Dynamics of personal social relationships in Online Social Networks: a study on Twitter

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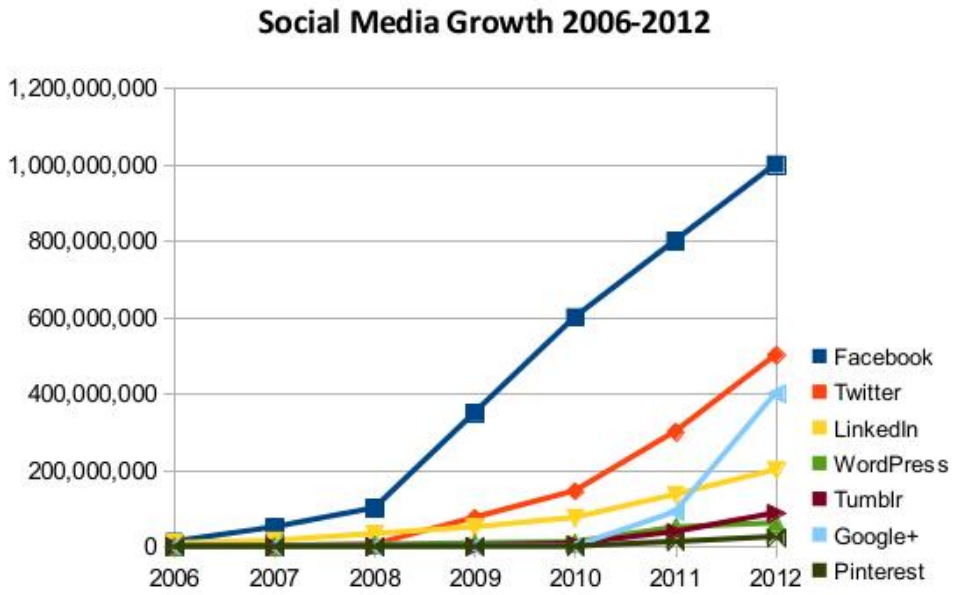
Social Lives vs. Social Networks



- **39 percent of Americans spend more time socializing online than face-to-face**

Sources:
[1] http://dstevenwhite.com
[2] http://corp.badoo.com
[3] http://press.experian.com

Benefits of OSNs

- Facilitate new friendships
- Bolster people's confidence
- People can "control" their online persona
- Enhance offline friendships

OSNs effects on our society

- Are OSNs changing the properties of our personal social relationships?
- Are the benefits of OSNs enough to justify a shift towards a completely online social life?

We need to fully understand the properties of social relationships in OSNs and the differences from face-to-face relationships

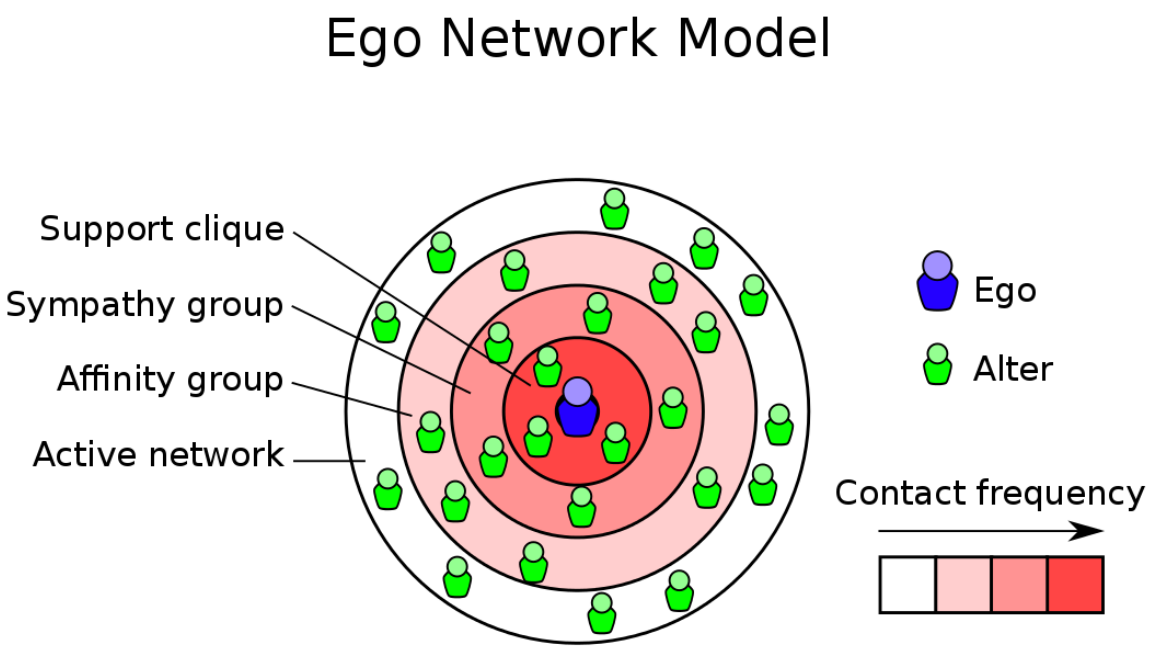
Dynamics of social relationships in OSNs

