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Situational Awareness of Health Events Using Social Media and the SMART Dashboard

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Objective

Create a flexible user-friendly geo-based social media analytic tool for local public health professionals. With the goal of increasing situational awareness, system has capability to process, sort and display tweets with text terms of potential public health interest. We continue to refine the Social Media and Research Testbed (SMART) via feedback from surveillance professionals.

Introduction

Introduction: Numerous methods using social media for syndromic surveillance and disease tracking have been developed. Many websites use Twitter and other social media to track specific diseases or syndromes.[1] Many are intended for public use and the extent of use by public health agencies is limited.[2] Our work builds on 4 years of experience by our multi-disciplinary team[3] with a focus on local surveillance of influenza. [4,5]

Methods

Tweets with key words of interest are collected continuously using customized geo-targeted Twitter APIs. Based on topic, different areas are monitored: Influenza- 32 North American cities; Ebola- 12 west African cities, U.S. 3 cities and 5 areas with airline hubs; HIV- 2 US states & worldwide; Vaccine Exemption- any location, California Wildfires -4 metro areas. Cities are described by a 17 m. radius from Twitter account location or coordinates. Collected tweets are processed using machine learning programs trained to filter and sort tweets. English tweets are coded for: geolocation; retweet; image or other media, hashtag(s), URL(s). Processed tweets are stored in a database and displayed as requested on the SMART dashboard built with Python®, JavaScript®, and Node.js®.

Results

The SMART dashboard allows selection of geographic subsets (cities, areas, countries) for each topic area. Figure 1. The top display provides a summary of all tweets in database (all points, daily, weekly, monthly). Other panels include: Scalable time trend; Word Cloud; top 10 for URLs, Hashtags, Mentions, Retweets, Media displayed and geocoding status. Each display panel allows sub-setting by (all, past 30 days, past week and yesterday). Raw and/or filtered tweets are displayed. Rates for selected tweets are calculated per appropriate denominator population, listed and displayed on selectable maps. For each display users can add a keyword for additional refinement and then display the raw tweets for their query. Permitted users can download samples of tweets to Excel for further examination.

Conclusions

Situational awareness can be enhanced by using geo-targeted social media analytics and GIS methods displayed in a user-friendly manner. The system provides a feasible method to track and monitor issues of public health concern. In the long term, utility of social media tracking and improvement of the SMART system depends on use by professionals and feedback to developers in this emerging field of syndromic surveillance.

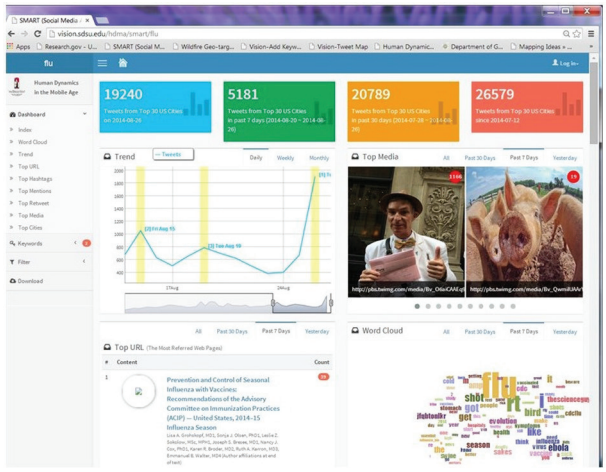

Figure 1. Screenshot of SMART dashboard

Keywords

Social media; Twitter; Syndromic; Dashboard; Influenza

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