Guest editorial

From humanities computing to the digital humanities: a literature review

Introduction

The theme "digital humanities" (DH) – its history, major projects and practitioners, and, especially, its many definitions – has been the subject of frenzied scholarship and publications for more than 20 years. However, many of the voices who have been most active within the field over this time have come from the more "traditional" DH academic fields such as English, Linguistics and History. In this special edition of *Digital Library Perspectives*, the editors have looked for new voices within the DH ecosystem to expand our understanding of where this work is taking place. We have achieved this through the collection of papers by librarians, as well as academic researchers, and by scholars working in non-Western contexts whose voices are so often left out of mainstream DH's discussions. The papers collected in this issue present a vision of the Library as a central partner in DH scholarship; therefore, positioning the Library not just as a place to consume knowledge but as a place where new knowledge is actively co-created by researchers and librarians alike.

The genealogy of DH as a field stretches back to late 1940s in the pioneering work of Jesuit scholar Roberto Busa, who in collaboration with IBM created a computer-generated concordance to Thomas Aquinas' writings now known as the Index Thomisticus, a tool for performing text searches within the massive corpus of Aquinas's works (Jones, 2016). As other scholars began using mainframe computers to automate tasks like word searching, sorting and counting, which was much faster than processing information from texts with handwritten or typed index cards, academics and librarians in those institutions began using a wide range of computational tools to enable humanities scholarship in integrating and developing research at a scale once thought as impossible. "DH" as such emerged as a term, as the practice allowed for collaborating and blending disciplines and methodological orientations together. Stanford University's Humanities Center describes DH as a field that encompasses a diverse array of initiatives that include "projects to digitize archival materials for posterity, to map the exchange and transmission of ideas in history, and to study the evolution of common words over the centuries" (Stanford University, 2018).

The formal institutionalization of DH has resulted in academic departments or units, annual conferences, journals, educational programs and a rather strong sense of communal identity, all qualities that are typically associated with the establishment of a new discipline (Svensson, 2016). In fact, DH conferences have occurred annually since 1989 which were sponsored by the Alliance of Digital Humanities Organizations, and constituent organizations of the Alliance have held conferences since 1973. A recent bibliometric analysis by Qing Wang found an obvious rapid growth in DH research, with the UK and the USA leading the way with research fields of theory and practice closely associated with history, literary, cultural heritage and library and information science (Wang, 2018).

The evolution of DH has its organizational roots stretching back to earlier times when they were referred more as "humanities computing" centers or units and were usually affiliated with school of liberal arts or humanities. Such units provided service to the rest of the school or faculty, and this simple, instrumental function has typically been primary. Though there might have been development in many other directions over time, this basic function cannot easily be dismissed. A prominent example would be the Humanities Computing Unit at Oxford University whose roots go back to 1960s (Burnard, 2002).

These humanities computing units – perhaps, what can be considered as proto-DH centers – were not normally on the same administrative level as most research and teaching departments which tended to be more "privileged" academic organizational units that had faculty and set the curricula. Indeed, such humanities computing units were viewed as service units at the whim of the larger faculty to maintain its financial support and their share of integrity and independence. Such academic units as technological services were often vulnerable to different kinds of organizational changes and budget cuts than academic departments. In the *LA Book Reviews'* ongoing series of interviews with DH practitioners called the "The Digital in the Humanities," the issue of funding from academic institutions have been raised a number of times. As a faculty who does DH work, Sharon Leon points out that although universities want the work to done, they are often unwilling to pay for it (Dinsman, 2016).

Instead, academic institutions tend to prefer external organizations funding digital projects. Even though putting together a solid DH research group requires a fair amount of funding, universities that face cutbacks in humanities are more hesitant to prioritize DH projects. As such, funding have for most of the part been funded by external sources for digital humanists. It is important to understand that the growth of the DH probably could not have developed without the aid from such agencies as the Mellon Foundation, Council on Library and Information Resources, National Endowment for the Humanities, the UK Arts and Humanities Research Council, the Canadian Foundation for Innovation and others, in supporting practitioners on focusing on infrastructure, tools and services to support humanities scholarship in digital environments (Borgman, 2009).

Yet, while external funding is critical to DH work, external funding often is channeled toward salaries, paying for people for a limited term only, but do not usually pay for hardware or infrastructure or collaborative space (Dinsman, 2016). Such is the institutional "dilemma," where on the one hand, universities do not necessarily want to commit to funding people on a long-term basis, but on the other, operational costs of infrastructure in the long term have to come from somewhere. This is perhaps where the Library comes into play in this complex network.