Goal: study how social relationships and personal social networks are maintained over time in OSNs

- Essential to understand – from an evolutionary perspective – the extent to which OSNs are changing the way we interact socially
- OSNs data contain the entire history of communication between users – unique opportunity to study the evolution of social relationships over time

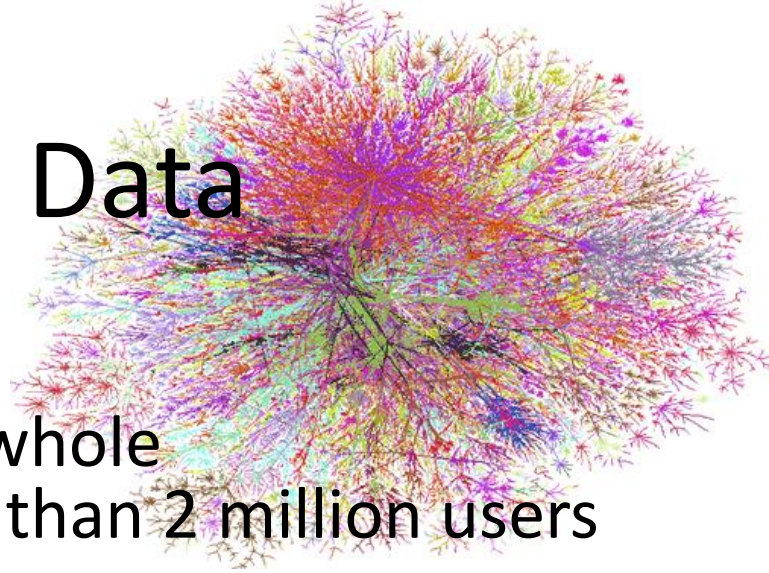
Methods

- Study the dynamic properties of user's behaviour in OSNs
- Compare the properties of OSNs with background findings in sociology and psychology about face-to-face Ego Networks



- Dunbar's Number – limit of 150 active friendships (on average)
- Structure of concentric circles with typical size (5-15-50-150)
- Active friends are contacted at least once a year

