Information Propagation in Social Network Sites*

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Progetto #SIGSNA
- Social networking can be defined as “a gathering of individuals into specific groups”.
- Making communities is typical of mankind.
  
  “Man is by nature a political animal” – Aristotle.
- This tendency to create social connections can be limited by geographical, cultural and time-related obstacles.
- The Web provides an extraordinary and cheap context where very large networks can be created.
- Users are linked through several kinds of connections, e.g., friend (facebook), follower (twitter), colleague (linkedin).
- In online social networks people can often interact not just with direct connections, but also with the extended network of friends of friends.
- How many people are in your *extended* network?
- In how many communities are you?
- *How can you reach these people?*

<table>
<thead>
<tr>
<th>Your Connections</th>
<th>51</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your trusted friends and colleagues</td>
<td></td>
</tr>
<tr>
<td>Two degrees away</td>
<td>3,900+</td>
</tr>
<tr>
<td>Friends of friends; each connected to one of your connections</td>
<td></td>
</tr>
<tr>
<td>Three degrees away</td>
<td>351,900+</td>
</tr>
<tr>
<td>Reach these users through a friend and one of their friends</td>
<td></td>
</tr>
<tr>
<td>Total users you can contact through an Introduction</td>
<td>355,900+</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Total users you can contact directly — try a search now!</td>
<td>65,000,000+</td>
</tr>
</tbody>
</table>
spreading dynamics

connection

users
potentially exposed users may not be on line, or just miss the information
some users will actually read the message

exposed
spreading dynamics

propagator

interaction (comment, share...)
- Information propagation depends on how the SNS is used.
- Every SNS has its own dynamics of information propagation.
- In the following, focus on the following sites.

**Twitter (microblogging):**
- Short messages (140 ch)
- Not very popular yet in Italy (expected climax in a short time)
- Order of **100 million messages per day**

**FriendFeed (social media aggregator + facebook-like dynamics):**
- Recently **acquired by Facebook**.
- Aggregates social content from Facebook, Twitter, Blogs…
- Allows microblogging, but also **complex conversations**.
- About **5 million messages per week**
- Public APIs.
Friendfeed: Many different sources

Global data

Twitter 27%
Ping.fm 15%
Friendfeed 10%
Google Reader 8%
Bookmarklet 3%
HelloTxt 1%
Digg 1%
identi.ca 1%
Posterous 1%
Delicious 1%
YouTube 1%
Flickr 1%
Other 31%

Italian data

Twitter 15%
Ping.fm 7%
Google Reader 3%
Bookmarklet 4%
Friendfeed 21%
Ultime Notizie 1%
Delicious 1%
Digg 1%
Posterous 1%
identi.ca 1%
Google News 1%
Blip.fm 1%
YouTube 1%
Flickr 1%
Tumblr 2%
Other 40%
It is possible to describe a **rather accurate time trend** on a weekly base. As it appears clearly from the figures content production seems to have quite a cyclic behavior with lowest peaks during the weekend and a **dull progression from Monday to Thursday**.

To propagate our information we need other on line users, but other users will produce content in competition with ours.
Tip: In Social Media propagation comes through interactions so keep in mind the daily activity patterns.
<table>
<thead>
<tr>
<th>Platform</th>
<th>Friendfeed</th>
<th>Twitter</th>
<th>Facebook</th>
<th>flickr™</th>
<th>YouTube</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>avg</strong></td>
<td>1.07</td>
<td>0.04</td>
<td>0.02</td>
<td>0.04</td>
<td>0.05</td>
</tr>
<tr>
<td><strong>min</strong></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>max</strong></td>
<td>669.5</td>
<td>40</td>
<td>19</td>
<td>34</td>
<td>21</td>
</tr>
<tr>
<td><strong>st.dev</strong></td>
<td>6.34</td>
<td>0.47</td>
<td>0.32</td>
<td>0.56</td>
<td>0.44</td>
</tr>
</tbody>
</table>

Average number of comments received *in Friendfeed* for entries generated inside Friendfeed or imported externally.

