



**QUEEN'S
UNIVERSITY
BELFAST**

The Importance of Place and Openness in Spatial Humanities Research

Porter, C. (2018). The Importance of Place and Openness in Spatial Humanities Research. *International Journal of Humanities and Arts Computing*, 12(2), 91-101. <https://doi.org/10.3366/ijhac.2018.0216>

Published in:
International Journal of Humanities and Arts Computing

Document Version:
Peer reviewed version

Queen's University Belfast - Research Portal:
[Link to publication record in Queen's University Belfast Research Portal](#)

Publisher rights
Copyright 2018 Edinburgh University Press. This work is made available online in accordance with the publisher's policies. Please refer to any applicable terms of use of the publisher.

General rights
Copyright for the publications made accessible via the Queen's University Belfast Research Portal is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy
The Research Portal is Queen's institutional repository that provides access to Queen's research output. Every effort has been made to ensure that content in the Research Portal does not infringe any person's rights, or applicable UK laws. If you discover content in the Research Portal that you believe breaches copyright or violates any law, please contact openaccess@qub.ac.uk.

Introduction: the importance of place and openness in spatial humanities research

CATHERINE PORTER

Abstract

Digital Humanities (DH) is a dynamic and developing field. In recent years, its evolution has been witnessed foremost in the growth of funded DH projects and through the willingness of scholars from diverse backgrounds to not only work in DH research, but also as 'digital humanists'. One crucial component to DH research is that of spatial enquiry, the expansion of which has rapidly evolved from a small component often found buried in research objectives, to the research aim of a growing number of projects. Spatial humanities, while still a relatively new interdisciplinary field, is exhibiting continued advancement and focus from the academic community; however, working with digital data is rarely a straightforward pursuit, even for the most accomplished scholar. Primarily access to appropriate and reliable (spatial) datasets, the keystone of spatial humanities research, the sharing and openness of spatial methods, tools and data (SMTD), and education in the former, all remain a challenge.

Witnessing the continued rise of spatial humanities research, this special issue brings together a selection of articles delivered at *Spatial Humanities 2016*, a conference held at Lancaster University (UK). The aim of this multi-disciplinary conference was to explore and demonstrate the contribution to knowledge that spatial technologies in humanities research may enable within and beyond the digital humanities. Here, this introductory text and associated articles present key research that embodies the growing relevance of the spatial humanities across a plethora of fields, and demonstrates several of the prevailing and enduring struggles when working in digital and spatial research. These articles emphasise that, despite common obstacles, spatial humanists make up an imaginative and thriving community keen to share innovation and knowledge and provide stimulating new insights through research.

Keywords: digital humanities, spatial humanities, SMTD, methods, tools, data, GIS

1. Introduction

This special issue is composed of articles delivered at the conference *Spatial Humanities 2016*¹. The conference attracted close to one hundred delegates, each keen to share and discuss their research, and each advertising how fundamental the 'spatial' is to their work. Delegates, varying from early career researchers through to senior members of the academy, were brought together in a friendly and relaxed atmosphere which was highly conducive to

¹The success of the *Spatial Humanities 2016* has led to the organisation of a second conference, *Spatial Humanities 2018*.

discussion and debate on all aspects of spatial research. Session foci varied from 'Critical perspectives', 'GIS and Text', 'Literary GIS' and 'Digital Landscapes of the Past', to the 'Urban', the 'Countryside' and '3D applications', but all with a common thread – to share and exhibit spatial humanities research to the wider community.

The spatial humanities has made extensive progress in recent years, rapidly evolving from a small component often found buried in research objectives, to the research aim of a growing number of projects. Nonetheless, we must not lose sight of the struggles and associated limitations when working in a digital environment, especially with historic sources, spatial datasets and tools, and associated education. The ambition of this introductory text is to highlight our progress and also to provide a brief reminder of the key difficulties, that we, as spatial humanists, frequently encounter, and make us pause to consider how we might engage with these obstacles and evolve solutions.

