Keep Your Friends Close and Your Facebook Friends Closer: A Multiplex Network Approach to the Analysis of Offline and Online Social Ties

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Multiplex Network Approach

Do stronger ties utilize more communication channels?

Are people who utilize more communication channels more similar?

Are online social circles more diverse than offline social circles?

TM ⊂ PC ⊂ CL

Do stronger ties utilize more communication channels?

Are people who utilize more communication channels more similar?

Are online social circles more diverse than offline social circles?

Multiplex Network Approach

Degree

Co-location
Phone Call
Test Message

No Relationship
Facebook Friends
Close Friends

n = 74

Multiplex Graphs

Graph Aggregations

Intersection all
Union all

Relationship
None(none)
Facebook(Fb)
Socialize(soc)
Close Friends(cf)

Degree

\[ \sum_{i,j} \delta_{ij} \]

\[ \sum_{i,j} \delta_{ij} \]

Multiplex distance: the shortest path distance between two nodes in a network where edges are weighted by their multiplexity

\[ d_{ij} = \min_{k} d_{ik} + d_{kj} \]

Survey Data*

<table>
<thead>
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<th>Category</th>
<th>Parameters</th>
<th>Range</th>
<th>avg</th>
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<tbody>
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<td>Political</td>
<td>Interest in politics</td>
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</tr>
<tr>
<td></td>
<td>Political orientation</td>
<td>Star</td>
<td>0.55</td>
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<tr>
<td></td>
<td>Liberal - Conservative</td>
<td>Liberal</td>
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<tr>
<td></td>
<td>Socialization intensity</td>
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<td>0.35</td>
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<tr>
<td>Health</td>
<td>Weight (lbs)</td>
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<td>110 lbs</td>
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<td>Height (in)</td>
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<td>5 ft 7 in</td>
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<td></td>
<td>Smoke per week</td>
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<td>3.5 days</td>
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<td></td>
<td>Exercise per week (days)</td>
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<td>2 days</td>
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<tr>
<td></td>
<td>Sleep per week (days)</td>
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<td>5 days</td>
</tr>
<tr>
<td></td>
<td>Socialization intensity</td>
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<tr>
<td></td>
<td>Music</td>
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<tr>
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<td>Other</td>
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Online Diversity

\[ D_{ij} = \sum_{k} \delta_{ik} \sum_{j} \delta_{jk} \]

Greatest diversity is possible online social circles with respect to the political and music connection.

Political Orientation

Music Preferences

Are online social circles more diverse than offline social circles?

Situational Factors

Health Factors

Take-aways

Strong social ties are characterized by maximal use of communication channels.
Weak social ties are characterized by minimal use of communication channels.
A multiplex network approach helps analyze social ties and their strength.
Similarity between pairs is greater at a shorter distance in the multiplex network.
Online social circles can provide greater diversity of information in politics and music.

Take-aways

Contact: dh478@cl.cam.ac.uk | www.cl.cam.ac.uk/~dh478/ | @desi_hristova

Situational Factors

Health Factors

Graph Aggregations

Intersection all
Union all

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