MISONET

Military Information Support and/to Operations (MISO) Investigations of Mobile Social Networking

Albert “Flip” Garrick, Lucas A. Overbey, Daniel Magers
Space and Naval Warfare Systems Center Atlantic, Code 56150
Tel: (843) 218-7966 E-mail: flip.garrick@us.army.mil

Introduction

Military Information Support and/to Operations (MISO) is a key capability for current military operations in the Global War on Terror. MISO forces have traditionally used radio and television media, as well as hand-delivered pamphlets and fliers, to circulate messages to various target audiences. The proliferation of the Internet worldwide has extended the ability to influence target audiences. MISO warriors typically use websites to broadcast messages, along with associated chat rooms and blogs to get feedback or to interact with the audience. Current mobile social networking services and micro-blogging applications provide internet or mobile broadcast capability between users and subscribers at near real-time rates, and have been gaining popularity and influence globally. The MISONET project investigated the use of these mobile social networking capabilities for MISO, and technologies for measuring effectiveness of MISO operations through these same capabilities.

Approach

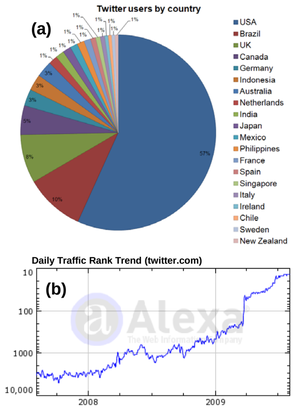
The MISONET project has made efforts in the following areas:

1. Develop a MISONET Concept of Operations (CONOPS)

Through interaction with subject matter experts (SMEs) and potential users, the MISONET team has developed a draft CONOPS for use of mobile social networking capabilities in planning, executing, and measuring MISO missions. Examples of possible scenarios were described as a foundation to MISO forces for use in employing this technology along with advanced analysis techniques.

2. Research the proliferation of mobile social networking

We researched the expanding popularity of social networking globally, including the mobile social networking application, Twitter. Twitter is a free social networking and micro-blogging service that enables users to send and receive messages of up to 140 characters, via the Twitter website, Short Message Service (SMS), or external applications. Based on web traffic (Alexa, 2010), Twitter is the 10th most popular website globally, with more than 50% of its users from outside the United States (Sysomos Blog, 2010). Between February 2008 and February 2009, Twitter was ranked as the fastest growing member community destination, with an annual growth rate of 1382% (McGiboney, 2009).



Twitter trends (a) by country (Sysomos Blog, 2010) and (b) by ranking (Alexa, 2009).

3. Develop analysis and visualization capabilities for measuring the effectiveness of MISO missions using mobile social networking.

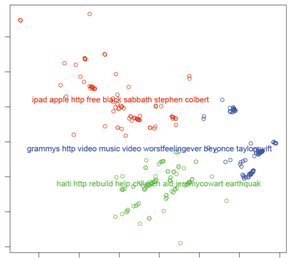
Several different technologies were investigated to discover and analyze the spread of MISO messages and ideas across the mobile social networking (specifically Twitter) community. Some of the algorithms investigated include:

- Message clustering and latent semantic analysis for content visualization
- Social network analysis of Twitter users and friends/followers
- Path analysis between users for distance analysis and message pathways
- Sentiment analysis using natural language processing and lexical knowledge

Results

Message Content Clustering

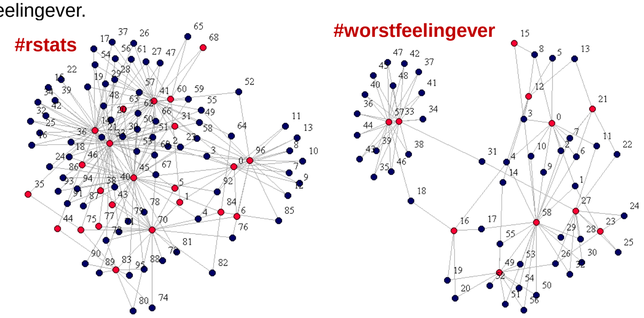
The image to the right shows k-means clustering results based on 300 messages returned from Twitter hashtag searching. Twitter searches were made on February 1, 2010 on #ipad, #haiti, and #grammys (searches related to current events/topics at the time). The messages were largely correctly clustered by hashtag, and related topics can be seen based on a latent semantic analysis (LSA) of the data. The revealed topics included both expected and surprising (but relevant) words.



