

Geothink this Summer 2016

Geothinkers have been present at quite a few exciting events since January. Our academics were present at the American Association of Geographers (AAG) 2016 conference in San Francisco this past March. Professors and students had a good showing, with 12 Geothinkers taking part organizing sessions, presenting their research, and participating in panel discussions. Other recent events with a Geothink academic or partner presence include GO Open Data in Ontario and the Canadian Open Data Summit (CODS) in New Brunswick.

Last week, we wrapped up our second Geothink Summer Institute, at Ryerson University's School of Urban Planning, and Annual General Meeting (AGM) at the University of Toronto. This year's Summer Institute was themed around "The Value of Open Data." A full issue on both events will follow soon. For more rapid updates, please visit our website, Geothink.ca.

Thank you to our Geothink partners for participating in both the Summer Institute and AGM and making each a success. We look forward to seeing you again next year.

Peck Sangiambut
Editor



Mark Gill presenting at the "Data in action: Tracing the open data experiment" panel



Data in action: Tracing the open data experiment

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Research Profile: Dr. Robert Feick. University of Waterloo



Dr. Feick is an Associate Professor at the University of Waterloo's School of Planning

Two major themes pervade Dr. Feick's research: "public engagement from a GIS perspective...how spatial data and tools condition and, hopefully, improve public dialogue" and "methods that help us transform these new types of spatial data into information that is useful for governments and citizens." In an interview with our digital journalist for Geothink.ca, he said that he is "interested in both understanding better the characteristics of these data sources, particularly data quality, as well as the methods we can develop to extract new types of information from large scale VGI resources." This has led him to Web 2.0 GIS and the Geospatial Web 2.0 as platforms to integrating citizens planning processes. His spheres of research include: Public Participation GIS (PPGIS), Volunteered Geographic Information (VGI), geovisualisation, and spatial decision support systems (SDSS). Through an understanding of the context of unstructured or less structured data (both

in terms of language and spatial relationships), more information can be classified and more meaning extracted.

Dr. Feick's PhD student, Shanqi (Ashley) Zhang, is working on the challenges of extracting meaningful information from less structured geosocial media (through text analysis and topic modelling), to help planners understand the spatial distribution of citizen input. This project will allow for the monitoring of public opinions and help planners engage with citizens more effectively throughout various stages of the planning process. Ashley is comparing different media for citizen input (social media, newspapers, microblogs). Initially analysing Twitter data, she has been developing methods to identify topic and spatial relevance in short messages, with the aim to compare newer forms of citizen input to existing public participation tools. Find out more about Ashley's work on the [next page](#).

A Master's student, Maju Sadagopan, is also working on VGI. Looking at data from the City of Kitchener's [Interactive Trail Survey](#) of the Iron Horse Trail, Maju's project has been working to automate the attribution of spatial context in VGI. The aim is to identify the correct object to which a user's textual comment is referring to. By looking at the keywords of a VGI contribution (which may have an ambiguous meaning) and its spatial location, it may be possible to identify specific road segments or landmarks. The project will therefore contribute to improvements in spatial data accuracy in VGI.

For more information Dr. Feick, see our digital journalist's article on [Geothink.ca](#).

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Investigating new forms of spatially-enabled government-citizen interaction

By Shanqi (Ashley) Zhang



I am currently pursuing a PhD degree in Geography at the University of Waterloo. Prior to this, I completed my Master's degree at the University of Georgia with a specialization in Geomatics and Urban Studies. Here at Waterloo, in collaboration with Dr. Rob Feick, my research primarily focuses on how local governments can take advantage of digital and location-aware technologies to facilitate the collection of public opinions and enable new methods of government-citizen interaction.

During the preparation of a new light rail transit (LRT) system in the Region of Waterloo, the Regional government and local city governments of Waterloo and Kitchener held several public meetings to collect public opinion on the transit plan at different stages of the project. In attending these meetings, I recognised the importance of consulting stakeholders during development, as well as the constraints of attending meetings at specific times and locations. Inspired by the quick growth of location-based social media services and the idea that social media provide an easy and inexpensive method of communication be-

tween governments and citizens, I was interested in whether geo-referenced user-generated content may contain information about public opinions and perceptions are comparable to comments collected through traditional public participation approaches and thus could become an additional source of public opinion. However, previous studies have also suggested that the quality of social media data may vary widely and the relevance of the data to local government is often unknown. Because social media users are mostly contributing information for networking and communication purposes, much of the data may be irrelevant. In addition, geosocial media are only a small portion of social media data and vary widely in their geographic representativeness. In this regard, an understanding of the nature of the information that can be harvested from geosocial media is essential to facilitate local government adoption of geosocial media.