Role of the academic library in supporting nontraditional digital humanities areas of scholarship
As the field of DH continues to evolve so will the perception of where DH-level work takes practice, whether it is in the lab or the classroom. While scholars sometimes view the work of DH in traditional departments such as English because of the historical connections between text, computing and composition, there are others who view libraries as the centers of DH work (Sula, 2013). An emerging number of DH centers are now housed in close proximity to university libraries, a natural partnership given the centrality of libraries to humanities, and that many DH initiatives have an interest in collections and interdisciplinary practice. Furthermore, such initiatives can sometimes function as resources in library-based development and research work. With library reconstruction, changing usage patterns and resizing may result in available space and structural possibilities. An example of this type of symbiotic relationship can be seen in the in the Center for Digital Scholarship at Brown.

The Association of Research Libraries (ARL) has done much work in exploring the landscape of support by libraries and published its SPEC Kit 326: Digital Humanities in 2011 on DH. In this report, it surveys ARL libraries how DH centers are staffed and funded, what services they offer and to whom, what technical infrastructure is provided, whether the library manages or archives the digital resources produced and how services are assessed.

The publication is often considered a benchmark analysis of the experiences of research libraries with digital scholarship centers and services that support humanities and the benefits and challenges of hosting them and referred to by libraries (Bryson *et al.*, 2011).

Current models of support working for digital humanities scholarship and pedagogy
Therefore, building institutional capacity for DH is critical in reducing the individual effort and risk involved for researchers and instructors who want to explore the adoption of new tools or methodologies. A number of faculty in colleges and universities have access to high-performance computing networks and basic hardware and software. However, institutional licenses for specialized software, high-end computers needed for some type of analysis and display and strategies for storage (both short and long term) for projects involving specialized software and a range of content types may not be available for researchers unless they source and pay for these things on their own. It has been recommended that it is important to help senior administrators, who control allocation of resources, to recognize that DH projects as part of the institutional research technology ecosystem, which has traditionally been tailored to meet the needs of scientists [EDUCAUSE Center for Analysis Research (ECAR), 2017].

DH work thus necessitates access to a complex infrastructure stack, including networking, systems, data storage and management, curation, compute infrastructure, a multiplicity of hardware and software devices and tools, publication and display systems and the tools for sharing with and connecting to the many people involved in a given body of work. Even in small institutions, scholars may have access to national computing resources, such as Compute Canada or XSEDE, for high-performance computing in North America [EDUCAUSE Center for Analysis Research (ECAR), 2017].

Dave Berry proposes an analogy in presenting DH through a common computer science technique of a software "stack," an idea that software components provides the infrastructure for a given computer system or platform. In a similar way, he illustrates similarly that the layers of abstraction can be conceptualized as a "digital humanities stack," an approach to viewing DH within the hierarchy of an institution's needs (Barry, 2016).

Before an institution can fully embrace DH support, meaningful change in institutional culture is also necessary. Within humanities, there is a traditional conception of individual scholars conducting his or her own research and pedagogy, often supported by an anonymous cast drawn from the library, IT organizations and educational technology groups [EDUCAUSE Center for Analysis Research (ECAR), 2017]. Yet, because DH work oftentimes requires a partnership that provides access to a different kind of valuable expertise, starting with the project design, the role of librarians and IT professionals is not simply to provide access to resources or to produce code according to predefined specifications. Instead, partnerships that span discipline, domain and institutional roles require ongoing effort of all parties, particularly when it comes to communication.

In case of humanities, researchers are more likely to find their data sources in the library than in other places. The library has not changed from the pre-digital era; it still is the humanist's lab. While the library continues to be more central to scholarship in humanities than it is to other fields, the characteristics of that relationship are changing. The use of physical space and of library staff has shifted drastically in the last two decades, largely in response to flat or declining university library budgets (Borgman, 2009). It is not surprising then that we see humanities scholars increasingly running their own computing laboratories and often work in distributed virtual environments for research and learning. Humanists need to partner both with librarians and with the information technology planning and policy groups on their campuses, and if the research library is the humanities laboratory of

the twenty-first century, the encroachment of libraries for both space and funding means DH researchers are in danger of losing a critical partner (Borgman, 2009). This is an ongoing and larger question that may define the future of research library.

While LIS scholars are wholeheartedly in agreement that research library is central to any DH project, there are variations as to the role of the library as a physical space. While Drucker sees the library as a crucial partner in planning and envisioning the future of preserving, using and even creating scholarly resources, his creation of archives, analytic tools and statistical analyses of aggregate data in humanities (and in some other scholarly fields) requires the combined expertise of technical, professional and scholarly personnel – in other words, a team-based approach is necessary. The task of modeling an environment for scholarship (not just individual projects but an environment, with a suite of tools for access, use and research activity) is not a responsibility that can be off-loaded onto libraries or technical staff (Drucker, 2009).