Experimental Data

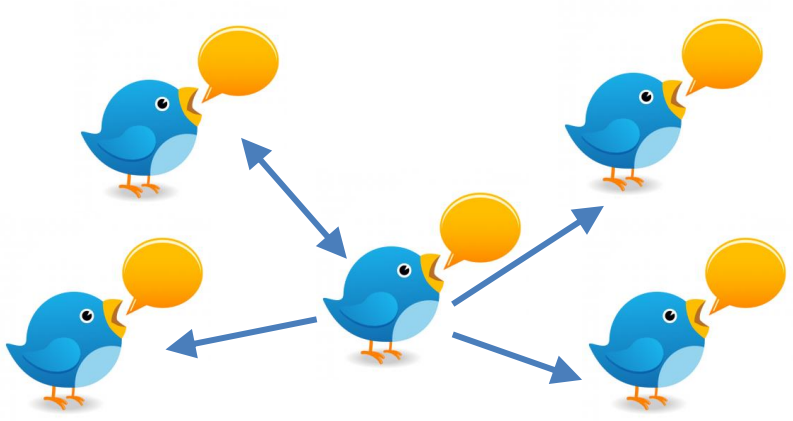


- Twitter data set containing the whole communication history of more than 2 million users (for up to 7 years of activity)
- The data have been filtered with a SVM to select profiles related to “humans”
- Number of direct messages sent between users (mentions and replies) to capture the maintenance of social relationships
- Active users – people who actively maintain their social relationships in Twitter
- Filtered data contains about 600,000 user profiles

Why Twitter?

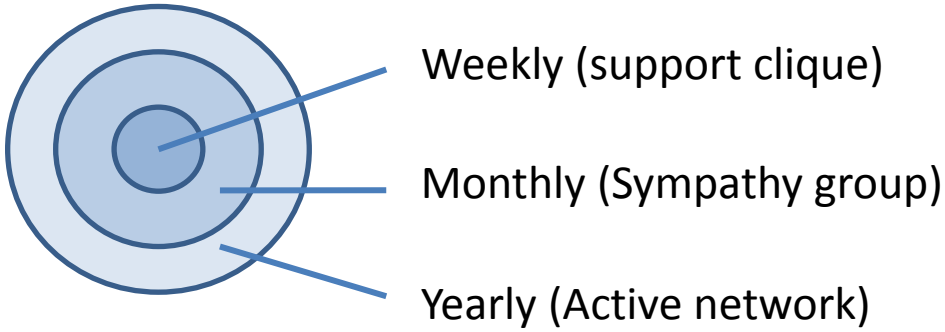
- Different from other OSNs
- Widely adopted and growing rapidly
- Easy to collect communication data between users in Twitter (direct messages are 39% of the total communications between “humans”)
- Users are heterogeneous – humans (68%) are mixed with other kinds of profiles (companies, public figures, etc.)

From Tweets to Ego Networks



- A social relationship between two users exists if they exchanged at least one direct message

- An Ego is a Twitter user (human) and alters are all the people with whom she has a social relationship



- Ego network circles are built considering typical frequencies of contact taken from the literature

Ego Network Evolution Over Time

- The communication history of each ego is divided into temporal windows of one year each
- The windows are slid with steps of 1 day and the size and composition of the circles in the ego networks are studied for each window
- To capture the differences between the users, we divide them into three categories based on users' active lifespan: occasional users (63%), regular users (35%) and aficionados (2%)