I took advantage of the Waterloo LRT project and used it as a case study to investigate the effectiveness of geosocial media to support public engagement, the challenges associated with using them, and to set the stage to consider local scale issues of representativeness, accuracy, and topicality. I collected Twitter data georeferenced in Waterloo and Kitchener before and during the construction of the LRT to investigate whether and what transportation-related topics are expressed by social media users. Modelling of the textual content of geosocial media revealed that geosocial media has the potential to help identify public concerns and needs re-

garding physical facilities and the quality of public services ([Figure. 1](#)). These perceptions are mostly sensations and reflections of the immediate environment thus differing from formal public participation. A comparison between information in geosocial media and information in citizen letters revealed that Tweets can better capture the dynamics of urban landscapes, as people often send messages when they are moving around the city, while citizen letters include more narratives and critical and deeper discussions on issues such as safety, urban design, policy, and more ([Figure. 2](#)). Exploration of geosocial media at different spatial and temporal scales also suggests the potential for timely public participation. One example in the case study was that one place only became related to topic "bus service" after the start of LRT construction within the area ([Figure. 3](#)).

While uneven geographic distributions of tweets are inevitable, a multi-scaled approach is able to reveal more patterns and help government identify places that are important to particular issues at particular times.

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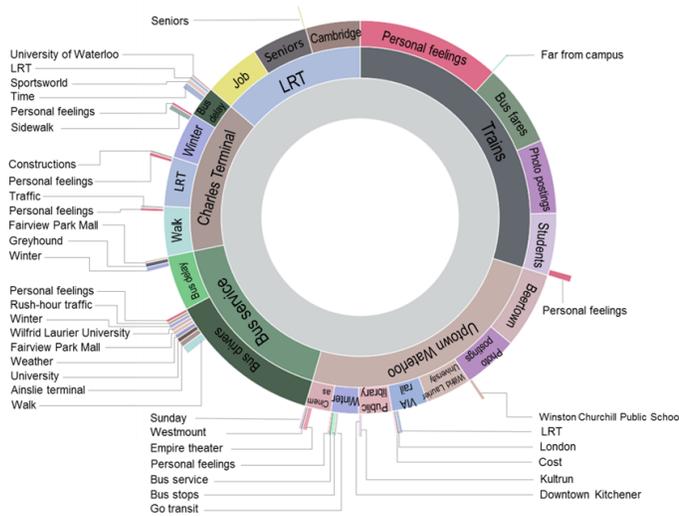


Figure 1. An overview of topic hierarchy generated from Twitter Tweets. More location-specific content was found in tweets than letters.

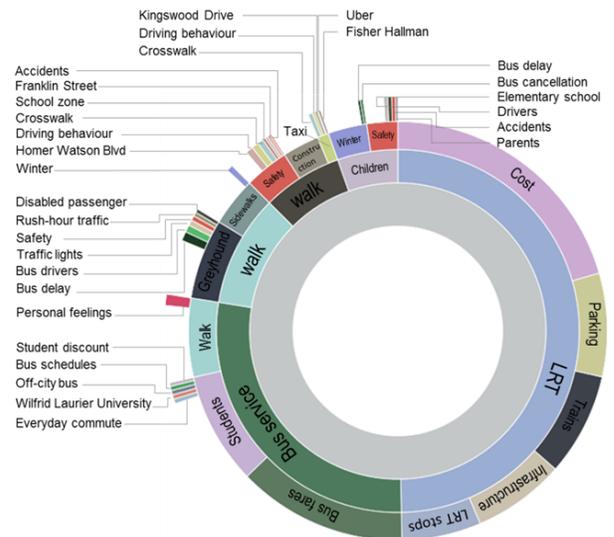


Figure 2. An overview of topic hierarchy generated from citizen letters. More narratives and critical discussion were found in citizen letters than tweets.



Figure 3. Comparisons of bus service-related tweets before (left) and after June, 2015 (right). The image shows new tweet hotspots appearing after new construction was started.



