Analysis of Tweets and Tweeters during the 2014 Umbrella Revolution

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Introduction

- We collected 2,915,037 tweets about the Hong Kong Revolution from 10/05/2014 to 12/06/2014.
- **Goals**: Understand the dynamics of the revolution using tweets alone.

Challenges

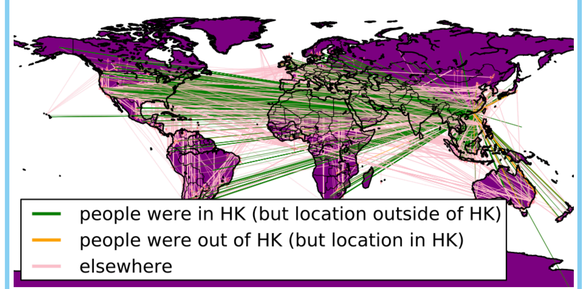
- Millions of raw tweets.
- Many top tweeters are bots, introducing noise in our analysis.
- Relationship between tweeters is complex.

Methods

- Analyze peaks in Twitter volume.
- Use Twitter API to build follower-following and tweet-retweet graphs.
- Detect bot and human groups with community detection algorithms on those graphs.
- Interpret graphs with visualization tools such as Gephi.
- Apply natural language processing (NLP) and machine learning for sentiment analysis on tweets.

Data Collection

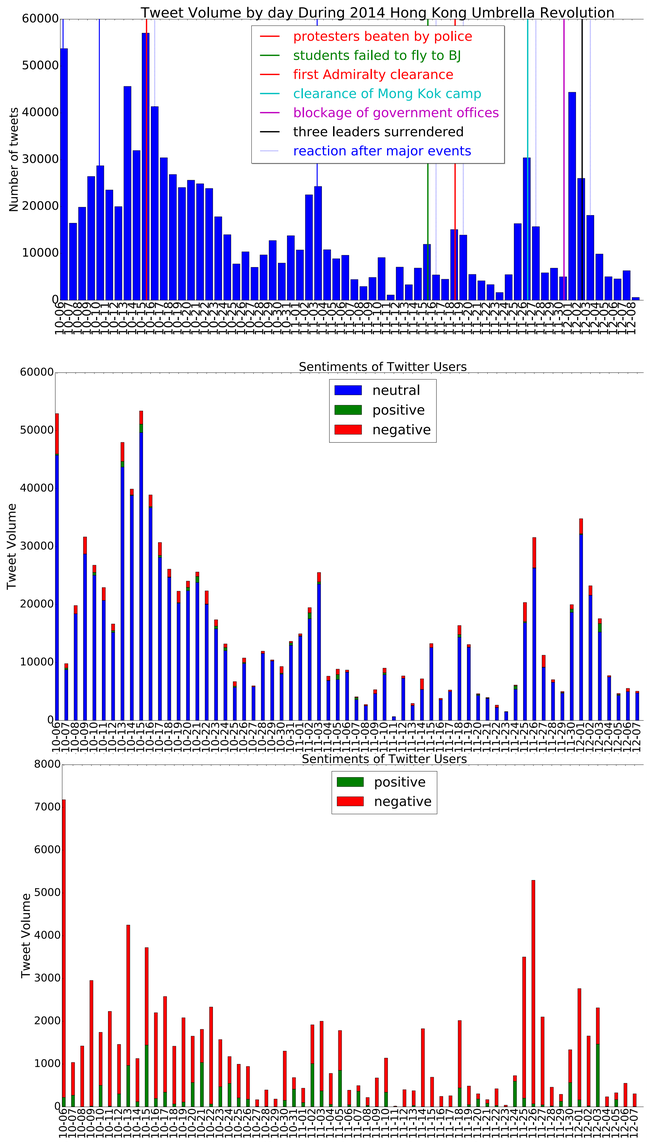
- Tweets collected from: Twitter Streaming API
- Number of protest-related tweets: 1,062,606
- Number of geo-enabled tweets: 3583



According to Twitter, ***location*** is "*The user-defined location for this account's profile*". The map shows that many people from all over the world were physically present in Hong Kong during the protest.

Analysis of Tweets: Events and Sentiment

- What are tweets about?
- What is the relationship between tweet volume and major events?
- How do people feel about the events?