2. Our shifting place as spatial humanists

To better understand our interest in, and growing contribution to, spatial research, we must first refer to the role that space and place has played in our history. The past brims with examples of natural inquisitiveness in our surroundings and landscape, our sense, awareness and attachment to place, and our urgency to define territory by “marking and making place” (David and Wilson, 2002). Historically, we have had a compulsion to mark out our place in the world, and so, to understand the spatial was as inherent to our ancestor’s lives as it is to ours. Evidence of the earliest forms of human spatial awareness are demonstrated through early chorography², the visualisation of which we have borrowed and developed over time through progressive spatially motivated application, writing and research. Crucially, today, the analysis of space and place play a significant role in developing and broadening our understanding of history.

The advent of computer technology in the twentieth-century saw the introduction of a new kind of spatiality - the digital. Scientists could now 'digitise', analyse and visualise datasets using fresh approaches, but only those niche humanists with statistical or computer science backgrounds (and largely quantitative interests) were coaxed to get involved. Gregory and Geddes (2014: 9) describe the take-up of Geographic Information Systems (GIS) by geographers in the 1980s as “controversial” with Historical GIS (HGIS) not becoming a focus of research until the turn of the century. By 2008, qualitative components of history and geography were readily being explored through digital technologies with “studies that developed the historiography by answering applied research questions” (Gregory and Geddes, 2014: 10).

² In pre-history, examples such as the Pavlov map in the Czech Republic (25000BC), the ancient Polynesian maps of the Pacific Ocean and cave maps of the stars such as those in Lascaux, France (13,200BC – 17,000BC). In the ancient and medieval world, we saw maps with religion at their core (in the form of T and O maps and Mappa Mundi) and Ptolemy’s *Geographia*. The early modern saw the knowledge of place coveted and used in conquest, strategy and power, and in the nineteenth-century a growing consideration of the importance of place and space was actively demonstrated through demographics as governments collected, collated, recorded and mapped key information on population.

The last ten years have seen a marked expansion in the use of digital and spatial technologies in humanities research, largely due to the growing availability of, and accessibility to, GIScience (and data visualisation software), and the development of geospatial datasets, each making the analysis of the spatial more achievable³. Thus, from a not too distant past, when advocates of the digital had the challenging task of persuading more ‘traditional’ methods-based academics to recognise the merits of spatial technologies, we now welcome to the fold (often self-trained), historians, geographers, literary scholars, linguists, anthropologists and archaeologists who use progressive digital and spatial mechanisms to focus and enhance their research⁴.

In a time, arguably described as a “crisis” for humanities research, (Waltzer, 2012; Jay, 2014; Kirsch, 2014; Berube and Ruth, 2015), spatial humanities is a burgeoning field that still “promises to revitalise and redefine scholarship by (re-) introducing geographic space to the humanities” (Bodenhamer et. al, 2010: 7). The field has yet to be formally defined, a difficult prospect considering that, as with all things digital, definitions shift and modify with each technological advancement⁵. Considerable change can also be noted in the growing number of scholars now working under the often-interchangeable titles of the digital and spatial humanities. These, often self-labelled, ‘digital humanists’, have diverse backgrounds and interests: it is no longer unusual to find a social historian with a postgraduate degree in computer science, an anthropologist who is an expert in spatial analysis, or an interdisciplinary project where these spatial humanists are working together towards a common goal⁶. There is an undoubted allure to the spatial humanist tribe – it provides a well-formed, yet ever-evolving, diverse and open community in which to belong. It is a community that puts ‘space’ first, expediting choice and opportunity to work freely across disciplines with common goals, and hence, providing the spatially minded with an enhanced sense of place in the academy.