Text analysis methods also greatly help automate some steps of harvesting and interpreting text content, which will alleviate technical and analytical barriers for civil servants when handling geosocial media. I developed a web-based toolkit (using Django, a web development framework) that integrates information retrieval and text modelling methods (Figure. 4). A series of models

that process and analyse text data was developed using Python scripts, which are built upon an open-source natural language processing (NLP) library called NLTK. Sunburst diagrams were used to represent the results of text analysis and were developed using a popular JavaScript-based visualisation library D3. Designed for social media messages, this toolkit can be used for

other text-based public input, such as that collected from surveys, public meetings, online forums, and different social media platforms. This may help in analysing text-based public input as well as facilitate more empirical studies on how geosocial media can complement other public opinion collections methods.

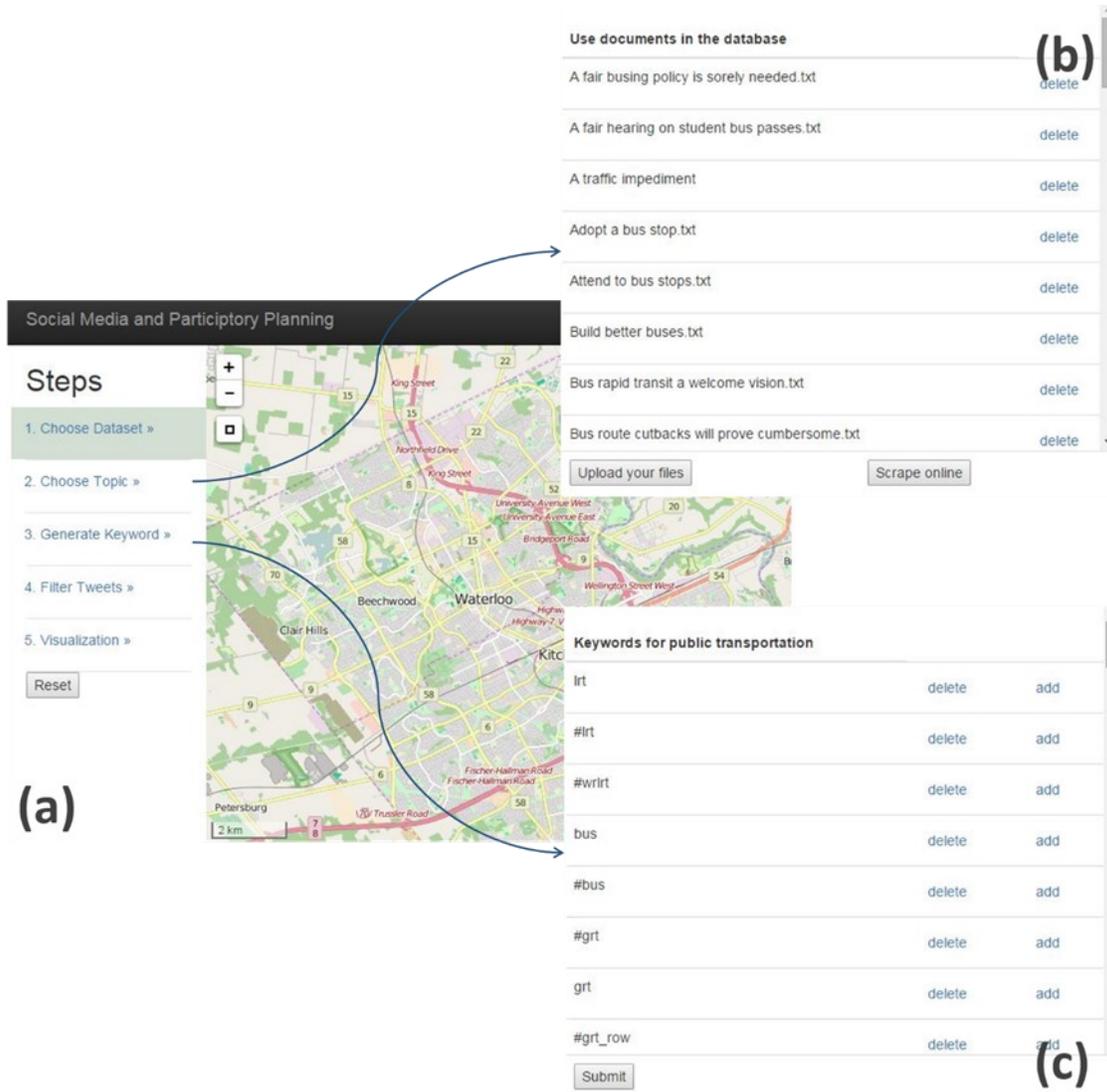


Figure 4. Screenshots of the web-based tool (a) the main interface of the web application (b) selecting documents for generating customized topic lexicon (c) reviewing and modifying the auto-generated keyword list