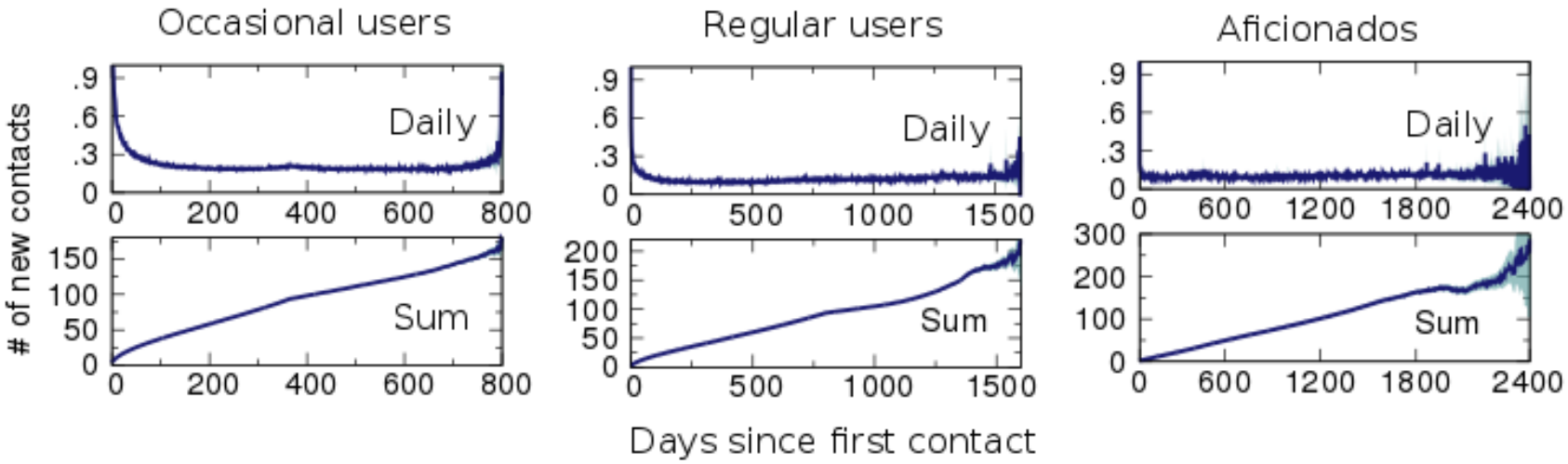
Twitter abandonment

- We say that a user abandons Twitter if her activity is followed by at least 6 months of inactivity

- We do not consider accounts created less than 12 month before the download
- 159,000 accounts (25%) of the data set abandoned Twitter
- Mostly occasional users (88%), 11.5% regular users and 0.5% aficionados

