Exploring the usefulness of transport Spatial Tweets from big events: A case study of 2014 Commonwealth Games

Godwin Yeboah, Caitlin Cottrill, Paul E. Gault, John Nelson, Jillian Anable, David Corsar

University of Aberdeen, Aberdeen AB24 3UH, Scotland, United Kingdom

CENTRE FOR *Transport Research*

UNIVERSITY OF ABERDEEN

dot.rural

Background

The future of GIS within the context of Big Data from social media platforms, such as Twitter, potentially depends on the possibility to capture, analyse, and make sense of the spatially referenced social media data such as Tweets. In this project, the broader aim is to study how people look for and respond to information on travel disruption related to large events, taking into account questions related to **trust, timeliness, and information diffusion** through a social network (Twitter). As part of the project, this poster explores sentiments from collected Tweets with spatial components.

Study Approach

This poster explores a sub-set of spatially referenced Tweets collected as part of a larger overall study with the aim of understanding the usefulness or non-usefulness of the Tweets. A Twitter Monitor Infrastructure (**TMI**) was developed to capture the Tweets followed by descriptive statistics together with GeoSentiment analysis.
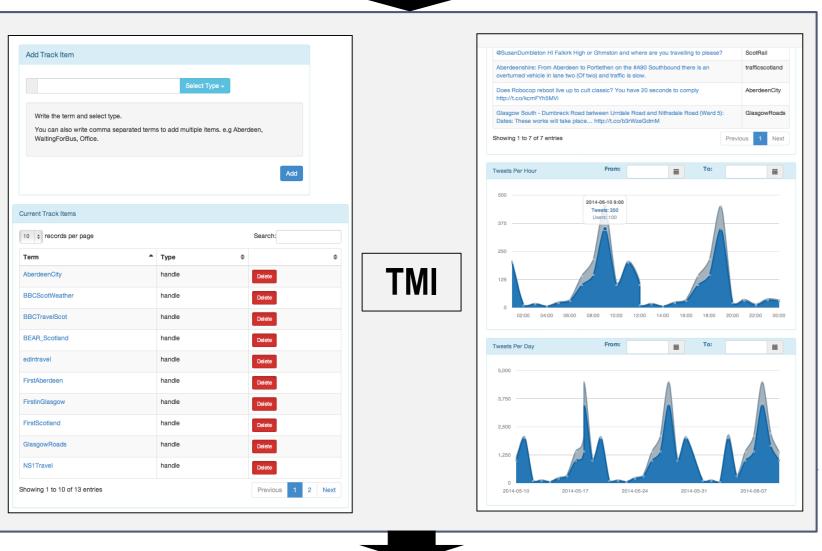
Study components

To research the above broader aim, we have developed a series of tasks designed to assess trust and diffusion of information across a network, using a combination of content and social network analysis.

In this poster, we used spatial information where available to analyse and visualise:

- negative sentiments (as sad spots); and,
- positive sentiments (as happy spots)

locally (i.e. host citywide) and globally (worldwide).

Methodological approach

Content analysis of literature on the event (e.g. event related websites, reports, etc. on Glasgow Commonwealth Games 2014) and GeoSentiment analysis

'Official' Hashtags
(e.g. #Glasgow2014, #X7Express, #TSIncident)

News | Policing | Traffic
Weather | Other

Mentioned by 'Official' source
(e.g. @Glasgow2014, @firstinglasgow, @trafficscotland)

Mentioned by 'Unofficial' source
(i.e. personal or corporate Twitter account holders)

Modal Information
(tweets related to public transport, traffic, taxis, flights, etc.)

TMI

Descriptive Statistics, GeoSentiment Analysis and Visualisation

Components of the Twitter network

Twitter is a directed social network in which the 'Tweeter' functions as a node and relation (e.g. follow) serve as edges.
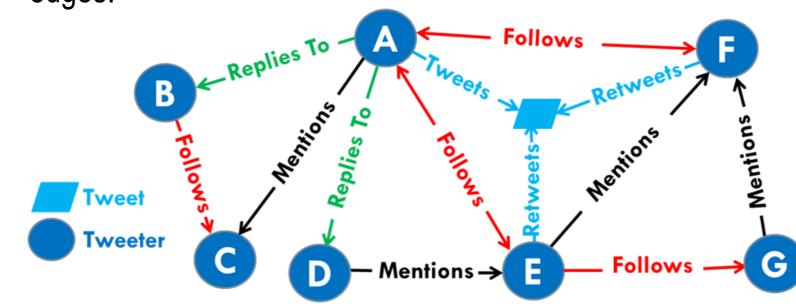
Figure 1: Diagram showing Twitter network (source: Authors)

In the network above, for example, Tweeter A mutually follows Tweeters E and F, is followed by Tweeter E, mentions Tweeter C and replies to Tweets from Tweeters B and D.

Information shared by A will diffuse through the network of nodes depending upon who follows whom, the content of the Tweet, and how it is shared, as shown in the Figure 1.

