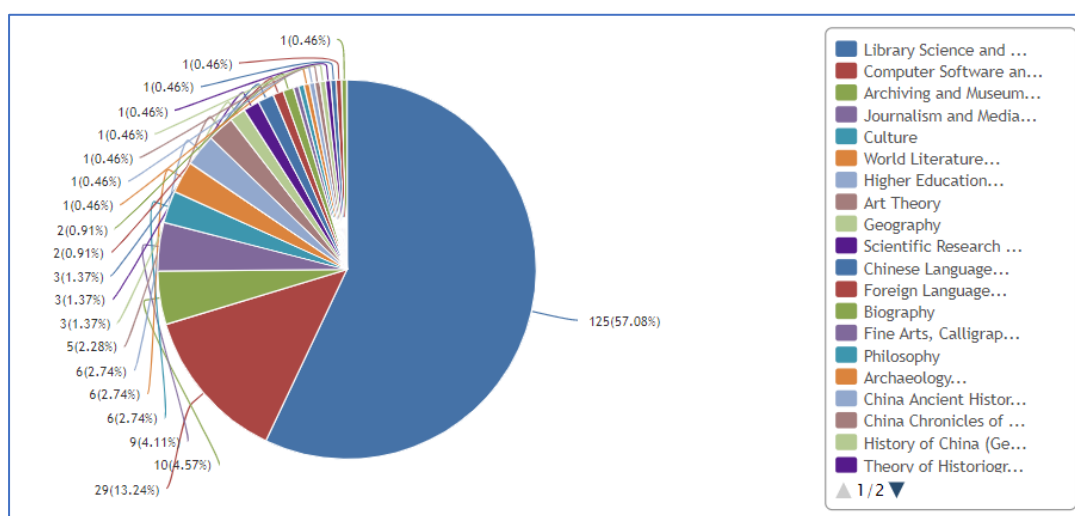
Figure 21 CNKI digital humanities text categories (categories are built-in categories in CNKI)

So, what is the difference between the major research areas? When taking a closer look at these articles, I found that some of the most cited digital humanities projects in East Asia mainly focus on the protection of cultural relics and restoring ancient books. For example, within the *China Biographical Database (CBDB)*, which was initiated by the Institute of Ancient Chinese History at Peking University and the Harvard Yenching

Institute, which is currently the most comprehensive historical database of Chinese biographies - it systematically collects all the important biographical materials in Chinese history, and contains a total of about 427,000 biographies. Another project is the *Welcome to the Chinese Text Project*. This project is an online open-access digital library, which aims to digitally explore new ways of interacting with Chinese pre-Qin, pre-Han, and post-Han texts, even allowing for keyword searching across the website. Similar Japanese undertakings aim to digitize the pre-modern (prior to 1868) Japanese literary documents, such as the *NIJL Database of Pre-modern Japanese Works* and the *Kuzushiji Project*: Developing a Mobile Learning Application for Reading Early Modern Japanese Texts and Web application.

However, these projects are also beneficial for readers outside of these Asian cultures to know, understand, and access Japanese or Chinese culture and language. The projects also prepare those texts for corpus analysis, including creating, modifying and applying more powerful search capabilities with significant speed and scale improvements. However, the disadvantage is that, from the reader's perspective, scholars tend to choose well-known, premodern books in the beginning; this kind of research may have a big impact on the academic world, but less influence on the general population. On top of this, language barriers still exist; classical and traditional characters and books are hard to understand even for the native population, so it is hard to attract digital humanities scholars from other regions, which greatly reduces the possibility of communication and exchange.

In short, by analyzing 2869 texts from 1990 to 2018, digital humanities research trends and hot topics have changed over time. North America digital humanities researches are transitioning from the information-orientated stage to the multidisciplinary collaborative stage and becoming more focused on interdisplinary topics. In East Asia, however, library science systems and databases (signifying the ongoing solidification of a foundation of a digital humanities infrastructure) developed dramatically but are still the primary subject of digital humanities in Asia.

5. Conclusions

My study aimed to navigate and summarize the trends and challenges in the field of digital humanities, while also deeply examining the differences between North American and East Asian research areas in this emerging field. I hope my findings can contribute to the future of digital humanities and lay the groundwork for more research that reflects the regional diversities of 21st-century cultures.

In this analysis, I found: (1) from the perspective of time, East Asia and North America have experienced an increased interest in digital humanities since 2008; scholars in both regions published their academic results in different channels. However, East Asian scholars tend to prefer to publish their academic results in their own language; consequently, these articles are not noticed by Web of Science. (2) From the institutional perspective, many universities in Europe and North America have established their own physical digital humanities research centres and due to the resources offered by digital centres, their scholars are more easily able to distribute digital humanities publications and research. In East Asia, various digital humanities conferences and seminars are frequently held; however, without many formalized digital centres, more and more East Asian scholars are building connections virtually through independent initiatives such as collaborative projects or co-translating books. (3) From an authorship and degree perspective, digital humanities research is unevenly distributed in English-speaking countries and prestigious institutions. Prestigious universities have published more than 1/3 of all digital humanities publications, methodological books, and articles, and are more likely to enjoy a higher number of

citations. Big countries like China and Japan, due to the habit of introspective research focuses towards their own cultures and native languages, did not achieve such high citations in their papers. (4) From the perspective of topics, there is a clear regional pattern of research culture. In East Asia, projects mainly focus on the protection of cultural relics and ancient texts, while in West there is no such apparent feature. Taken together, the imbalance between East Asia and North America / the West in terms of digital humanities is decreasing and East Asian scholarship in the space is slowly receiving broader recognition; many barriers still exist for East Asian digital humanities to fully engage with the "global" conversation in the field and the risk to East Asian digital humanities remaining isolated persists.

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