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## The potential of social media in delivering transport policy goals



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### ABSTRACT

Information flow plays a central role in the development of transport policy, transport planning and the effective operation of the transport system. The recent upsurge in web enabled and pervasive technologies offer the opportunity of a new route for dynamic information flow that captures the views, needs and experiences of the travelling public in a timely and direct fashion through social media text posts. To date there is little published research, however, on how to realize this opportunity for the sector by capturing and analysing the text data.

This paper provides an overview of the different categories of social media, the characteristics of its content and how these characteristics are reflected in transport-related posts. The research described in this paper includes a formulation of the goals for harvesting transport-related information from social media, the hypotheses to be tested to demonstrate that such information can provide valuable input to transport policy development or delivery and the challenges this involves.

A hierarchical approach for categorizing transport-related information harvested from social media is presented. An explanatory study was designed, based on the understanding of the nature of social media content, the goals in harvesting it for transport planning and management purposes and existing text mining techniques. An exploratory case study is used to illustrate the process based on Twitter posts associated with particular UK sporting fixtures (i.e. football matches).

The results demonstrate both the volume and pertinence of the information obtained. Whilst text-mining techniques have been applied in a number of other sectors (notably entertainment, business and the political arena), the use of information in the transport sector has some unique features that stem from both day-to-day operational practices and the longer term decision making processes surrounding the transport system – hence the significance and novelty of the results reported here. Many challenges in refining the methodology and techniques remain for future research, however the outcomes presented here are of relevance to a wide range of stakeholders in the transport and text mining fields.

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### 1. Introduction

The cultural revolution of social media is the first of the 21st century (DuBose, 2011) and a central pillar of the new Information Age (Castells, 2011). User-generated messages now play an important role across politics, business and entertainment and it would be a natural extension of this phenomenon if social media were to also have a role within the transport sector. In the same way that social media content can reveal people's political tendencies it may also reveal people's preferences regarding mobility decisions.

The important role that information plays in transport decision making ranges from understanding choices and preferences (e.g. on routes and modes) to participatory scheme evaluation (Bickerstaff and Walker, 2001). Surveys are often used to capture information such as travel times, waiting times, vehicle occupancies and perceived service quality. Combined SP-RP questionnaires may be needed with both subjective and objective measures to capture the latter (Cappelli and Nocera, 2006; Eboli and Mazzulla, 2011, 2012; Nocera, 2010, 2011). Information harvested from social media to compliment, enrich (or even to replace) traditional data may hold great value and incur lower costs. This research therefore aims to research the conjecture that harvesting social media has the potential to enhance and deliver transport policy goals. This paper also identifies the main requirements for an information harvesting methodology in the transport context, highlighting the challenges involved.

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Firstly, the definition and characteristics of social media are outlined in Section 2. The goals and challenges of harvesting and the two hypotheses to be tested are formulated in Section 3. Section 4 describes an explanatory study, whilst conclusions and discussion are in Section 5.

## 2. Definitions and existing uses of social media in transport

Many definitions of social media can be found in literature. Kaplan and Haenlein (2010) defined it as a group of internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content. Gartner Inc.<sup>1</sup> described it as an online environment where content is created, consumed, promoted, distributed, discovered or shared for purposes that are primarily related to communities and social activities, rather than functional, task-oriented objectives. Sterne (2010) proposed seven broad categories of social media: (1) *forums and messages boards* (for the submission of questions, opinions and answers), (2) *review and opinion sites* (for sharing reviews and opinions, and response to customer feedback), (3) *social networks* (enabling general interaction on several levels of privacy, for example Facebook and LinkedIn), (4) *blogging* (used to share individuals opinions or experiences and may include sophisticated or lengthy content e.g. by politicians and other public figures as semi-informal communication), (5) *micro-blogging* (characterized by short posts, e.g. Twitter), (6) *bookmarking* (allowing individuals to tag items that are of most interest to them, including dedicated content e.g. the social news website reddit<sup>2</sup>, or more general content, e.g. Stumbleupon<sup>3</sup> and (7) *media sharing* (for photos and videos e.g. YouTube and Flickr).

The contents in these new forms of social interaction are diverse, representing a large variety of interests from the users of this media. Once a topic is raised by a social media participant, typically others react and a 'conversation' may develop. The nature and depth of the conversation largely depends on the application or website providing the infrastructure for the social interaction, as reflected by the seven categories defined in Sterne (2010).