While I identified several potential uses of geosocial media in local government context, local government professionals' perspectives will be critical to evaluate the identified opportunities and challenges. In practice, there is resistance to government adoption of data collected outside of authoritative processes, may it be due to technical challenges of validating the data, or various organizational concerns. Therefore, I am going to further address such organizational constraints through semi-structured interviews and web surveys with local government staff. In addition to geosocial media, often considered a passive source of user-generated content, the further study will expand to active user contribution. Dr. Feick and I are currently working with the City of Kitchener to examine the practice of incorporating VGI into government service delivery. Through the implementation of a location-based routing service for pedestrians with different mobilities, we are going to investigate the role of co-producing spatial data in improving government service delivery from an

integrated framework that combines the perspectives of participants, decision-makers, and technology, and identify factors that may contribute to the success of incorporating VGI in government operations.

Altogether, my thesis is intended to build upon the studies of opportunities and challenges for government-citizen interactions brought by developments in digital technologies and prevalent uses of location-based service, through empirical studies and theoretical discussions. I would like to thank Geothink for the constant help through my research and comments and suggestions from all Geothink partners.

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Ashley has just had a publication, co-authored with Prof. Feick, accepted at the International Journal of Geo-Information. The abstract has been reproduced below, and the full paper will be published soon.

Zhang, S.; Feick, R. Understanding public opinions from geosocial media. *ISPRS International Journal of Geo-Information*. 2016

Increasingly, social media data are linked to locations through embedded GPS coordinates. Many local governments are showing interest in the potential to repurpose these firsthand geo-data to gauge spatial and temporal dynamics of public opinions in ways that complement information collected through traditional public engagement methods. Using these geosocial data is not without challenges since they are usually unstructured, vary in quality, and often require considerable effort to extract information that is relevant to local governments' needs from large data volumes. Understanding local relevance requires development of both data processing methods and their use in empirical studies. This paper addresses this latter need through a case study that demonstrates how spatially-referenced Twitter data can shed light on citizens' transportation and planning concerns. A web-based toolkit that integrates text processing methods is used to model Twitter data collected for the Region of Waterloo (Ontario, Canada) between March 2014 and July 2015 and assess citizens' concerns related to the planning and construction of a new light rail transit line. The study suggests that geosocial media can help identify geographies of public perceptions concerning public facilities and services and have potential to complement other participation methods.

Collaborator Profile: Dr. Piotr Jankowski, SDSU



Professor Jankowski is a professor of Geographic Information Science and Chair of the Department of Geography, San Diego State University (SDSU) in California. His past appointments were in Geography at the University of Idaho, and in Geoinformatics at Westfälische Wilhelms-Universität in Münster, Germany. His GIScience research focuses on decision-making (Spatial Decision Support Systems), participation (Participatory GIS), and uncertainty and sensitivity analysis in spatial models. While based in San Diego, his work extends across both sides of the Atlantic,

with collaborations in Poland, Austria, and Germany. Not only does he cross national boundaries when working on research projects, he has experience working across disciplines as well. This is evidenced in the variety of content covered by his publications (health, social media, water resources, transportation) and their associated disciplines (geography, GIS, environmental management, urban planning, informatics). Prof. Jankowski's research tackles core GIScience issues of accuracy and uncertainty, but he is also involved in the tool-building side by developing models for multi-criteria decision support systems. Of particular interest to Geothinkers may be his recent interdisciplinary work with Dara Seidl—a PhD student on privacy protection through spatial obfuscation—which aims to hide individual data points (such as households) while preserving spatial distribution needed for analysis. His other recent work with potential linkages to Geothink project involves online *geo-questionnaires* – a highly scalable method of collecting geographical preferences of the public about the use and organization of space in domains such as land use planning, transportation, and environmental quality.

