TWITTER EFFECT: 
A SOCIAL NETWORK? 
OR 
A NEWS MEDIA?

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WHAT IS TWITTER?
PAPER OBJECTIVE

- To study the topology of the characteristics of Twitter and its power as a new medium of information sharing.
- To study how Twitter follow the characteristics of other social network mediums.
- To study such trends in popular topics that users tweet and how this information spread.
Motivation

- More than 41 million users in July 2009
- Only after half a year, 200+ million Twitter users!
- Is Twitter like Facebook?
- 140 characters can be long enough!
- Do you tweet or retweet?
- Who is the most famous Twitter user? Barack Obama?
Problem Formulation

- How are people connected on Twitter?
- Who are the most influential person? How to rank them? More than one method?
- What is the next hawt topic? Who started it?
- How does information diffuse via retweet?
- Twitter is a social network or a news media?
OUTLINE

- Data collection
  - Basic Analysis of follower, following and tweets
  - Ranking of Twitter users
  - Trending the trends
  - Impact of retweet
- Related Work
- Conclusion
  - A different perspective
DATA COLLECTION

- Gathering data
  - User profiles from July 6th to July 31st, 2009
  - Starting point
  - Trending topics
  - Tweets

- Removing unwanted tweets
  - Spam tweets
  - How to rid of?
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On Twitter’s Trail

- Basic Analysis
  - Number of followings and followers
  - Followers vs. Tweets
  - Reciprocity

Figure 1: CCDF

Figure 2: The number of tweets vs. number of followings

Figure 3: The number of followings and that of tweets per user
**Twitter User Analysis**

- **Basic Analysis**
  - **Degree of Separation**
    - Milgram’s experiment = 6 vs. Twitter = 4.12
  - **Homophily**: a contact between similar people occurs at a higher rate than among dissimilar people

**Figure 5**: The average number of followers of r-friends per user

**Figure 6**: The average number of followers of r-friends per user
USER ANALYSIS SUMMARY

Summary
- Twitter diverges from well-known traits of social networks
  - Non power-law distribution of followers
  - Degree of separation is shorter
  - No reciprocity
- But if look at reciprocated relationships, they exhibit some level of homophily
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RANKING OF TWITTER USERS

1. Ranking by the Number of Followers
2. PageRank algorithm (An algorithm developed by Larry Page, Google’s founder and CEO)
3. Retweets algorithm
   - Number of ReTweets used as a measure of Tweet’s popularity hence the Tweet writer’s popularity
   - Retweet: copying someone else’s tweet
COMPARISON OF RANKINGS

- Kendall’s Tau algorithm to compare only the top $k$ lists of the generated three ranking lists.

  - $K_r$ = number of elements in each ranking
  - $K = 0$ means complete disagreement, $K = 1$ means agreement

- The above expression equals 1 if:
  - $r_1$ is only in one list and $r_2$ is in the other list
  - $r_1$ is ranked higher than $r_2$ in one list and only $r_2$ appears in the other list
  - $r_1$ and $r_2$ are in both lists but in the opposite order
  - 0 otherwise

**Figure 8: Comparison among rankings**
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TRENDING THE TRENDS

- Twitter serves more as an information spreading medium than an online social networking service.
- What information spreads on Twitter? What topics become trending topics? For how long is the topic popular? Is there a pattern?
- Comparison with
- Terms
  - Singleton: no response or a retweet
  - Reply: replying
  - Mention: defined by @username
  - Retweet: copy someone else’s tweet as one’s own sometimes with additional comments

Figure 9: The age of the trending topics from Google and Twitter
ACTIVE TOPICS

- User Participation
  - Apple or iranelec

- Active Period of Trends
  - Attraction at first sight? Or a long-lasting attraction?

![Graphs showing cumulative number of tweets and users over days for various topics]  

(a) Topic ‘apple’  
(b) Exogenous critical (topic ‘beyonce’)  
(c) Endogenous subcritical (topic ‘lynn harris’)  
(d) Endogenous critical (topic ‘#redsox’)

Figure 11: Cumulative

Figure 13: The examples of classified popularity patterns
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**IMPACT OF RETWEET**

- Retweet is a powerful means to relay information and influence beyond adjacent neighbors.
- Audience size of retweet: no matter how many followers, retweet reaches a certain number.
- ReTweet trees: ~98% have less than 6 degrees of separation, tree height less than 6 – follows Power Law

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**Figure 14:** Average and minimum of sent via retweet

**Figure 16:** Height and participating users in retweet trees
**POWER OF RETWEET**

- 50% in 1 hour, 75% in 1 day, 10% in 1 month later
- Retweets that are 2 or more hops away, more responsive up to 5 hops away

![Figure 17: Time lag bet](image)

![Figure 18: Elapsed time of retweet from \((n - 1)\) hop to \(n\) hop](image)
RELATED WORK

- Analyze the user characteristics by the relationships between the number of followers and that of following [Krishnamurthy et al.]
- Information diffusion in online social networks
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CONCLUSION

- Twitter is a Social Network or a News Media?
- Twitter is a deviant social media that connects many people in the world but there are some Social Networking traits that can be found in Twitter.
- Like the News Media, Twitter allows incredibly fast relay of information propagation.
- A question arises: Could there be a different way of ranking the Twitter users? We should examine how influential are those top users in a different approach?
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A DIFFERENT PERSPECTIVE (1)

- Measuring User Influence in Twitter: The Million Follower Fallacy [Cha et al.]
  - Measures the degree of influence in popular users and how they maintain or gain more influence
  - Compar
    - Ind
    - Ret
    - Me
  - Similar
  - Three measures

Figure 1: Venn diagram of the top-100 influentials across measures: The chart is normalized so that the total is 100%.
A DIFFERENT PERSPECTIVE (2)

- 233 distinct users from three measures
  - Similarly, news media and celebrities were on the very top of the list followed by powerful individuals who are influential.
- Retweet preferred top 10 users whereas mentions preferred top 101-233 users over 8-month period
- $p =$ a prob. that a random tweet posted on twitter during a 15 day period is a retweet or a mention of that user
A DIFFERENT PERSPECTIVE (3)

- Conclusion
  - Indegree alone reveals very little about the influence of a user, and not related to retweets or mentions that engage audience
  - Focusing on retweets and mentions: most influential users can hold significant influence over a variety of topics (Power Law)
  - Influence not gained spontaneously or accidentally, rather needs consistent effort of maintaining or gaining one.

- Hitler used Twitter to spread his words, too!
  [http://www.youtube.com/watch?v=wd4WZ3LqCKw](http://www.youtube.com/watch?v=wd4WZ3LqCKw)
REFERENCES

[1] Haewoon Kwak, Changhyun Lee, Hosung Park, and Sue Moon. What is Twitter, a Social Network or a News Media?


Thank you