The mapping and spatial analysis of social media data can show the dynamics of activities in urban space, such as protest events. This work focuses on the spatial relationship between the density of geo-tagged tweets and a large anti-government protest in London on 20 June 2015. The tweets are aggregated to hexagonal grid cells to visualize activity density in different Central London areas. The results of the mapping illustrate very high densities at the beginning and endpoints of the protest (the Bank of England and Parliament Square). Additionally, there are high tweet densities in the West End and Bank than in other neighbouring areas.

Keywords: Twitter; density; urban form; protest; 3D visualization; GIS; mapping; big data

It is widely accepted that social media has influenced the dynamics of political events in urban areas (Gonzalez-Bailon & Wang, 2013). In particular, Twitter has been regarded as the main tool for protesters to share information and broadcast news in situ since the Arab Spring in 2011 (Gerbaudo, 2012). However, there has been limited research to identify the practical relationships between protests and social media activity on protest days. Geo-tagged tweets that show Twitter users’ location are an effective resource to analyse the linkage between protests and communications. Mapping and visualization in three dimensions (3D) identify the spatial densities and patterns of the tweets, and provide a comprehensive analysis of the geography of activities during the protest march.

Method

There was a very large anti-government protest in London on 20 June 2015 that called for ‘End Austerity Now’ against public service cuts. An estimated 250,000 people attended the protest and marched from the Bank of England to Parliament Square. On that day, a total of 12,201 geo-tagged tweets were collected from London by the crowdsourcing tool Big Data Tool Kit (BDTK).

Based on building height data using the Ordnance Survey (OS) Master Map Topography Layer, a 6.0 × 3.5 km area of Central London where the protest took place was modelled in 3D. A 200-m edge hexagon grid was used to aggregate the number of geo-tagged tweets. The cells are extruded in 3D following the aggregate number of

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tweets to represent the relationship between area and density. The hexagon cells are then classified into six groups and given different colours to clarify the level of spatial density. As the final process, the protest march is simulated from the start point to the endpoint along the its route to understand the relationship of the protest and the tweets’ activity.

Several software programs were used to create this visualization. ArcGIS was the main tool to map the tweets and calculate the number of tweets in the hexagon grid. CityEngine and SketchUp were used to create the 3D London environment and the 3D hexagon grid. Finally, 3ds Max was used to combine, render and animate the visualization.

Results

Figure 1 shows that the start to endpoints of the protest mark the highest level of activity density. The cells for the Bank of England, the start point of the march, and Parliament Square, the endpoint of the march, are highlighted by Level 6, which is the highest level of tweet density. Furthermore, the timing of the tweets in these cell peaks is matched with the start and finish times of the protest (See Figure 2).

There are two high-density areas in Central London: the West End and Bank. A total of 75% of the areas of Levels 5 and 6 density are found in these two areas. In particular, the West End, including Oxford Circus and Piccadilly Circus, shows higher densities than other areas, with 80 of the Level 6 cells.

This study has shown the relationship between Twitter activity and the geography of the ‘End Austerity Now’ protest march in London. The next stage of the research will
be to analyse the contents of social media in relation to the networks of actors in urban space.

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Disclosure statement
No potential conflict of interest was reported by the author.

Note
1. BDTK is a data-collection tool developed by Steven Gray at Centre for Advanced Spatial Analysis, University College London (https://bigdatatoolkit.org/).

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Figure 2. Simulation images of the ‘End Austerity Now’ protest day in Central London using a 3D Twitter density grid.