Recent Publications

Seidl, D.E, Jankowski, P., Tsou, M-H. 2015. Privacy and spatial pattern preservation in masked GPS trajectory data. *International Journal of Geographical Information Science*, DOI:10.1080/13658816.2015.1101767

Jankowski, P., Czepkiewicz, M., Młodkowski, M. Zwolinski, Z. 2016. Geo-questionnaire: A Method and Tool for Public Preference Elicitation in Land Use Planning. *Transactions in GIS*, DOI: 10.1111/tgis.12191]

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Recent Publications

Sieber, R. E., & Haklay, M. (2015). The epistemology(s) of volunteered geographic information: a critique. *Geo: Geography and Environment*, 2(6), 566-136. <http://onlinelibrary.wiley.com/doi/10.1002/geo2.10/full>

Numerous exegeses have been written about the epistemologies of volunteered geographic information (VGI). We contend that VGI is itself a socially constructed epistemology crafted in the discipline of geography, which when re-examined, does not sit comfortably with either GIScience or critical GIS scholarship. Using insights from Albert Borgmann's philosophy of technology we offer a critique that, rather than appreciating the contours of this new form of data, truth appears to derive from traditional analytic views of information found within GIScience. This is assisted by structures that enable VGI to be treated as independent of the process that led to its creation. Allusions to individual emancipation further hamper VGI and problematise participatory practices in mapping/geospatial technologies (e.g. public participation geographic information systems). The paper concludes with implications of this epistemological turn and prescriptions for designing systems and advancing the field to ensure nuanced views of participation within the core conceptualisation of VGI.

Geothink at the AAG 2016

For a full report on the AAG 2016 conference, visit <http://geothink.ca/3560-2>.



Dr. Renee Sieber and Dr. Sarah Elwood at a panel session on Gender and GIScience.

Photo credit: Victoria Fast



Geography in Action: A walk over the Golden Gate Bridge. *Photo credit: Victoria Fast*



James Steenberg at the Disrupt Geo session.

Photo credit: Peck Sangiambut

Geothink Research Themes

Theme 1: Anywhere, Anyone, Anytime

We believe that the Web 2.0 and its associated technologies will dramatically shift the way cities talk to their constituents and others. People can communicate with cities from anywhere, outside of a jurisdiction, and at any time, for example, which means outside formal venues like city council meetings. Anonymity implies that you do not know the identity of the contributor. This challenges traditional definitions of community, citizen, and participation. We will evaluate the processes of technology development and that impact on its city and the citizen.

Theme 2: Spatial Authenticity, Accuracy, and Standards

The moment you bring up volunteered geographic information (VGI) (e.g., with Open 311), you worry about the quality of data. This theme considers questions of data structures, standards, and documentation practices used by public agencies. The research produced also aims to develop consensus on terminology, data standards, and dissemination regarding the opening up of government data and acceptance of VGI.

Theme 3: Laws, Norms, Rights and Code

Data related to governance is not simply a technical matter. Issues that are policy-related and legal in nature will be a primary focus as we try to understand the way Geoweb 1) fits within existing laws and policy, and 2) shapes new policies and law. Specific legal domains of interest are privacy, intellectual property, access to information, access to justice, and the interplay between norms, codes and technology with regards to governance.

Theme 4: Open Everything

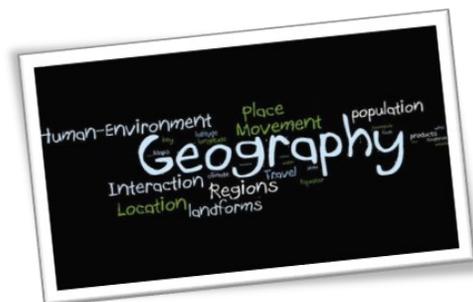
We will track municipal open data engagement over time, theorize about the impacts of open data on governance, and understand and develop best practices. We also have the opportunity to document these approaches and track the evolution of open data practices over time.

Theme 5: Social Justice

We will explore aspects of Geoweb – Society relationships as they pertain to social justice. We will identify the success and failures of Geoweb for community development. Using a case study approach we will employ participatory research to identify emerging concepts of place, the intersection of community, engagement and social justice, and accessibility to the Geoweb.

Theme 6: Geoweb Political Economy

This theme will focus on understanding the political economy of the Geoweb as it concerns ownership structures, institutions, and policies. Power relationships between actors and processes of inclusion and exclusion among social media owners and users also will be our focus.



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Your participation in Geothink

For us to have the broadest impact with Geothink, we would greatly appreciate your input. This can mean providing monthly contributions to our social media outlets, writing blog posts, research updates, and being involved in future events. If you wish to be involved in our media output, please contact the editor or our digital journalist.

Summer Institute 2016: 9-11 May 2016 @ Ryerson University

Topic: The Value of Open Data

AGM 2016: 11-13 May 2016 @ University of Toronto

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