The Context of the Twitterverse

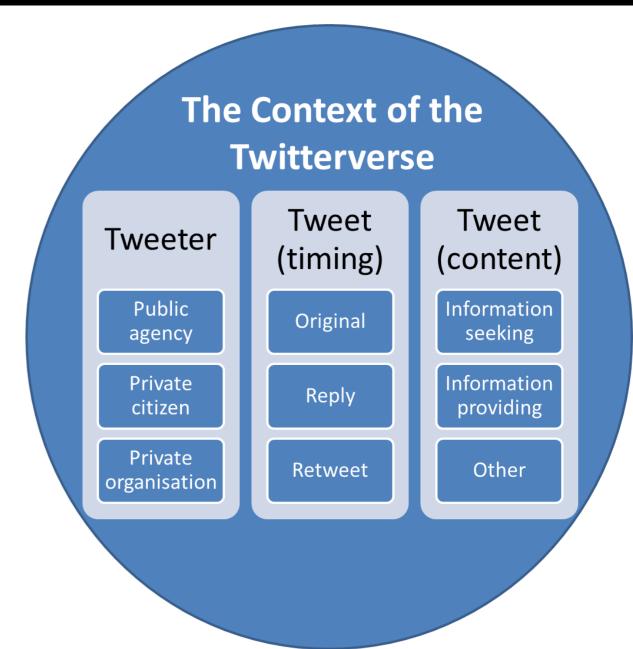| Tweeter	Tweet (timing)	Tweet (content)
Public agency	Original	Information seeking
Private citizen	Reply	Information providing
Private organisation	Retweet	Other

Figure 2: Provides the basic structure of information that will be studied in the overall research project. In this poster, we examine only the sentiments of Tweeters allowing spatially enabled Tweets.

Descriptive Statistics

Study Event: 2014 Glasgow Commonwealth Games

- An international sporting event with participating athletes from the Commonwealth Nations (an intergovernmental organisation made up of 53 member states that mostly constituted territories of the former British Empire)
- Event period: 23rd June to 3rd August 2014;
- 160,000 spectators estimated on peak days;
- 6,500 athletes and officials;
- 9 venues in Glasgow, Edinburgh, and Carnoustie (Barry Buddon Shooting Range);
- 260 event sessions over eleven consecutive days;

Corpus of Tweets
(23rd June - 3rd August 2014)

A) Daily average (all Tweets): 757, 002
B) Daily average (spatial Tweets): 19, 051
C) Overall total (all Tweets): 9, 084, 024
D) Overall total (spatial Tweets): 228,612 (2.52% of C)

GeoSentiment Analysis and Visualisation
Spatial locations exhibiting positive (happy), negative (sad) and neutral "emotional" spots

Happy spots: Tweets containing positive emotions such as happiness, amusement and joy. The following emoticons were used: ":)", ":-)", "=)", ":D"

Sad spots: Tweets containing negative emotions, such as sadness, anger or disappointment. The following emoticons were used: ":-(", ":(", "=(", ";("

Neutral spots: Tweets containing no expression of positive and negative emotions. No emoticons were used.

Figure 3: Spatial locations of happy spots (Yellow) & sad spots (Red) with OpenStreetMap as basemap (Glasgow boundary in black)

Figure 4: Spatial locations of happy spots and sad spots with OpenStreetMap as basemap (World perspective)

1.95% Happy spot Tweets | 0.65% Sad spot Tweets
Spatial Tweets

Note: We are cautious about how the data are presented here as the Tweets were obtained as part of the collection process, but that does not mean that they were actually related to the games. Future work will refine the Tweets.

Concluding remarks and future work

The approach adopted for the GeoSentiment analysis provided a useful way of exploring transport related spatial Tweets from the big event – 2014 Glasgow Commonwealth Games. The limitation we find is that the approach uses only emoticons (causing over sampling) as a means for mining sentiments from the Tweets and therefore suggests future work to consider other alternatives for mining happy and sad spots from spatial Tweets. Our findings show that spatial Tweets is about 3% of captured Tweets and such Tweets are from relatively few twitter users suggesting that most twitter users are unwilling to disclose where they Tweet or perhaps do not border enabling location feature in their default setting. We suggest future research to investigate data privacy issues of spatial Tweets. Another work with the collected data is to examine the types of twitter users interested in transport event information during big events along with types of transport-related information included in Tweets from big events like this case study (Cottrill et al., 2015). Also examining views from transport operators.

Selected Reference

- Commonwealth, 2014. The Commonwealth - About us [WWW Document]. URL http://thecommonwealth.org/about-us (accessed 10.26.14).
- Cottrill, C.D., Yeboah, G., Gault, P., Nelson, J., Anable, J., Budd, T., 2015. Tweeting transport: Examining the use of Twitter in transport events. In: UTSG 2015 Conference. London, UK.
- DeLyser, D., Sui, D., 2014. Crossing the qualitative-quantitative chasm III: Enduring methods, open geography, participatory research, and the fourth paradigm Prog. Hum. Geogr. 38 (2), 294–307.
- GetReadyGlasgow, 2014. Travel Advice for Business (February).
- Pak, A., Paroubek, P., 2010. Twitter as a Corpus for Sentiment Analysis and Opinion Mining 1320–1326.

Contact

Professor John Nelson, Chair in Transport Studies
Director, Centre for Transport Research (CTR)
Co-Director, dot.rural
Tel:+44 (0)1224 272354/274077 / Email: j.d.nelson@abdn.ac.uk

Acknowledgement