Landscape and Urban Planning xxx (2015) xxx–xxx

Contents lists available at ScienceDirect

Landscape and Urban Planning

journal homepage: www.elsevier.com/locate/landurbplan

Research Paper

Social media and the city: Rethinking urban socio-spatial inequality using user-generated geographic information

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HIGHLIGHTS

- Analyzes two years of geotagged tweets from Louisville, Kentucky.
- Explores popular spatial imaginaries of the '9th Street Divide'.
- Argues for greater linkages between socio-spatial theory and big data research.
- Develops a novel conceptual and methodological frame for using social media data.

ARTICLE INFO

Article history:
Available online xxx

Keywords:
Big data
Critical GIS
Mixed methods
Socio-spatial theory
Urban planning

ABSTRACT

Big data is increasingly seen as a way of providing a more 'scientific' approach to the understanding and management of cities. But most geographic analyses of geotagged social media data have failed to mobilize a sufficiently complex understanding of socio-spatial relations. By combining the conceptual approach of relational socio-spatial theory with the methods of critical GIScience, this paper explores the spatial imaginaries and processes of segregation and mobility at play in the notion of the '9th Street Divide' in Louisville, Kentucky. Through a more context-sensitive analysis of this data, this paper argues against this popular spatial imaginary and the notion that the Louisville's West End is somehow separate and apart from the rest of the city. By analyzing the everyday activity spaces of different groups of Louisvillians through geotagged Twitter data, we instead argue for an understanding of these neighborhoods as fluid, porous and actively produced, rather than as rigid, static or fixed. Ultimately, this paper is meant to provide a conceptual and methodological framework for the analysis of social media data that is more attentive to the multiplicity of socio-spatial relations embodied in such data.

1. Introduction

Attempts to make the ideas and practices of urban planning more 'scientific' through the application of new technologies have been persistent over the course of the last century (Fairfield, 1994; Ford, 1913; LeGates, Tate, & Kingston, 2009; Light, 2003). But as new sources of digital data – whether collected from mobile phones, social media feeds, sensors embedded in the built environment or any number of other sources – are increasingly able to be combined and cross-referenced to produce 'big data', there has been a revival of interest in mobilizing this data toward the end of a supposedly more holistic 'science of cities' (Bettencourt & West, 2010; Batty, 2012). The breadth of available data sources has expanded rapidly, allowing researchers to end their dependence upon official statistics on demographics, economic activity, traffic, and any number of other urban indicators.

But as these new data sources and new ways of approaching social science research have become more prominent, they have also faced increasing amounts of criticism. This is due in no small part to the hubris of big data advocates, as exemplified in Anderson's (2008) now-infamous declaration of the 'end of theory'. And while claims to greater objectivity, neutrality, and accuracy are rampant among proponents of big data, boyd and Crawford (2012) astutely argue that these data are always the result of conscious, subjective decisions on the part of researchers, and are the result of inherently social processes. Indeed, it is important to keep in mind that in spite of the celebratory discourses around big data, many of these ideas and techniques have been around for considerable amounts of time (Barnes, 2013; Graham & Shelton, 2013). Wyly (2014), however, positions big data as the driver of a 'new

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http://dx.doi.org/10.1016/j.landurbplan.2015.02.020
0169-2046/

quantitative revolution' in geography, a largely reductionist effort enabled by processes of neoliberalization which threaten the kind of situated research which geographers have become experts at producing. In describing what he sees as "the speedy pseudopositivism of tweet-space analysis", Wyly argues that "big data give us a quickly expanding, shallow view of the vast horizontal landscape of the desert of the present real, with each new technological advance accomplishing new kinds of devalorization of past generations of human knowledge" (Wyly, 2014:28).

While we are sympathetic to such critiques of big data, we also recognize that these traits are not inherent in the data themselves, nor in the analysis of such data. The use of big datasets is not necessarily reductionist or ahistorical; these are, in fact, to echo Wyly's (2009) earlier analysis of quantification in geography, contingent circumstances. Indeed, we believe that big data can be quite easily fit into more critical-quantitative approaches to urban geography and planning (cf. Barnes, 2009; Schwanen & Kwan, 2009; Sheppard, 2001; Wyly, 2011). Though issues around the over-valorization of this kind of data remain, including how they might displace other forms of official statistical knowledge, we believe that there is also significant potential. For example, the finer spatial and temporal scale of these kinds of datasets provides a way to ask different kinds of questions than is possible with, for instance, census data, which is often several years old by the time of its release, and is generally associated only with one's place of residence, and then aggregated to more-or-less arbitrary spatial units. As such, this paper highlights the potential in mobilizing big data sources for understanding urban socio-spatial processes, so long as such research is also explicit in its engagement with the appropriate conceptual and methodological frameworks, and built on a critical and contextualized understanding of the underlying data. When coupled with exactly the kind of historical and geographical context that Wyly sees missing from many big data analyses, we argue that these approaches can provide useful insight for urban planning and geographical research.