**Tip:** Every Social Media platform has its own culture. Choose wisely where do you want to play and learn the local rules.
### Contacts

<table>
<thead>
<tr>
<th></th>
<th>Contacts</th>
<th>Active contacts (communications)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edges</td>
<td>14,946,610</td>
<td>161,603</td>
</tr>
<tr>
<td>Followers (avg)</td>
<td>44*</td>
<td>13*</td>
</tr>
</tbody>
</table>

* for users with public connections

**Tip:** do not judge a user from the number of connections, but consider their **quality**
Impact of Multimedia content (and culture)

(all posts)

<table>
<thead>
<tr>
<th>Global data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>entries</td>
<td>9,107,217</td>
</tr>
<tr>
<td>comments</td>
<td>1,346,978</td>
</tr>
<tr>
<td>ratio</td>
<td>0.15</td>
</tr>
</tbody>
</table>

(only posts with jpg, mp3, avi, ...)

<table>
<thead>
<tr>
<th>Multimedia</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>entries</td>
<td>686,491</td>
</tr>
<tr>
<td>comments</td>
<td>297,064</td>
</tr>
<tr>
<td>ratio</td>
<td>0.43</td>
</tr>
</tbody>
</table>

Tip: be cool

Comments per entry

.15

Comments per entry

.43
Cultural Influence (by language)
Users or services that post on-line a large quantity of messages usually get zero or very few comments: there is no conversation or real interaction going on between them and the community. Those services can surely be used, with an informative purpose, but as soon as they are perceived as spammers the interaction disappears.

With no interaction there is a very limited propagation.

Tip: participate, but do not annoy
Case studies on Breaking News propagation analysis

Online Propagations of Breaking News:
- The Death of Mike Bongiorno (Sep. 2009)
- Rescue operations for 33 Chilean Miners (Oct. 2010)
The Death of Mike Bongiorno (Sep. 2009)

- The news stroke Friendfeed users at 01.57 PM, Sep. 8.
- At that time only SkyTG24 was broadcasting the event.
- At the end of the day the death of Mike Bongiorno counted 585 comments, 276 during the first hour.
- Daily trends like the ones of traditional newspapers (on line versions).
The Death of Mike Bongiorno (Sep. 2009)

More than the 50% of the comments were generated by only 7 entries.

364 entries generated no comments at all.

Breaking news propagates through two main kinds of messages: those giving the news and those developing discussions on topics related to it.

Information persists through the mourning ritual (R.I.P. messages).

The life cycles of the two kinds of messages are significantly different: the first has a peak which decreases after short time. The second has a lower peak but may stay alive longer, keeping the news active on the SNS. This is a direct consequence of the different social roles of these messages.
Rescue operations for 33 Chilean Miners (Oct. 2010)

Global breaking news, data collected on Twitter and FriendFeed
Twitter conversation on the Miners’s rescue. It is possible to see how **local national communities still exist.**
The case of FriendFeed: some final remarks

– Users active inside Friendfeed generate much more comments than external users importing their messages into the service: **choose your service.**

– Content production rate follows specific time-trends: **follow the users’ rythm.**

– The average audience of an entry depends on its **posting time** with specifically identified trends.

– Information spreads on communication networks only partially overlapping the network of contacts: **having many friends doesn’t mean much.**

– Automated users tend not to generate discussions: **be real.**

– The number of comments received by users with more limited entry production rates increases only up to some threshold: **do not spam you readers.**

– Most conversations have a very quick growth and an evolution that usually ends within a few hours.
From FriendFeed to Twitter

- Most of microblogging messages produced none or very small communication activities and even the users that received a large number of directed messages reached that level through a few interactions from a large number of users instead of many interactions from a small number of users.

- The most commented users seem to be celebrities in different fields (from politics to journalism) or official channels. Mainstream media still play a key role as gatekeeper of communicative paths also in the microblogging context.

- The situation is however different in FriendFeed, where a socio-technical environment favoring discussions highlights the contributions of active users more than passive public figures.

- Users seem to communicate according to a regional or geographical identity. Local communities are clearly visible through the observation of communication networks.
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Questions?

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