3. Opportunities, challenges and solutions

However key challenges remain. Aside from the difficulties in securing funding⁷ and knowledgeable staff, designing and executing digital research can have numerous complications, none more so than the creation and application of spatial methods, tools and data (henceforth referred to as SMTD). In recent years there has been a surge in new and innovative SMTD, as more data and computer scientists pursue spatial analysis, but often information on these is presented on websites such as GitHub⁸ - extremely useful to those

³ According to Lee and Kang (2015), geospatial ‘big data’ is growing at a rate of 20% per annum. Here, we also must consider how to tackle this increasing volume of data as illustrated by Songnian et al. (2016).

⁴ It should be noted that not all of these more ‘traditional’ scholars are open to digital methodologies and so there is still some way to go in terms of persuasion.

⁵ see Dunn (2016) for further discussion and examples of this. Bodenhamer et al. (various) has made the most comprehensive definition.

⁶ the authors of the articles in this special issue portray this diversity well.

⁷ The Times Higher Education (UK) published an overall figure of 27 per cent success rate in grant proposals for 2016/17 financial year. See: <https://www.timeshighereducation.com/news/uk-research-grant-success-rates-rise-first-time-five-years>

⁸ GitHub can be used to access open source coding and tools for many forms of analysis. <https://github.com/> There are also several studies referring to the quality of coding available on GitHub – see Dabbish et al. (2012) and Kalliamvakou et al. (2014).

of us with programming and software development backgrounds, but not so favourable for those without - or is hidden behind publications with little explanation of how one might access or use them.

The sourcing of reliable and trustworthy data is particularly important as the lack of available datasets for certain times and spaces complicates this fundamental ingredient of digital research. Thankfully, and responsively, librarians and curators are playing a crucial role in combating this deficiency⁹. Many large libraries, museums and repositories are now digitising collections and making them available as a crucial resource for researchers. However this supply of robust data, in turn, introduces the danger of data availability shaping research. Those of us keen to push the boundaries of our research areas and deliver unique insight into key historical and geographical thought must therefore *create* datasets, an often time-consuming and arduous process involving multiple stages. Sometimes this involves using long-established methods in which many of us were originally trained: trawling through original source material extant in archives and libraries (much of which was not 'born digital'), actively collecting data in the field, or for a fortunate few, the acquisition of existing (trusted) datasets. Once data are sourced, digitisation is often required. This might comprise of transcription and scanning, but is often a manual, or at best, a semi-automated process. Apart from the obvious costs involved in time and money, digitisation processes can also lead to levels of inaccuracy in the final datasets (for instance, Optical Character Recognition (OCR) for textual data¹⁰) and therefore two-tier checking systems (think punch card dual-checking for main frames!) and post-correction are necessary to carefully assess the newly created datasets before they might be considered a trusted, 'gold standard' output (Clematide et al., 2016)¹¹.

For any research with a spatial focus, following the digitisation of data, a spatial component must be created. This involves firstly, finding and applying a method for extracting 'place' information from the collected data, and secondly, linking these data to the most crucial form of data in spatial research (and a common thread highlighted in the articles of this issue), gazetteers. However access to reliable and appropriate gazetteers remains problematic. Not only are spatial humanists often working with varied languages and temporal and spatial extents, they must also contend with change over time in country and administrative boundaries, placename revision and standardisation of the same. Some notable projects tackling this are the World-Historical Gazetteer project (WHG), A Vision of Britain through Time (and the related Great Britain Historical GIS (GBHGIS)), the Map of Early Modern London, and Pelagios commons¹². Each project, in its own way, promises to

⁹ For example, the British Library has undergone extensive digitisation programmes such as that of the newspaper collections and now employs expert digital librarians, archivists and curators. See King (2008) for an early discussion of this. They also have a focus on Digital Scholarship see: <https://www.bl.uk/subjects/digital-scholarship>

¹⁰ See Schiuma & Carlucci, 2018

¹¹ Clematide et al. use crowdsourcing to post-correct OCR for a German and French heritage corpus.