The exchange of transport-related information can be found in all forms of social media. HolloPeter.com is an example of a site focused on reviews and opinions, enabling individuals to report good and bad service in many domains (including transport) and allowing the service providers to respond. As an example, on February 12th, 2013, a traveller complained about bus drivers not stopping at one of the bus stops along the route<sup>4</sup>. Transport-related forums often focus on a specific mode of transport, such as bikeforums<sup>5</sup> (serving the community of bicycle riders) and the transport forum within Topix<sup>6</sup> that deals largely with air transport issues. Social media applications may also catalyze social networks concerned with both personal mobility and general transport issues. These communities mostly focus on a specific mode of transport, such as the Facebook open group TRAFFIC UPDATE \*\*LONDON-ESSEX-KENT\*\*<sup>7</sup>. However, whilst forums are often characterized by information that is not necessarily time-dependent, social networks mainly exploit real-time information. WAZE<sup>8</sup> is an example of a well-established application targeted towards users of private vehicles. In addition to the geo-spatial information automatically obtained from community members

(which serves as a basis to identify traffic conditions), WAZE allows users to report specific events such as an accident by clicking a predefined button (structured data) and also to use a 'chit chat' service to contribute free text (unstructured data). Real time transport-related information is also frequently exchanged through Twitter<sup>9</sup>, the wide-spread micro-blogging application, which is extremely effective for short real-time information delivery and status updates. Travellers use Twitter to report events related to the different transport modes they may be using. 'Guy tries to get away from cops screws up traffic MT @MassDOT Traffic Alert: Chelsea- Carter Street off ramp Rt 1SB Accident ramp blocked' is an example of an individual sharing information concerning private vehicles, while 'With no Central Line at Liverpool St youd think the Hammersmith/ Circle lines might be working too. Obsvs not #RAGE' is one that relates to use of the underground.

These examples provide the initial basis for the notion that content voluntarily contributed through social media by the public can potentially assist in understanding users' needs, which is a precondition for developing and implementing user-led transport services. The information may be used for example in:

- Planning and evaluation of outcomes;
- identifying unintended outcomes from policies;
- user-generated proposals on reform; and
- forecasting policy impacts on the travelling public.

Giannopoulos (2004) defines seven categories of information use in transport at a more disaggregate level, whilst Kenyon and Lyons (2003) highlight the role of traveller information in encouraging mode switch for more sustainable transport systems. Users' perceptions may not reflect the outcomes of rational planning choices, but may be influenced by sensations (Eboli and Mazzulla, 2012; Mazzulla and Forciniti, 2012). The collection of user views and perceptions is therefore essentially a commitment to evaluate differences between expected and perceived results and correct process deficiencies, rather than simply measure outcomes. The ability of social media to capture this dynamically at the time of the experience is one source of added value.

Evidence is beginning to emerge of transport suppliers and operators incorporating social media into their marketing and communications strategies. Bregman (2012) reveals that the main goals for such agencies in engaging with social media include communicating with current travellers, reaching out to potential new customers and enhancing the organizations' branding and messaging. Many agencies are still taking their first steps on this challenging path and several barriers still need to be overcome. In particular the availability of staff resources to effectively engage with the public through social media appears to be one significant barrier to harnessing the full potential. The findings by Bregman (2012) that research in this field is currently very limited suggests that research is needed to develop automatic or semi-automatic methodologies for harvesting and analysing transport-related social media information.

When considering the automatic techniques available, two main features have to be considered:

- The information available is both structured (including predefined reports sent by clicking a button or by tagging an item), and unstructured, i.e., free text.
- Social media text is often ungrammatical. It contains typographical errors, uses specialized language and lacks contextual information (Minkov et al, 2005). This applies to opinion sites and blogs but is seen extensively in micro-blogging.

<sup>1</sup> <http://www.gartner.com/it-glossary/social-media/>.

<sup>2</sup> <http://en.reddit.com/>.

<sup>3</sup> <http://www.stumbleupon.com/>.

<sup>4</sup> <http://helloworld.com/putco/complaints/>

<sup>5</sup> <http://www.bikeforums.net/forum.php>.

<sup>6</sup> <http://www.topix.com/forum/business/transportation>.

<sup>7</sup> <http://www.facebook.com/groups/369684789781652/?fref=ts>.

<sup>8</sup> <http://world.waze.com/?redirect=1>.

<sup>9</sup> <https://twitter.com/>.

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