As Miriam Posner proposes, as buildings have to come down to be repurposed and libraries are caught wondering how to deal with books, do these pressures create an opportunity to restructure the library, particularly for digital scholarship centers? She asks:

> Are all books destined to be condemned to remote storage practically on arrival from their presses, to be read at terminals, or are there opportunities for redefining the library as living laboratories for research? (Posner, 2013)

Instead of DH in libraries being viewed as a service, libraries could be more successful at generating engagement with DH if they focus on helping librarians lead their own initiatives and projects. The physical space for performing the work of a digital humanist has become a point of importance, and not surprisingly, much work has been devoted to the area of how a digital lab of some sort functions within the academic institution. Indeed, there is still much work to do in research libraries, as on most university campuses, there are few articulated campus-wide strategies for supporting faculty that address the full life cycle of their DH projects, from planning stage, through building and launch, to ongoing preservation and dissemination (Maron and Pickle, 2014). While Vinopal and McCormick used the New York University Library as a case study for proposing a four-tiered structure of its Digital Scholarship Center by partnering with its Information Technology Services unit in creating an enterprise-wide technology solution, these types of models are still at an embryonic stage (McCormick and Vinopal, 2012).

Exploring the intersections between the digital humanities and the social sciences
When Matthew Kirschenbaum's "What Is Digital Humanities and What's It Doing in English Departments" first arrived, it set a theme for how DH would be perceived and accepted in academic circles. As a humanist and a scholar in a traditional English department, Kirschenbaum was appropriately positioned in writing what is now known as a seminal piece in the DH literature, tracing the genealogy of the term and its navigating of circuitous pathways of academia. It is true that while DH has seen an uphill struggle for its place in academic institutions, it has been viewed with a sense of ownership among traditional humanities disciplines, such as English literature, History, Philosophy or even Linguistics.

But is this the case? As early adopters of infusing digital tools and techniques into its practice, archeologists have used them as far back as when computers and interactive media have been available. In fact, European archeologists Peter Ihm, Jean-Claude Gardin and James Deetz used electronic data processing as far back as 1950s and 1960s (Huggett, 2013). Archeologists were quick to embrace new tools, such as digital photography and field data

capture on laptops and GPS units. In the early 1990s, archeologists improvised proto-GIS models of sites and regions in Hypercard and spreadsheet software.

Huggett has argued that the expansion of archeological reconstruction into virtual spaces in the 1990s has made it possible for anyone with modest computer equipment and an internet connection to be in an imagined past, to manipulate it and to help create it (Huggett, 2012). Indeed, the elements of digital archeology and DH are not widely divergent as both share similar ideas of interdisciplinarity, technology and digital methods, and archeologists can be considered positioned among digital humanists as the discipline sits on a cusp between the humanities, the social sciences, the "hard" sciences and the biological and material sciences. Thus, this interdisciplinary character has fostered a wide-ranging set of methodologies and a highly critical approach to data collection and to methods of machine-based processing, manipulation and interpretation. Perhaps, what sets digital humanists apart from those who use digital tools within their independent disciplines is that they have considered the wider institutional, cultural and political issues (Huggett, 2015) that DH researchers are now tackling.

"Traditional" digital humanities and "emerging" digital humanities

Stephen Ramsay continues this approach in tracing the genealogy of DH, proposing the idea that "DH" as a field may not be novel at all, suggesting that many subject areas have long used the digital tools and methodologies that is now currently associated within the DH framework. Stephen Ramsay's "DH Types One and Two" was perhaps the first to bring to light the dichotomy of disciplines:

> Media studies practitioners are digital humanists; people who had devoted several decades to digital pedagogy are digital humanists; cultural critics who were interested in Internet culture are digital humanists; and digital artists of a certain variety were digital humanists. (Ramsay, 2013).

Some academics have emerged with research interests that span beyond humanities and into a technology-focused approach. Indeed, it seems a generation of scholars have emerged with dual backgrounds in the sciences and humanities which speaks to the transdisciplinarity of DH itself and how expertise requires crossing and overlapping subject domains. Although far from an emerging academic, and originally trained as a scholar of British Romanticism, Ted Underwood's scholarship and appointment in the School of Information Sciences and English Department have produced works distant reading enabling new findings in historical perspectives through the use of machine learning and digital libraries (Underwood, 2017). Annette Vee's research is about the ways that computer programing is being talked about and spread as "literacy" and how that is changing what we think writing and literacy are. Her book *Coding Literacy: How Computer Programming is Changing Writing* invites the merger of two seemingly disparate fields of computer science and English into a new dynamic scholarship (Vee, 2017).