¹² the World-Historical Gazetteer project is based at the University of Pittsburgh <http://whgazetteer.org/> ; A Vision of Britain through Time is at the University of Portsmouth <http://www.visionofbritain.org.uk/> ; The Map of Early Modern London https://mapoflondon.uvic.ca/gazetteer_about.htm ; Pelagios commons is funded by the Andrew W. Mellon Foundation <http://commons.pelagios.org/>

deliver opensource gazetteer-based resources to all. Despite the on-going success of such projects and the openness that they encourage, many projects have a need for more bespoke datasets by necessity. Unfortunately, this process, too, is littered with hurdles and without reliable and robust gazetteers employed we may not be able to commence our analysis or trust in our results.

The creation of a new SMTD for digital and spatial research is futile if we do not have the skills to analyse and interpret these digital data. A common thread that developed during *Spatial Humanities 2016* was an admission by several attendees to their lack of formal education in the digital and their apprehension in presenting their work to those they perceived as qualified. There are key concerns for those with no explicit education in the 'digital' (or perhaps little contact the digital and/or spatial humanities communities). Firstly, the danger of doing research the 'long way' when an arduous process (of say, transcription or digitisation) may be least semi-automated using an existing tool, or indeed, duplicating already existing and established SMTD. Secondly, there is a real concern in the visualisation process and (mis)interpretation of results: as any spatial humanist will tell you, mapping data can produce misleading outputs depending on how data are, intentionally or otherwise, collated and/or classified. Lastly, and perhaps worst of all, some will not have the confidence to try at all! As spatial humanists, we have the responsibility to encourage the osmosis of our SMTD across established scholarly boundaries and provide a bridge for others. Equally importantly, we must as a community strive towards inclusion by continuing to work towards a platform for those at the beginning of their spatial research journey whether they be early career researchers or more established scholars. Conferences such as *Spatial Humanities 2016* and the *ADHO* Digital Humanities series of events are a beginning of this process.

However, this form of sharing is insufficient in itself. There is also a considerable need to offer more accessible training for individuals who are keen to explore the spatial in their research. Summer Schools based at universities and colleges are key to this digital education¹³. These courses and workshops (which are usually free to attend except for travel and accommodation although student bursaries are sometimes offered) are run by leaders in the field and provide an opportunity for first-hand engagement, practice and discussion. Chiefly, they introduce researchers, of all levels, to the basics of spatial research and provide attendees with a starting point, a first opportunity to use and discuss their own data. However, while there are clear barriers to this form of education, for example geographical location and finance (which can be particularly difficult for early career researchers), a greater issue is that of personal anxiety and uncertainty about whether we can do 'how to' digital courses. One option that solves geographical and financial constraints is to offer more online training in the ever-popular MOOC (Massive Open Online Courses) style courses that some universities, colleges and companies such as ESRI now successfully employ and provide more access to training websites such as *The Programming Historian*,

¹³ Such as the Digital Humanities Summer Institute at the University of Victoria; the Summer School in GIS for the Digital Humanities at Lancaster University; the University of Oxford Digital Humanities at Oxford Summer School; Sussex Humanities Lab; Digital Humanities@Manchester's DH week; and the Summer A.W. Mellon Workshop in Digital Humanities at Carnegie Mellon University, to name a few.

where opensource 'how to' tutorials can be followed¹⁴. This can only be achieved by leaders in the field working together to offer this education. Self-doubt and related anxieties might then be treated by self-paced learning and forums that offer direct assistance from course leaders and peers.

Regardless of educative delivery formats, the crux of the issues mentioned here is that of openness (Graham, 2016). Openness of SMTD and associated education is key to the accessibility and transparency within the spatial humanities community and essential for future growth. Although many funded projects now publish (or are required to publish) the SMTD and associated code alongside the research, there is a genuine need for increased clarity so that we might each learn the processes involved and have the confidence and ability to apply these to our own research. Refreshingly, some of the authors in this issue explicitly mention sharing as a core aspect to their research, serving to project the welcoming and receptive attitude of the spatial community and cement the importance of conferences such as the *Spatial Humanities* series in moving this positive attitude to openness forward. To do so lies at the heart of what it means to be a spatial humanist – sharing knowledge, educating, being open to new ideas, and carrying out innovative and successful interdisciplinary research toward common goals.

