Carnegie Mellon

Ph.D. Program in
Computation,
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& **S**ociety

Visualizing the FiribiNome Social Botnet on Twitter:
Manipulating Social Influence through Networked Activity

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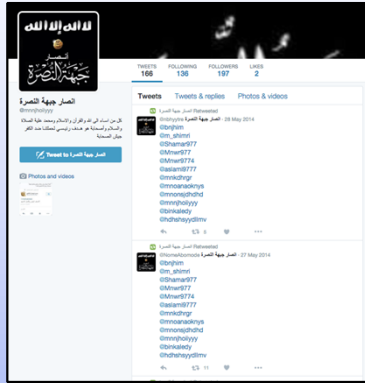**Prof. Kathleen M. Carley**
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Figure 1 Example of FiribiNome core bot account and associated mention activity.

Introductions
Social botnets are teams of software controlled online Twitter accounts designed to mimic human users and construct large networks of followers to promote specific online propagandists or websites. The bots exhibit a sophisticated strategy that remains undetected by Twitter. Their use to influence political opinion has been documented in the US, the MENA region, Ukraine, and Russia.

Botnet Behavior
Botnets in pervious networks have been used to manipulate elections, but with the FiribiNome social botnet we observe a botnet that appears to promote specific accounts supportive to Jabhat al-Nusra. The FiribiNome social botnet has at least 120 accounts that all exhibit similar behavior. The bots tweet strings of mentions (see Figure 1), most of which are other members of the core bot network, along with the occasional mention of a high profile propagandist account or bot spokesmen account. Figures 2 and 3 both show the core bots have heavily weighted and highly dense edges to other core bots meaning they tweet often and frequently to other core bots. Their behavior appears to generate mentions of the propagandist accounts among their followers (see Figure 2), but we hypothesize that these behaviors could also generate followers for core bot accounts.

Botnet User Types
- **Core Bot Member**: Accounts display shared naming convention and profile image, and consistent behavior of 120-200 tweets containing mentions of bot spokesmen, other core members, and propagandist accounts.
- **Bot Spokesman**: Appear to be developed by the same bot master and promote a third-party automated propaganda tweeting application and a Jabhat al-Nusra supporting charity, **d3ua.org**.
- **Bot Follower**: human users who follow of one or more core bot accounts.
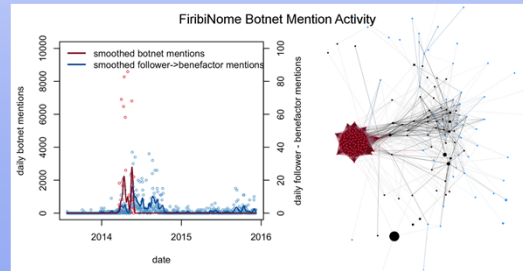- **Community Propagandist**: highly central accounts within the Jabhat al-Nusra supporting Twitter community.

Figure 2 Depicts mention behaviors and their effects within the FiribiNome Social Botnet. The left panel depicts two scaled time series. The red circles and smoothed trend line depict the number of daily mentions by botnet members. The blue circles and corresponding trend line depict botnet followers' mentions of propagandist accounts. The right panel depicts the mention network of the FiribiNome social botnet. The vertices are user accounts. The plot depicts how botnet members (red) interact with propagandists (black) and followers (blue).
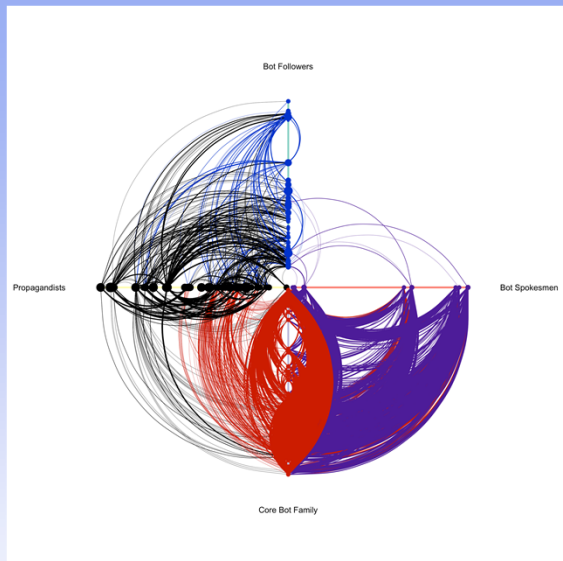
Visualization and Insight
One challenge in understanding the role of each account type within the Firibi Botnet and how the groups as a whole interact with each other is creating informative visualizations. We tried numerous network visualizations including force-directed, hierarchical, and box layouts. Each of these layouts were effective in grouping by account type, however the degree of edges produced by core bot members made understanding their relationship with other account types difficult. We found the hive plot to be an effective visualization to help hypothesize the function and purpose of the botnet. The plot preserves the separation of account types allowing one to understand the role of each group as a whole.

Key Findings
Although the purpose of the botnet's structure and activity is not completely understood, we have the following hypotheses:
- Migrates followers from Propagandist accounts to core bot accounts
- Mention structure causes Twitter to place bot messages higher in followers' Twitter feeds which generates more followers and attention for the botnet
- Used to gain a central position within the Jabhat al-Nusra supporting community and market the application and charities associated with **d3ua.org**.

Future Research
- Measure the diffusion of the **d3ua.org** throughout the community
- Analyze similar bot structures found in other detected extremist communities
- Incorporate Natural Language Processing to inform detection strategies

Scholastic Goals
- Gain proficiency in R and Python
- Understand how to utilize Natural Language Processing techniques to interpret social media activity in East Asia.

Figure 3 The nodes are colored and divided among four axis according to account type and positioned along the axis according to total degree centrality. Each node's size is determined by the respective user's follower count, the weight of the edges is determined by the number of each source node's mentions to the receiving node, and the color of the edges is matched to the color of each edge's source node.

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