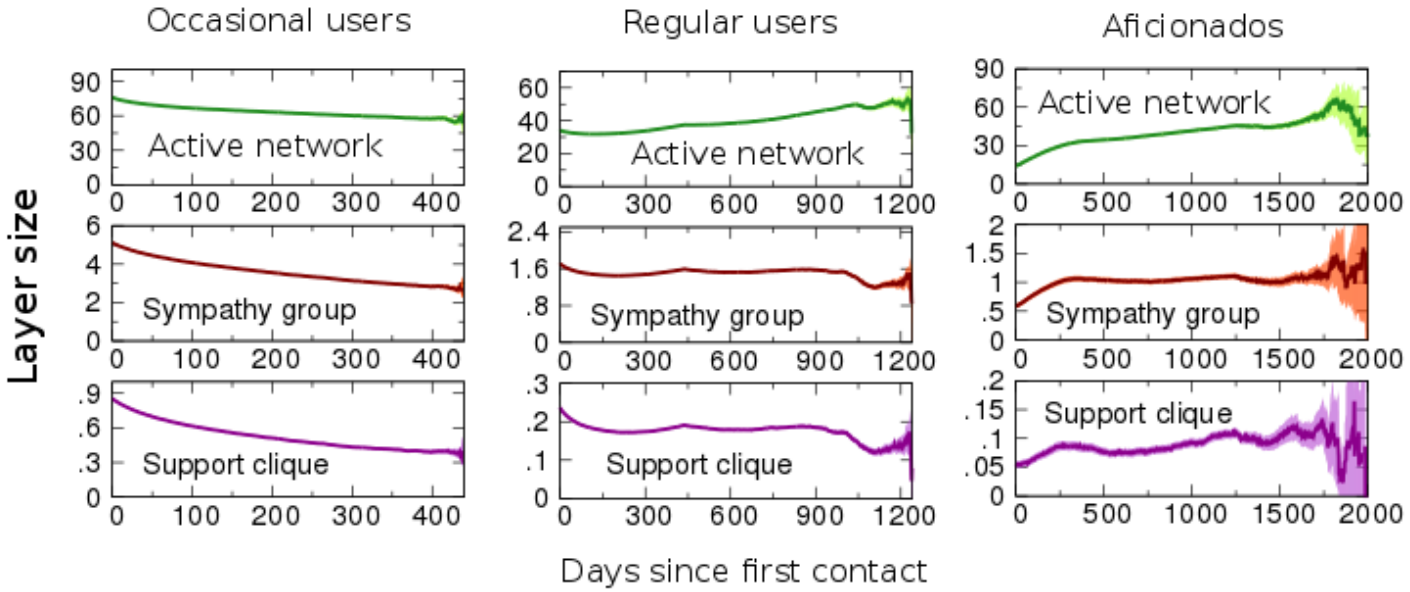
Number of contacts added over time

- The communication history of each user is shifted to start from the same point in time (origin)



- People add new contacts in their social networks at a nearly constant rate

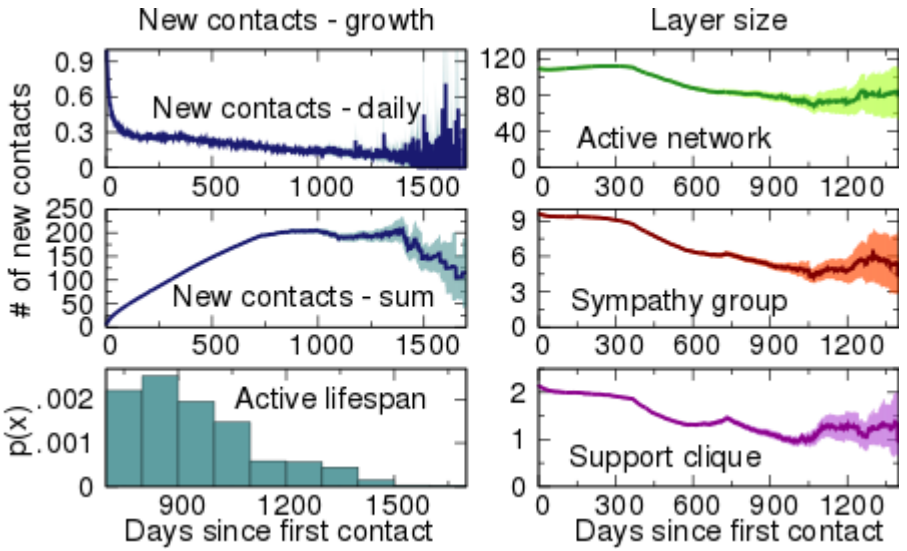
Number of contacts actively contacted



- The number of contacts actively maintained is limited – effect of cognitive constraints
- Different behaviour: Initial boost followed by decay or slow start followed by more stable activity
- Different from face-to-face ego networks

Structured ego networks

- Networks maintaining a support clique during all their temporal windows
- More similar to face-to-face ego networks
- Only 5.5% of the analysed ego networks



Ego Network Turnover

- Jaccard coefficient over consecutive (but not overlapped) 1-year windows
- Ego networks with at least 2 years of communications

Circle	Occasional users	Regular users	Aficionados
All ego networks			
Active network	0.124	0.098	0.103
Sympathy group	0.122	0.075	0.072
Support clique	0.057	0.024	0.012
Structured ego networks			
Active network	0.191	0.190	0.193
Sympathy group	0.287	0.309	0.362
Support clique	0.346	0.395	0.488

- Very high turnover (low Jaccard)
- Structured networks show turnover similar to face-to-face networks
- Turnover also affects support cliques

Conclusions

- Compared to “traditional” social networks, Twitter has smaller ego networks with a high percentage of weak ties and really high turnover
- Many users show an initial phase of very high activity followed by decay or abandonment
- A small but noticeable set of users prefer a “slow” start with a gradual increase of activity and more stable networks
- Users’ behaviour in Twitter seems to be adapting to the dynamism of our “liquid” society

Thanks for your attention!

Velocity of movement and access to faster means of mobility are the principal tool of power and domination.

Zygmunt Bauman