4. Outline of articles in this special issue

Leading on from the previous short discussion, the chosen articles that make up this special issue touch on each of the previous points and epitomise the breadth and diversity of contemporary spatial humanities research. They embody the variation in research interests, with a temporal scale ranging from the early modern through to the twenty-first century and projects focusing on Europe, the Americas and beyond. Some are building 'deep maps' (Bodenhamer et al., 2015), historical GIS (HGIS) and other spatial tools, others are applying existing techniques and methods but pushing known boundaries. Overall, the articles have three common goals: (i) to carry out robust historical research using what is frequently unstructured and undigitised historical source material; (ii) to use the spatial as a core component of enquiry and; (iii) to develop and/or use digital tools, methods and datasets to answer key research questions.

Within this, the articles fall into two central categories. The first are those that are actively developing and building Historical Geographic Information Systems (HGIS) as a core component of their research. The second are those that are using methods of spatial enquiry to investigate textual data, be it historic, modern and/or literary in nature. Notably, each article introduces new and impressive SMTDs and showcase the ability to place all kinds of resources into a workable framework for analysis, core to the character of spatial humanities research (Terpstra & Rose, 2016).

Beginning with the first category, HGIS is still a growing methodology in historical and geographical research, although now frequently referred to under the DH umbrella. Devos

¹⁴ <https://programminghistorian.org/> Tutorials are created by a mix of archivists, librarians and academics. They vary in the level of difficulty.

et al. present the innovative STREAM-project (Ghent University and Vrije Universiteit Brussel) which has developed a much awaited spatio-temporal infrastructure for early modern data, specifically, an early modern Brabant and Flanders Historical Geographic Information System (HGIS). The creation of the system and vast dataset serves to highlight the earlier discussion on access to historic datasets for research, something which this project tackles with strength, not least because of the varied datasets it includes: the STREAM model contains local level data on early modern society including territory, transport, demography, agriculture, industry and trade, data which the team has valiantly sourced and in some cases digitised as part of the on-going project. The project therefore promises not only a new HGIS of early modern data but methodological innovation that will assist with the longevity of STREAM and will extend interest beyond the project's spatial and temporal context. Schindling and Harris (West Virginia) continue the issue's focus on methodology and HGIS but move towards the integration of textual sources that link source materials related to people, places and events. In common with other papers here, there is a very real focus on the use of historical source material, but the ingenuity and uniqueness lies in the method and the developing technology which includes a mobile application for collecting and adding data in the field and the ability to query and edit the dataset concurrently and in real time, a model that will no doubt be profoundly useful to many archival researchers. Stangl (University of Graz, Austria) transports us to Latin America at the end of the colonial period (eighteenth and early nineteenth century) with a historical and web GIS. Here, the author uses historical data to reconstruct colonial rule as seen through populated places, and various entities such as political and ecclesiastical divisions, territories and administrative boundaries. The need for such a system again reflects common complications mentioned by other papers in this issue, and more generally, the availability of comprehensive historical datasets for research. Wisely, the author uses a grading system for the source material, prioritising primary information gathered from the period under research rather than source material reflecting on the time under study.