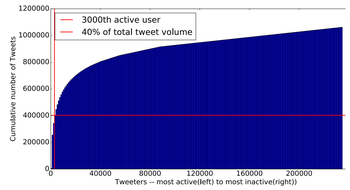


Example positive tweet*: "Something about this just gives me a little more faith in the world. Hong Kong protesters are so freaking nice."*

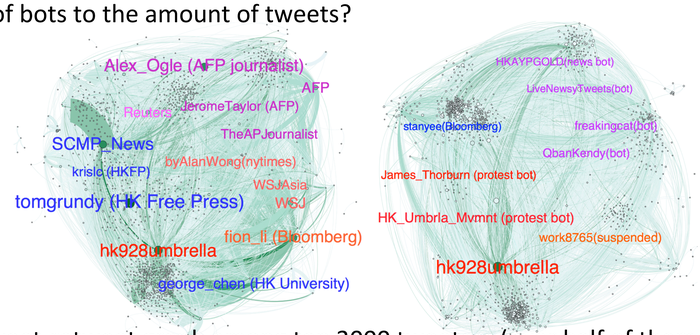
Example negative tweet*: "Everytime I hear about the Umbrella Revolution I want to groan for a few years."*

Analysis of Tweeters: Bots and Humans

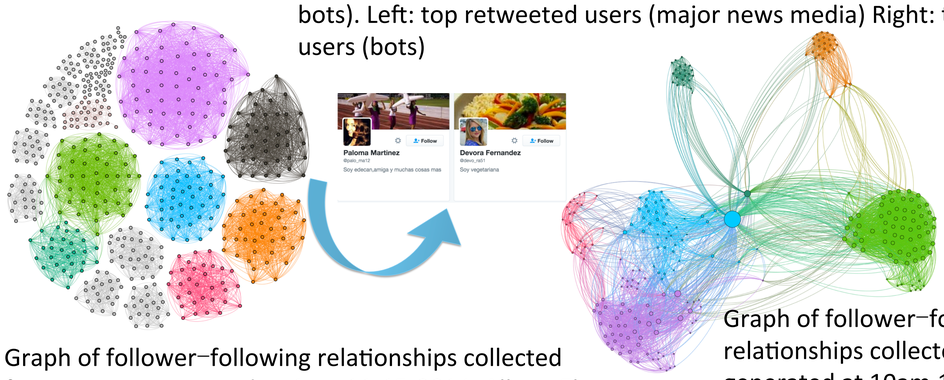
- Who are the top tweeters?
- What is the relationship between the top tweeters?
- What is the contribution of bots to the amount of tweets?



Top 3000 tweeters generate 40% of tweets

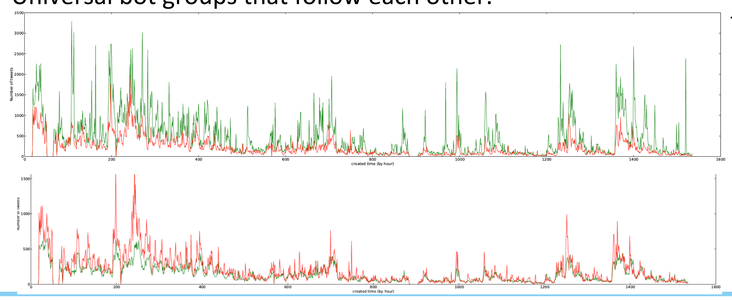


Tweet-retweet graph among top 3000 tweeters (over half of them are bots). Left: top retweeted users (major news media) Right: top retweeting users (bots)



Graph of follower–following relationships collected from tweets generated at 4pm,11-15-2014. All are El Universal bot groups that follow each other.

Graph of follower–following relationships collected from tweets generated at 10am,10-23-2014. All are Falcons News bot groups that follow each other.



Tweet-retweet volume before and after bot removal. Note the significant reduction in noise peaks.

Conclusions

1. 90% - 95% of tweets are about news events or are retweets of news events. Only 5% - 10% express opinions about the events.
2. Top 3000 tweeters (out of 240,000 users) generate 40% of tweets. Over half of them are bots. Bot groups have interesting internal structures.
3. Sentiment analysis of tweets reveals the lack of sustained positive feelings about the revolution.

References

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