Clustering results from three Twitter hashtag searches. Circles represent individual Twitter messages. Colors represent cluster belonging.

Social Network Analysis

The below images show the user social networks returned based on one degree of separation from Twitter users who posted in the last 100 tweets on the two hashtags below (search from August 27, 2010). The red nodes are the users who sent messages with the respective hashtag. It is evident that the smaller, more tightly knit #rstats community is more dense and closely aligned than those that tweet on #worstfeelingever.



Sentiment Analysis

Below are two tag clouds of the most common words used from Twitter messages that include the hashtags below (from March 8, 2010). Using a lexicon-based sentiment analysis technique, we were able to extract the average sentiments from each of these message sets.

#nigeria

agree baby bright children christmas city crisis dead depressing fight glass hard heart highway hope love man name news office people plane power radio riot sad terrible time truck tune ugly victim village violent women world young youth

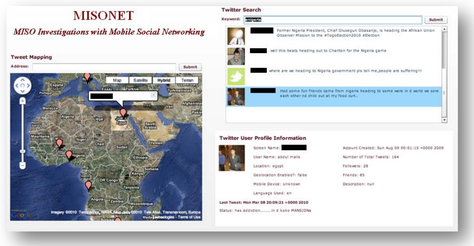
#oscars

accept air art boring dead dress fantasy father fish gift girl good gossip happy hate hurt industry kids locker love luxury man market moment money month movie music news outstanding party poster powerful pretty proud red respect rock rotten scream star surprise thought time watch white win wish woman wonder writer young

Avg. Valence: 4.92	Valence (1-9): bad ↔ good	Avg. Valence: 6.71
Avg. Arousal: 5.50	Arousal (1-9): weak ↔ strong	Avg. Arousal: 5.64
Avg. Dominance: 4.79	Dominance (1-9): passive ↔ active	Avg. Dominance: 5.94

Conclusions & Future Work

The analysis on in the previous section provides functionality for understanding and evaluating the presence, spread, and sentiment of ideas and messages for MISO foreign operations, as evidenced through current event topic searches. The current MISONET application is shown below. Along with those analytic methods, the application is also able to provide specific information about Twitter users including location-based information, automatically linked to a Google Maps display. With the developed CONOPS, analysis tools, and application, the MISONET project has investigated, researched, and formulated a methodology for MISO missions to take advantage of mobile social networking technology, for sending information, tracking the spread of messages or ideas, or for evaluating feelings and sentiments of a given foreign population of interest.



References

Agarwal, N. and Liu, H. (2008). Blogosphere: research issues, tools, and applications. *SIGKDD Explorations*. 10(1).

Alexa Top 500. (2010). http://www.alexa.com/topsites/global (accessed August 27, 2010).

Chapman, G. (2009). Twitter streams break Iran news dam. *AFP*. June 15, 2009.

Colbath, S. (2009). Theme, topic and sentiment tracking in open source media. *Human, Social, Cultural, and Behavioral (HSCB) Focus 2010 Conference*. Chantilly, VA. August 4-7, 2009.

Dodds, P.S. and Danforth, C.M. (2009). Measuring the happiness of large-scale written expression: songs, blogs, and presidents. *Journal of Happiness Studies*. July 17, 2009.

Entous, A. (2009). U.S. military reviews use of Twitter, other sites. *Reuters*. August 4, 2009.

Madrigal, A. (2009). Tracking internet chatter helps spot swine flu outbreak. *Wired*. April 27, 2009.

McGiboney, M. (2009). Twitter’s tweet smell of success. *Nielson Wire*. March 18, 2009.

Rhoads, C. (2009). Helping spread the news through Twitter feed in translation. *Wall Street Journal*. March 16, 2009.

Schachtman, N. (2009). Exclusive: U.S. spies buy stake in firm that monitors blogs, tweets. *Wired*. October 19, 2009.

Sysomos Blog (2010). Exploring the use of Twitter around the world. http://blog.sysomos.com/2010/01/14/exploring-the-use-of-twitter-around-the-world/ (accessed August 27, 2010).

Acknowledgements

The authors acknowledge support through the Space and Naval Warfare Systems Center Atlantic Innovation Program. This work was performed under the auspices of the Advanced Technology Solutions Branch (Code 56150), Intelligence, Surveillance, and Reconnaissance / Information Operations (ISR/IO) Competency, Space and Naval Warfare Systems Center Atlantic. Thanks to collaboration partners at the Prosoft, Inc.