Taylor et al. (Lancaster University) herald the second theme in this special issue, textual analysis. They tackle the methods of 'reading' text through the analysis of a textual corpora containing eighty key pieces of literature related to the English Lake District (dating from the seventeenth through to early twentieth century). Uniquely, this textual exploration focuses on historical soundscape and in doing so provides a detailed explanation of how the more traditional and computationally driven methods of textual analysis might be combined in the form of Geographical Text Analysis (GTA). The method clearly describes the complex weave of processes and techniques necessary to digitise literary text effectively and how we can analyse these data through corpus linguistics. The article highlights the difficulties in geoparsing datasets and points to the lack of complete historical gazetteers. Notably, the spatial analysis component of the article combines textual data with various forms of statistical analysis and quantitative datasets (such as Digital Terrain Models), and final visualisation of the data in cartographic form, shows how the techniques devised by this team provide a new voice for not only soundscape studies but also the digital and spatial humanities. The authors clearly highlight the importance of incorporating close reading with what are largely automated, digital and distant reading procedures: to 'read' a text

effectively the researcher must do so at varying distances and scales. Staying with the trend of mapping place in literature, Lopez-Sandez (University of Santiago de Compostela) writes of another interdisciplinary project made up of literary scholars, geographers and cartographers who have created databases from two sets of written corpora; one historic and one modern, to compare historic perception of place in Compostela with the twenty-first century city experience. The author justifies the use of manual reading, transcription and extraction of placenames in the text speaking to the nuance that they believe more difficult to achieve through automated processes. This differs from the combined methods in the paper by Taylor et. al but also highlights that one method is not always applicable to every project. The author does, however, highlight that to go further (say, analysing emotion in the corpora) they must employ automated processes such as collocation using existing software packages. Lopez-Sandez points to differences between the social use of space as recorded in the historic corpora and the modern student texts. For example, the lack of interest current students of the university has in pilgrimage, religion and the Camino and the differing global imaginary in both the historic and modern corpora. The final article shows that through spatial technologies we can now investigate historic texts on a scale not previously possible. Porter et al. (Queen's University Belfast, the University of Liverpool and Lancaster University) apply Geographical Text Analysis (GTA) to investigate space and time across millions of words extracted from one British nineteenth-century newspaper. In this method-based paper, the authors push the known boundaries of GTA to test the techniques and shed light on how a newspaper discussed health in the population of Britain. The methods are key to this paper in that they show strong promise for porting to other topics and literary genres as well as illustrating the sheer size of texts that can now be analysed using semi-automated processes.

The articles show the intrinsic breadth and interdisciplinarity of the spatial humanities. Here, we have geographers, historians, linguists, literary historians, archaeologists and computer scientists working together towards a common goal and in doing so expose the determination of the contributors to conceive of and apply solutions to key obstacles inherent in digital research.

5. Conclusions

This corpus of spatially focused articles reaffirms that spatial humanities research is a flourishing field with the interdisciplinary and collaborative research at its core. Each article showcases our continued fascination with place and space and through innovative SDTM heralds a promising future for spatial research. Equally, we are witness to the ongoing complexity of spatial research. Through this issue are introduced several new and complex SMTDs, each built with a specific purpose in mind, but with the prospect of making substantial contributions to not only the author's research fields but to the broader spatial community. The articles also highlight that working in the realm of the spatial humanities is not a solely digital pursuit. Scholars must be multi-talented and interdisciplinary in their approach to research. They should not only be willing (and able) to search archives, understand census returns, grasp translation and grapple with transcription, but also have

the necessary digital skills to record and manipulate this information (or the inclination to learn), so it might make a meaningful contribution to knowledge.

As we move forward, in reading the articles we should consider three key elements to spatial humanities research: (i) how the encouragement of openness, sharing and accessibility of SMTDs would benefit the spatial humanities community;; (ii) acknowledge that more accessible and tailored education is needed to enable new and existing scholars to further their spatial research and actively contribute to knowledge and; (iii) how can you, as an individual or as part of a larger team, help facilitate this?

Ultimately, these articles are symbols of the continued success of digital and spatial research to ask AND answer key questions that add to narratives of time and space. The variation in research interest and background, the tenacity and the innovation of spatial humanists today, is clear and continues to progress.

References

- Berube, M. & Ruth, J. (2015) *The Humanities, Higher Education, and Academic Freedom: Three Necessary Arguments*. Houndsmills, Basingstoke, Hampshire: Palgrave Macmillan.
- Bodenhamer, D.J., Corrigan, J. & Harris, T.M. (2015) *Deep Maps and Spatial Narratives*. Bloomington & Indianapolis: Indiana University Press.
- Bodenhamer, D.J., Corrigan, J. & Harris, T.M. (2010) *The Spatial Humanities: GIS and the Future of Humanities Scholarship*. Bloomington & Indianapolis: Indiana University Press.
- British Library Digital Scholarship <https://www.bl.uk/subjects/digital-scholarship> [Accessed 04/05/2018].
- Clematide, S., Furrer, L. & Volk, M. (2016) Crowdsourcing an OCR Gold Standard for a German and French Heritage Corpus. In *Proceedings of the Tenth International Conference on Language Resources and Evaluation (LREC 2016)*, Portoroz, Slovenia, 23 May 2016 – 28 May 2016: 975-982.
- Dabbish, L., Stuart, C., Tsay, J. and Herbsleb, J. (2012) Social coding in GitHub: transparency and collaboration in an open software repository, In *Proceedings of the ACM 2012 conference on Computer Supported Cooperative Work*: 1277-1286.
- David, B & Wilson, M. (2002) *Inscribed Landscapes: Marking and Making Place*. Honolulu: University of Hawaii Press.
- Dunn, S. (2016) Praxes of “The Human” and “The Digital”: Spatial Humanities and the Digitization of Place, *GeoHumanities*, Vol. 3 (1): 88-107.
- Graham, L. (2017) Applied Media Studies and Digital Humanities: Technology, Textuality, Methodology. In Ostherr, K. (ed.) *Applied Media Studies: Theory and Practice*. New York: Routledge.
- Gregory, I.N. & Geddes, A. (2014) *Toward Spatial Humanities: Historical GIS & Spatial History*. Bloomington & Indianapolis: Indiana University Press.

- Jay, P. (2014) *The Humanities "Crisis" and the Future of Literary Studies*. Houndsmills, Basingstoke, Hampshire: Palgrave Macmillan.
- Kalliamvakou, E., Gousios, G., Blincoe, K., Singer, L., German, D.M. & Damian, D. (2014) The promises and perils of mining GitHub. In *Proceedings of the 11th Working Conference on Mining Software Repositories*: 92-101.
- King, E. (2008) Digitisation of Newspapers at the British Library, *The Serials Librarian*, Vol. 49 (1-2): 165-181.
- Kirsch, A. (2010) *Technology is Taking Over the English Departments*. Available online: <https://newrepublic.com/article/117428/limits-digital-humanities-adam-kirsch> [Accessed 04/05/2018].
- Lee, JG & Kang, M. (2015) Geospatial Big Data: Challenges and Opportunities, *Big Data Research*, Vol 2 (2): 74-81.
- Schiuma, G. & Carlucci, D. (2018) *Big Data in the Arts and Humanities: Theory and Practice*. Florida: CRC Press.
- Songnian, Li, Dragicevic, S., Castro, F.A., Sester, M., Winter, S., Coltekin, A., Pettit, C., Jiang, B., Haworth, J., Stein, A & Cheng, T. (2016) Geospatial big data handling theory and methods: A review and research challenges, *ISPRS Journal of Photogrammetry and Remote Sensing*, Volume 115: 119-133.
- Terpstra, N. & Rose, C. (eds) (2016) *Mapping Space, Sense, and Movement in Florence: Historical GIS and the Early Modern City*. London: Routledge.
- Terras, M., Nyhan, J. & Vanhoutte, E. (eds) (2013) *Defining Digital Humanities: A Reader*. Farnham: Ashgate.
- Waltzer, L. (2012) 'Digital Humanities and the "Ugly Stepchildren" of American Higher Education'. In Gold, M. (ed) *Debates in the Digital Humanities*. Minneapolis: University of Minnesota Press.