Wendy Hui Kyong Chun, Professor of Modern Culture and Media at Brown University, is one who believes that humanists should learn statistics (Chun, 2012). As a scholar who has studied both Systems Design Engineering and English Literature, she combines and mutates in her current work on digital media. Central to the notion of cyberinfrastructure and e-science is that "data" are essential scholarly objects to be captured, mined, used and reused. This trend has been under way in science for many years, to varying degrees by field (Borgman, 2009).

Non-Western forms of digital humanities
The truth that much DH is still largely done in the Western world, findings from a study of patterns in the US' National Endowment of the Humanities' federal funding for DH projects found that there is great disparity between projects identified as having a focus on white people and other races and ethnicities. While white men were likely to be treated as individuals in a given project, other race/ethnic categories and women were treated as groups almost exclusively. Instead of a project focusing on specific historical figures, the narrative and documentary history of these groups is considered at the aggregate level. The data point to systematic inequalities in DH funding based on race and gender of this kind that are showing up in many other cultural venues at present:

> This disparity is important to note because it speaks to a larger social phenomenon whereby great (white) men stand out for their achievements, but other groups have been largely left to be remembered for their collective struggle. (Martin and Runyon, 2016).

Mullaney argues that the "Asia deficit" within DH is in no small part the outcome of more entrenched divides within the platforms and digital tools that form the foundation of DH itself. Digital databases and text corpora – the "raw material" of text mining and computational text analysis – are far more abundant for English and other Latin alphabetic scripts than they are for Chinese, Japanese, Korean, Sanskrit, Hindi, Arabic and other non-Latin orthographies. Not in any way because of the lack of primary source materials has much materials been digitized in Asian area studies, the "deficit" is because of the fact that there are still gaps in the availability of optical character recognition platforms, text parsers and tokenizers capable of handling and processing the non-Latin scripts (Mullaney, 2016). Even for historic maps of Asia, the number of such maps that have been metadata-tagged, digitized and georectified (three essential processes that must be carried out before digital spatial analysis can be undertaken) are consistently far less than their Western European and the USA counterparts.

Indeed, studies have indicated that the DH community predominantly comprises scholars from a handful of mainly English-speaking countries, and the current challenge is achieving a broader internationalization of the DH community (Russell, 2014). Meanwhile, with digitization of languages and cultures carried out in mainly Anglophone-driven economic and technological context, Fiorante asks digital humanists to be concerned about this disparity as in terms of geopolitics and to ask questions about political representation and cultural diversity, encoding standards, digital infrastructures and linguistic hegemonies (Fiormonte, 2017).

As a result, when we look at DH in Western Europe and the Americas, we find a vibrant intellectual environment in which even college and university undergraduates – let alone more advanced researchers – can download off-the-shelf analytical platforms and data corpora and venture into new and cutting-edge research questions, while, in the context of Asian studies, we find an environment in which many of the most basic elements of DH research remain underdeveloped or non-existent. Thus, it is not enough for Asian studies scholars simply to receive training in the existing set of DH tools (Mullaney, 2016).

MacPherson argues that we must better understand the machines and networks that continue to powerfully shape our lives in ways that we are often ill-equipped to deal with as media and humanities scholars. This necessarily involves more than simply studying our screens and the images that dance across them, moving beyond the study of representations and the rhetorics of visuality. We might read representations seeking symptoms of information capital's fault lines and successes, but we cannot read the logics of these systems and networks solely at the level of our screens. Capital is now fully organized under

the sign of modularity. Scholars in DH must demand that these fields do not replay the formalist and structuralist tendencies of new media theory of earlier times (McPherson, 2012).

for e DH and code studies to take up the questions of culture and meaning that animate so many scholars of race, it does not mean that we should simply add race to our analysis in a modular way, neatly tacking it on or building digital archives of racial material but that we must understand and theorize deep imbrications of race and digital technology even when our objects of analysis (say UNIX or search engines) seem not to be about race at all. We must remember that computers are themselves encoders of culture (McPherson, 2012).

Conclusion

Therefore, we return to the original question we posed at the beginning of this paper, why devote an entire issue to the topic of DH? Certainly, while there have been LIS journals such as the *Journal of Library Administration* that have had an entire issue devoted to DH, the focus of these journals have been library-centric or DH-centric. The focus of our journal, we hope to achieve, is a juxtaposition of the library and the practitioner, blending a balanced view of the state of the field.

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Further reading

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