

Profiling Terrorists in Social Media Using Psycholinguistics



GOVERNMENT

The Problem

The use of social media by terrorist groups is very sophisticated and, when used for radical propaganda and terrorist recruitment, its broad reach can be difficult to combat without ways to isolate highest value targets. By combining multiple types of analytic techniques, we can identify content of interest, and analyze the social networks of members and their supporters.

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The increasing number of potential accounts to analyze can quickly become overwhelming. Just three layers into the friends/followers of a single individual can result in a set of over 1 million users—far too many to analyze manually. Teradata's multi-genre use of text, machine learning, psycholinguistic, and graph techniques allows rapid analysis of vast amounts of data with a high degree of accuracy for identifying Twitter posts and people of interest.

The Data

A 1 percent Twitter sample was analyzed.

Technical Approach

A four-phase approach reduces a set of Twitter accounts of interest to a manageable level, and with a sufficient degree of accuracy so that manual review can take over.

Phase 1: Identify Tweets of Interest—Teradata filters out the noise (i.e., tokenize, remove URLs and stopwords), then builds a supervised machine learning model for distinguishing between radical vs. non-radical tweets using word frequencies as features. High model accuracies are achieved (~90%).

Phase 2: Refine List of Suspects: A psycholinguistic tool is used to develop personality models of suspect users

based upon patterns of expression in tweets. The volume/extent of tweets is so broad that analysis of content must be refined for better understanding of intent—accomplished by a Receptiviti app that generates over 100 new psychological variables, which can be combined with content analytics (Figure 1). The combined analytics on tweet content and psycholinguistic criteria is effective at filtering out false positives.

Phase 3: Determine Topics and Trends—Combining Phases 1 and 2 yields a reduced set of accounts of interest. Tweet content can now be analyzed for common topics, trends or important messaging, and sentiment. Word associations can be calculated with collaborative filtering and visualized (Figure 2).

Phase 4: Map the Social Network—The reduced set of accounts yields a network of connections that can be analyzed using graph analysis techniques to identify the most connected users in the sample. Figure 3 shows the top 1 percent of users by betweenness as one of the most important views in the network.

Psycholinguistic Measures

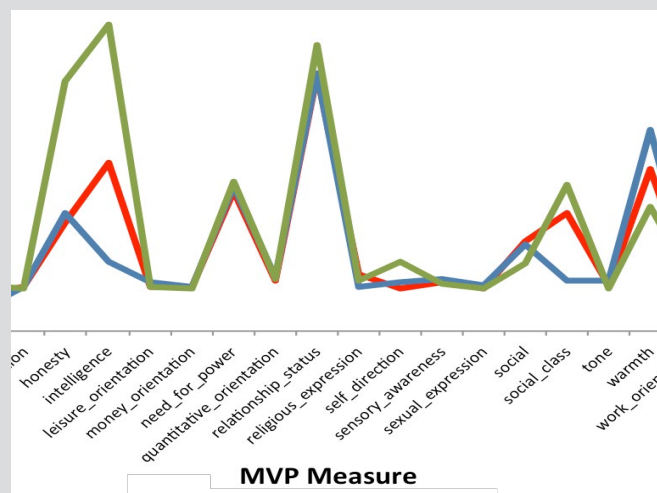


Figure 1: Psycholinguistic measures of radical vs. non-radical expression (visual is from a Receptiviti app used in this analysis).

The Results

By combining analytics techniques we identified Twitter users of interest, discovered their text-based content, and mapped their social network. Utilizing the multi-genre approach, Teradata triages available data down to a manageable size for analysts to work with. This approach also has applications well beyond extremism (e.g., border patrol, drug traffickers, human trafficking, and pedophile rings).

Radical Twitter Content Topics

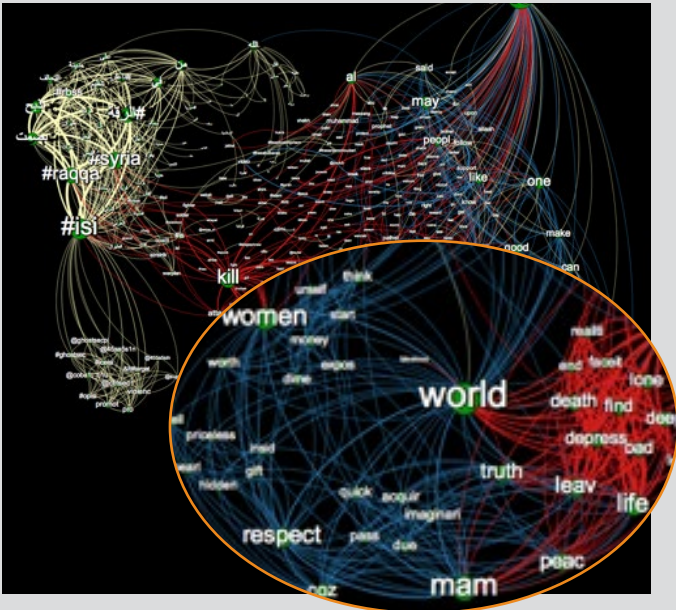


Figure 2: Radical Twitter content topics visualized by tweet sentiment (red = negative, blue = positive, yellow = neutral). The negative cluster at bottom right is from a single tweet retweeted many times.

Graph Analysis Techniques



Figure 3: The larger the node, the more influential the account; same page rank technique as Google uses to order search feeds.