Twitris v3: From Citizen Sensing to Analysis, Coordination and Action

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Abstract

Citizen sensing, with a billion plus active users and billion plus tweets/week, is complemented by shared information from contextually relevant Web of Data (blogs, news, and media objects) and background knowledge. How can these enable us in informing, understanding and managing a broad variety of activities and events locally and around the world? Twitris, currently in version 3, is a scalable and interactive platform which continuously collects, aggregates, integrates, and analyzes the above forms of data and knowledge to give deeper insights, as well as facilitate research and development on coordination and targeted actions related to any event. In this demonstration, we will show Twitris' comprehensive capabilities in spatio-temporal-thematic, people-content-network, and sentiment-emotion-subjectivity analyses, with examples from business intelligence including brand tracking and advertising campaigns, social/political unrests, and disaster events such as U.S. Election 2012, Occupy Wall Street (OWS) protest, Hurricane Sandy, etc. Visitors from diverse backgrounds will be able to play with the system for analyses of archived as well as live events during the demo.

Introduction

The inception of social media has revolutionized the communication paradigm where a network of people actively observe, report, collect, analyze, and disseminate information via text, audio, or video messages, increasingly through pervasively connected mobile devices, termed citizen sensing (Sheth 2009). Citizen sensing enables an opportune platform to aggregate and analyze social perceptions across multiple facets for an event– time, space, people, content, network, sentiment, emotion, etc. and we materialize this potential into capabilities of a scalable online platform- Twitris (`http://twitris.knoesis.org`). Twitris provides situational awareness by monitoring an event on Twitter at both micro (important key-phrases) and macro-levels (sentiment trends and community evolution) while also enabling social scientists to assess relative efficacy of emerging (existing) social (organizational) structures suitable for coordination in emergent situation. It crawls Twitter data for an event using Twitter Streaming API, starting with a manual seed word-set which is updated frequently by top n-grams. Twitris has the following three core analyses:

- *Spatio-Temporal-Thematic (STT) analysis:* Slicing and dicing the citizen sensor observations along dimensions of space (location of observation)- *where*, temporal (time of observation)- *when*, and thematic views (the topics in question)- *what*, allows holistic situational awareness of an event. We create spatio-temporal clusters of data and then apply content analysis techniques to extract important social nuggets in them. (Nagarajan et al. 2009)
- *People-Content-Network (PCN) analysis:* Understanding any event-centric social media community involves its integral parts: *people*- the participants of communication, *content*- what is communicated, and *network*- the communication medium. We identify contextually important people to engage with in the communities (Purohit et al. 2012), and analyze community evolution while integrating PCN signals into one analysis framework.
- *Sentiment-Emotion-Subjectivity (SES) analysis:* Dynamics of social communities is highly driven by human experience of individuals and groups. We analyze the target-specific (person/organization/topic) sentiment and emotions (Chen et al. 2012) to meaningfully understand the pulse of an event-oriented community and its unfolding.

Twitris v3 capabilities: Figure 1 shows the features corresponding to the numbers marked on widgets: *Popular Topics (1)*- show social signals (STT weighted n-grams) related to the chosen event (13) on a day; *Search and Explore (2)*- search from among the event related tweets with autocomplete, popular event hashtags and active users, and explore content for deep analytical questions leveraging semantic knowledge base and technologies; *Browse by Location*- show key topics of discussions as per chosen pushpin by region on the map- states, country; *Real-time (4)*- see event related tweets in real-time on a global/local map (automatically categorized along an event-specific taxonomy); *Sentiment and Emotion (5)*- analyze topic/people/region specific sentiment, emotion and popularity *Network Analysis (6)*- see the networks with insights of community structures, influencers, user demographics, etc.; *Related Tweets and Articles (7)*- display tweets, recent news and Wikipedia pages related to selected event and a social signal; *Multimedia (8)*- show event related images and videos; *Tweet traffic (9)*- see content volume; *Change date for analysis (10)*, and *Choose an event (13)*- e.g., US Election, #OWS protest.

Figure 1: Capabilities of Twitris v3 Platform- http://twitris.knoesis.org (numbers marked to explain)

Exemplary insights: Visitors will be able to see for themselves numerous examples illustrated by the following:

- Identifying insightful information nuggets: In the Twitris archive (Archive 2011), while exploring Politics->Terrorism->'Bin Laden Death' event, the social signals and *Related Tweets* widgets highlighted a tweet of the Egyptian Foreign Ministry "#Egypt foreign minister: Egy gov't has no official comment but we condemn all forms of violence in international relations. #osama #obl".
- Combining social data with Web of Data (Linked Open Data, News, Wikipedia): For the OWS event, in the *Explore* widget, a complex question "Who are the most talked about dead people in the OWS movement" showed the eminent civil rights activist Rosa Parks (OWS 2011).
- Community structures for coordination in an event: During the OWS event, the OccupyLA community was highly structured among influential users while OccupyChicago was sparse, leaving us with questions on to investigate for organizational sensemaking (OWS 2011).
- Spatio-temporal and target-specific sentiment-emotion: During the US presidential elections 2012, our sentiment-emotion analyses in addition to people and networks established relationships to real world activities, e.g., what was the effect of "racist t-shirts" during Romney campaign or Obama's comment on "dream of wonderful world for children" on social perceptions of the voters, before the second US Presidential Debate on Oct. 16, especially in the swing states (Ohio). We further observed a macro-level positive effect for Obama's topical community gaining over Romney's community due to his leadership in the Hurricane Sandy response. (Elections 2012).
- Actionable visualization for disasters: During Hurricane Sandy crisis response phase, we created a real-time tweet classification on the map for actionable information about needs (shelter, medical, etc.) and identified users who were potentially critical to engage with (influential need-based community seekers and suppliers) while working with the CrisisMappers community (Sandy 2012).

Conclusion: Twitris has processed many types of events (e.g., local vs global, short vs long lasting; online since 2010) and continues to do so while analyzing to glean actionable insights that assist in coordination, as shown by examples. Visitors with diverse interests will be able to play with the system to ask questions related to their findings, perceived shortcomings, and discuss areas of further applications and research using our datasets (60M+ tweets).

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