To this end, we use a dataset of geotagged tweets from Louisville, Kentucky to explore longstanding problems of socio-spatial inequality in the city. Louisville represents an interesting case study for a number of reasons: first, Louisville is something of an 'ordinary' city, especially when it comes to its reflection in these kinds of big data sources. Louisville is fairly average in the density of its social media footprint, meaning that the methods demonstrated in this paper are likely to be applicable to other localities, whereas a study of a New York City or another global outlier would beg the question of relevance for studying metropolitan areas more broadly. Second, Louisville is an increasingly prominent player in the landscape of data-driven urban governance, with Mayor Greg Fischer receiving national and international recognition for various policy initiatives aimed at making data, including data from social media platforms, a key driver in municipal policy development and implementation (Carroll, 2013; Fischer, 2012; Goldsmith, 2013; Louisville Metro Government, 2012; Reno-Weber & Niblock, 2013; Shelton, Zook, & Wiig, 2015). Third and finally, Louisville is a city with intense social inequalities and a keen appreciation how they are manifest spatially. This is seen most clearly in the notion of the "9th Street Divide", which signifies the material inequalities and imaginative distance that separates the city's predominantly poor and African–American neighborhoods in the West End from more affluent and predominantly white areas throughout the rest of the city (Crutcher, 2013).

As such, this study provides an opportunity to show how big data can be mobilized to produce alternative understandings of cities and urban processes. It is, however, important to acknowledge that our choice of case study is not accidental, and that the insights gleaned from our analysis rely on our own local knowledge and understandings of the city's social dynamics, taken from our experiences living in and conducting a variety of research projects in Louisville. Our choice to highlight this is, however, much more than simply an acknowledgement of our own situatedness and biases; it is also an explicit attempt to counter the notion that meaningful insights about cities can be gleaned simply by 'crunching the numbers'. Understanding urban socio-spatial processes requires more than massive amounts of data and clever software algorithms; it also necessitates grounded understandings of local history and culture, and the broader political-economic forces at play. Thus, our goal in this paper is to highlight the usefulness of combining the conceptual approaches of critical socio-spatial theory with new methodological approaches being utilized to understand big social media data.

2. Information technologies and the contemporary urban condition

Though the use of new sources of data and other new technologies are at the center of many contemporary urban policy initiatives, information technologies have long played a prominent role in the way that urban spaces are conceived, planned and enacted. This is especially true of mapping and geographic information technologies, whether in the form of hand-drawn maps or Google Maps mashups used to display data interactively on the web (Schein, 1993; Söderström, 1996). And while these technologies have evolved from early computer models and planning support systems toward more participatory and web-based approaches to GIS, the nascent 'smart cities' movement has begun to shift these technologies from desktop computers toward being embedded in the fabric of the city itself, allowing for a continuous collection and analysis of heterogeneous data streams meant to make urban systems operate more rationally and efficiently (Greenfield, 2013; Kitchin, 2014).

2.1. Urban analysis in the era of Web 2.0 and big data

One of the most powerful ways that information technology is shaping urban life in the 21st century is through the production of digital content – text, photos, videos, etc. – tied to particular locations on the earth's surface. While the act of creating a geotagged tweet, posting a photo to Instagram, reviewing a restaurant on Yelp or 'checking in' to your favorite park on Foursquare may seem relatively mundane, these platforms and data sources are allowing for new ways of interacting with, and studying, cities (Arribas-Bel, 2014). As both Goodchild (2007, 2009) and Graham (2010) have argued, these platforms of data production offer unprecedented possibilities for codifying local knowledge about otherwise neglected places and making it widely accessible, even opening up the possibility for non-positivist epistemologies of mapping (Elwood & Leszczynski, 2013; Warf & Sui, 2010). These platforms not only allow for such local knowledge to be transferred to or accessed from distant places, but they also allow citizens in close proximity to one another to interact in a place-specific way through digital networks (Hardey, 2007).

While this data can be incredibly important for helping tourists navigate through unknown places using their smartphones and a combination of location-based applications, the significance of this data for the purposes of this paper is our capability of collecting, aggregating, mapping and analyzing this data to understand how these digital data shadows are intimately intermingled with offline, material geographies of everyday life. Geotagged social media data has been used to research topics ranging from linguistic and religious differences (Graham & Zook, 2013; Shelton, Zook, & Graham, 2012; Wall & Kirdnark, 2012; Watkins, 2012), to differences in the

Please cite this article in press as: Shelton, T., et al. Social media and the city: Rethinking urban socio-spatial inequality using user-generated geographic information. *Landscape Urban Plan.* (2015), http://dx.doi.org/10.1016/j.landurbplan.2015.02.020