A Temporal Visualizer for Social Networks

Example: Trying to Correlate Temporal Communication Patterns of Online Communities with Innovation

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Our tools employ a flexible & scalable systems architecture

e-Mail archives:
- mailing lists
- flat files
- .pst
- .mbx

parsing

From: To: Title: Timestamp: Contents...

database (SQL, grid, p2p)

Structural queries
Temporal Visualization by a Sliding Time Frame

With history:

No history:
Demo
Method of Analysis

• Watch movies
• Come up with hypothesis
• Verify/reject hypothesis
3 Streams of previous work

- Core/periphery structures (Borgatti, Everet, 1999)
- Work group structure & performance (Cummings, Cross, 2003)
- Temporal analysis of network structure (Holme, Edling, Lijeros, 2003)
Data Set

• One year mail archive of 200 people emerging global consulting practice
• Ego network of practice leader (his mailbox)
• Ego network of practice coordinator (his mailbox)
• Assumption: corresponds to organizational memory of practice
• 15 communities (messages grouped by practice coordinator and leader)
  – Development of 8 service offerings
  – Sales and marketing efforts
  – Weekly brownbag
  – Webinar organization (Web seminar)
  – Web Site development
  – Software vendor collaboration
• Performance measurement: quality of community output
  (popularity for service offerings, judgment of practice leader for admin communities)
Advantages/Disadvantages of Data Set

+ Researcher has deep knowledge
+ Organizational memory of practice
+ Measurable output
  – Researcher might be biased
  – Incomplete data (ego network)
Hypothesis: Innovation Dissemination by evolving types of Collaborative Knowledge Networks

Example:

Linux Creators

+ 

Linux Sysadmin

+ 

Linux Users

COIN
Collaborative Innovation Network

CLN
Collaborative Learning Network

CIN
Collaborative Interest Network
In SNA terms

<table>
<thead>
<tr>
<th></th>
<th>COIN</th>
<th>CLN/CIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>core/periphery</td>
<td>large core</td>
<td>small core</td>
</tr>
<tr>
<td></td>
<td>small periphery</td>
<td>large periphery</td>
</tr>
<tr>
<td>density</td>
<td>high</td>
<td>low</td>
</tr>
<tr>
<td>betweenness centrality</td>
<td>low</td>
<td>high</td>
</tr>
</tbody>
</table>

GBC: Global Betweenness Centrality
- GBC=1
- GBC=0

Diagram:
- GBC=1
- GBC=0
- GBC=0
Application: virtual global consulting practice

Core team
Group Betweenness Centrality for service offering development no history, time window 5-50 days
Community Building Service Offering
(381 mails, 65 individuals)

Brownbag
(665 mails, 96 individuals)

no history  30 days
Webinar, 152 individuals, 606 messages

presentation/broadcast of content

development of content

presentation/broadcast of content

development of content
6 innovation communities 130 individuals, 736 messages
But: Admin has same pattern

Blue: Swiss
Light blue: European
Red: US
Green: UK
Conclusions

• New way for temporal analysis of social networks:
  – Measuring a sliding time window
  – Movies of evolving networks with/without history
  – Evolving properties of social networks (group betweenness centrality)

• Temporal analysis conveys new insights
• Fast way to find periods of low/high centrality
• Identify periods of high productivity and information dissemination
• Need other contextual cues to obtain full understanding
More info

• CKN Web site: www.ickn.org
• Download CKN tool
  http://www.ickn.org/ickndemo/

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