The Impact of Graph Structure on Small-World Shortest Paths

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Motivation: Adding “social” to social networks analysis!

Idea:
- Small-world shortest paths: Merging the concept of shortest paths in a social network with small-world phenomenon.
- Small-world representation: The flow of information is NOT always unidirectional!

Analysis:
- Global and local network measures vs. small-world shortest paths

Goal:
- Identification of network measures with highest average shortest path prediction capability

Data: 10 real-world online and physical social networks

Influential Network Measures: Maximum Degree Centrality and Diameter

Local Measures and Shortest Path Distribution

• Goal: Can we approximate shortest path distribution using local network measures?

• Shortest path node ranking:

• Distributions:
  - Naïve Unif (1, SPN_{max})
  - Small-World Unif (1, SPN_{max})
  - Small-World Normal (SPN (n_{mcc}), 1)

• Results:
  - Big Picture: Approximating global properties of social networks using only network local information

Network Measures and Average Shortest Path

Goal:
- Identification of network measures with highest average shortest path prediction capability

Dataset | deg, dist.Deg, cont.Cent, cont.Local Clust. coeff. | Average shortest path | Estimated average shortest distance |
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References: