

EDITORIAL

# 25 Years of GISRUK

## 1 Introduction

Welcome to this special edition of the Journal of Spatial Information Science, which contains a selection of papers arising from the 25<sup>th</sup> GIS Research UK (GISRUK) conference, held at the University of Manchester 18th–21st April 2017 [3]. Manchester was one of the largest conferences in the history of the series and served to showcase cutting edge research relating to Geographical Information Science (GIS) or one of the numerous associated disciplines that are attracted to the conference each year, including Geography, Environmental Science, Ecology, Computer Science, Planning, Archaeology, and many more. This special edition presents full-length research articles that have been developed from four of the oral presentations delivered at GISRUK 2017.

GISRUK is an international conference series that has grown out of the UK's national GIS research conference, the first of which was held at The University of Keele in 1993 and was chaired by Mike Worboys. Since then, we have held the conference at venues throughout UK and Ireland, with a new chair and venue chosen to host the conference each year. The conferences attract those interested in GIS and its applications from all parts of the UK, Europe, and beyond, and provide a great deal of support to early career researchers, offering a forum in which to discuss their work as well as providing numerous workshops and career development opportunities alongside the main conference. The 25<sup>th</sup> year was one of change for GISRUK, as Bruce Gittings (University of Edinburgh) stepped down as the long-standing chair of the national steering committee and was succeeded by Duncan Whyatt (Lancaster University). I would like to take this opportunity to thank Bruce for his many years of hard work, and to wish Duncan all the best for his tenure as chair.

This edition represents the first in a new series of annual special editions celebrating the work that originates from each conference in the GISRUK series. It serves to complement and expand upon the online conference proceedings [4], which contain all of the extended abstracts that were accepted for presentation at GISRUK 2017, and which showcase the wide variety of content that GISRUK has to offer.

## 2 Special edition overview

When I came to write this editorial celebrating the 25th anniversary of GISRUK, I was reminded of a speech delivered by Mike Goodchild following the conference dinner at the 20<sup>th</sup> GISRUK, which was held in Lancaster in 2012. Goodchild's speech was later summarized in Transactions in GIS entitled "Unforeseen at GISRUK '93" [5], and offers an

insight into the ways in which the field had developed over the previous 20 years from the rare vantage point of one who has been at the forefront of the field from the very beginning. In addition to this retrospective, Goodchild also provided us with an outline of the emerging topics that could not have been foreseen 20 years earlier, all of which are now firmly on the agenda five years on, including 3D GIS, space-time GIS, and crowdsourced data.

Of particular relevance to this special edition is the increasing interest in incorporating time into GIS analysis and representation; expanding GIS to a “full four dimensions” [5]. This topic is reflected in three of the four articles presented in this edition: Adepeju et al.’s *The optimization of spatial and temporal thresholds of the Prospective Space-time scan statistical (PSTSS) hotspot method to maximize predictive accuracy* [1], Long’s *Modeling movement probabilities within heterogeneous spatial fields* [7], and Sulis et al.’s *Using mobility data as proxy for measuring urban vitality* [8]. Adepeju et al., for example, propose an optimization approach for the Prospective Space-Time Scan Statistic (PTSS), which is a predictive variant of the Space Time Scan Statistic (STSS), one of the most common techniques for detecting clusters in geographical phenomena (crime in this case) [1]. The article critiques existing approaches to PSTSS by identifying the lack of justification for both the spatial ( $K$ ) and temporal ( $T$ ) bandwidths used in the analysis, both of which have a substantial impact upon the results. Their optimization approach is therefore presented as an alternative, whereby the  $K$  and  $T$  threshold values can be determined by establishing the value that returns the greatest *mean hit rate* (a simple measure of accuracy). The sensitivity of the analysis to each of these parameters is examined and the benefits of this novel approach are illustrated through a case study set in South Chicago.

Long’s article *Modeling movement probabilities within heterogeneous spatial fields* [7] also focuses upon improving the way in which we deal with time geographies, this time through the formulation of a model of field-based space-time geography that may be used in order to probabilistically model movement opportunities based upon known origins and destinations, with a particular focus upon applications in wildlife tracking. This new approach uses cost-path analysis in order to determine the most probable path between known points, and the results are compared to existing approaches such as Brownian bridges (the dominant method in wildlife tracking) and time-geographic kernel density estimation. The benefits of Long’s field-based approach are illustrated using three synthetic datasets, two of which model archetypal corridor and barrier features and one a more “realistic” heterogeneous environment. The key benefit of the intended approach is that the use of a cost surface permits the characterization of underlying factors that may impact upon movement opportunities, providing a substantial advantage over the other two methods.

The third spatio-temporal article in this edition is presented by Sulis et al.’s *Using mobility data as proxy for measuring urban vitality* [8], which presents a new approach to modeling urban dynamics. Goodchild attributed the growing interest in time in GIScience in part to the abundance of real-time spatial data that is becoming available from a variety of sources [5], and it is this type of dataset that is employed by the authors to examine spatio-temporal variations of urban flows in order to characterize the nature of places in London. In order to achieve this, Sulis et al. present a computational approach to the concept of “urban vitality” as introduced by Jane Jacobs in her 1961 book “The life and death of great American cities” [6]. In doing so, the authors seek to quantitatively characterize attributes such as the vibrancy and diversity of places using mobility data

from a variety of sources including “smart card” data from London public transport and geotagged social media data from Twitter. These data sets are then used in order to model and validate weekday and weekend vitality at an hourly resolution for a selection of locations on the London transport network, permitting a quantitative evaluation of urban dynamics that can afford researchers a deeper understanding of phenomena related to human mobility and spatial interaction in cities.

Goodchild also identified that GIScience has found applications across the entire range of human experience, and that by 2012 the field was seeing an increasing volume of applied research [5]. This is also a pattern that has continued in the years since 2012, with GIS research now addressing more application areas than ever before. The fourth paper in this special edition offers such an application of GIS, demonstrating an elegant solution to the exploration of voter preference using local spatial statistics. Beecham et al.’s *Locally-varying explanations behind the United Kingdom’s vote to leave the European Union* [2] applies local statistical models to understanding spatial variations in how a number of demographic variables explain voter preference in the 2016 UK referendum on membership of the European Union. Although other studies have previously examined the impact of demographic variables upon the EU referendum, the novelty here is the application of local modeling techniques. This allows for the possibility that, whilst certain variables impacted voter preference across the whole country, the impact of other variables have a greater degree of local specificity, permitting a much deeper understanding of voting patterns and influences to be achieved.

### 3 Conclusion

Goodchild closed his speech with a description of several “sources of satisfaction” that he had found in his 40-year career in GIScience. Of the seven that he presents, number six that stands out most prominently to me: “I have found great satisfaction in participating in the transformation of GIS from a minor and highly specialized computer application into a full-bodied science, with principles and theories that can form a solid foundation for intellectual exploration and practical development” [5]. Researchers in rapidly developing fields such as GIS rely heavily upon conferences in order to be able to showcase our latest work, develop new ideas, and keep the discipline moving forward. It is through the pioneering work presented at GISRUK and similar conferences around the world over the last quarter-century that we are able to exist today as a fully-fledged, fast moving and exciting discipline. Only five years after Goodchild’s list, there are newly emerging areas that featured prominently in GISRUK 2017 but which were not represented in 2012: big data, machine learning, and the Internet of Things to name but a few. The continued success of the GISRUK conference series serves to demonstrate the growing importance of our field to research of all kinds, four of which are represented in this special edition. It is, therefore, with great anticipation that we await the developments of the next 25 years of GISRUK.

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