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Identifying Terrorist Affiliations Through Social Network Analysis Using Data Mining Techniques

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Poster: "Identifying Terrorist Affiliations through Social Network Analysis Using Data Mining Techniques"

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In a world in which, not only since the fall of Twin Towers in New York on 9/11/2001, local ideologically inspired warfare becomes global all too quickly, terrorist groups like Al Quaeda and ISIS (Daesh) have successfully used modern computing technology and social networking environments to disperse their message, recruit new members, and plot attacks. This is especially true for such platforms as Twitter and encrypted mobile apps like Telegram or the clandestine Anrawi. Early detection of such activity is crucial to event prevention, and in recent years, data mining techniques have become increasingly important in the fight against the spread of global terrorist activity.

This study employs data mining tools to mine Twitter for terrorist organizing vocabulary and to pinpoint, through the analysis of (admittedly spotty) tweet metadata, the most likely geographical location and connected identities behind the user accounts from which organizing or post-event information is disseminated.

To accomplish this goal, I use R code and the twitteR package to connect through the existing Twitter API in order to validate a relevant word/ search term list. I then determine, by "most likely" frequency counts and wordclouds, the number of kMeans clusters into which to separate the linguistic uses of these words and, by virtue of association, their user accounts. I investigate these user accounts with network graphs using R, NodeXL, and Gephi, which produce of the user network as the final step.

One challenge to my approach has been the meaningful extraction of Arabic terms in R, which has required UTF-8 workarounds; another is the temporary nature of social network activity, in which user accounts change frequently and tweets can be deleted at any time. For this poster, I will use data collected on 03/22/2016, the date of a major ISIS suicide bombing attack in the city of Brussels, Belgium.

In the poster, augmented by a real-time demonstration, I will show how a dynamic analysis of live Twitter streams produces results that may potentially be relevant to national and international law enforcement efforts.

Selected Sources:

1. Bifet, Albert, Geoffrey Holmes, and Bernhard Pfahringer (2011). "Moa-tweetreader: real-time analysis in twitter streaming data." *Discovery Science*. Springer Berlin Heidelberg.
2. Bolz, Frank (2012). *The Counterterrorism Handbook: Tactics, Procedures, and Techniques*. 4th ed. CRC Press.
3. Cheong, Marc, and Vincent CS Lee (2011). "A microblogging-based approach to terrorism informatics: Exploration and chronicling civilian sentiment and response to terrorism events via Twitter." *Information Systems Frontiers* 13.1: 45-59.
4. Dudas, Patrick M (2013). "Cooperative, dynamic Twitter parsing and visualization for dark network analysis." *Network Science Workshop (NSW), 2013 IEEE 2nd*.
5. Martens, David, Bart Baesens, and Tom Fawcett (2011). "Editorial survey: swarm intelligence for data mining." *Machine Learning* 82.1: 1-42.
6. Saif, Hassan, Yulan He, and Harith Alani (2012). "Alleviating data sparsity for twitter sentiment analysis." *CEUR Workshop Proceedings* (CEUR-WS. org).
7. Scime, Anthony, Gregg R. Murray, and Lance Y. Hunter (2010). "Testing terrorism theory with data mining." *International Journal of Data Analysis Techniques and Strategies* 2.2: 122-139.
8. Shaikh, Muhammad Akram, Jiaxin Wang, Hongbo Liu, Yixu Song (2006). "Investigative Data Mining for Counterterrorism." *Advances in Hybrid Information Technology*. Volume 4413 of the series Lecture Notes in Computer Science pp 31-41. Springer.
9. Thuraisingham, Bhavani (2015). "Data Mining for Counter-Terrorism". https://www.utdallas.edu/~jxr061100/paper-for-website/%5B18%5DMining-Terrorism-NGDM04.pdf . Last accessed 09/16/2015.
10. Xu, Lei, et al (2014). "Information Security in Big Data: Privacy and Data Mining."*Access, IEEE* 2: 1149-1176.