Scientific Modeling Computer Laboratory

Project: Time Evolving Networks

Midterm Presentation
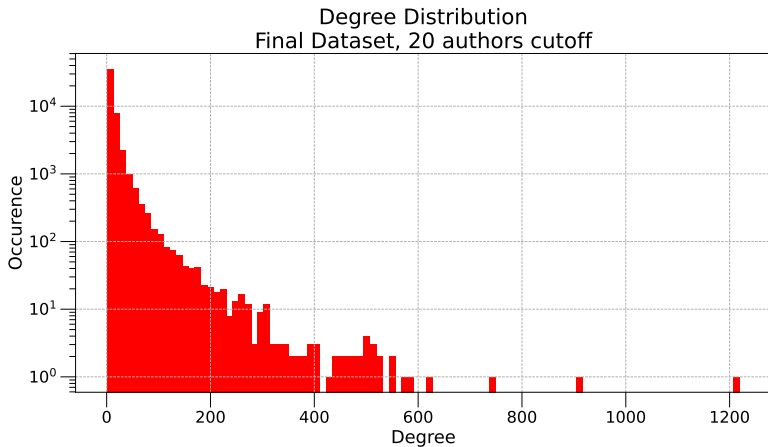
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Previously

- ▶ What is MTMT?
  Hungarian Repository of Scientific Works
- ▶ How to acquire data?
  ReST API Queries
- ▶ What part of the data is needed?
  Authors for a given publication

Degree Distribution From Final Dataset

Degree Distribution
Final Dataset, 20 authors cutoff

Degree Distribution From Final Dataset

Degree Distribution
Final Dataset, 20 authors cutoff (no multiple connection)
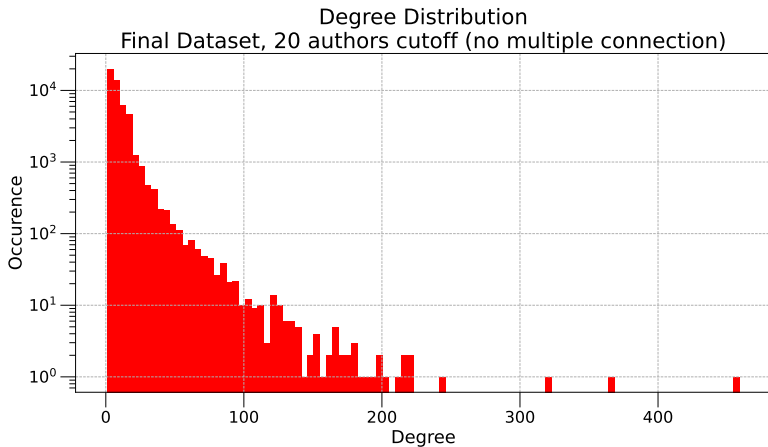
Difference in the Distributions

What is the difference?

The difference is that in first one multiple connections are allowed between nodes, while it is not allowed in the other.
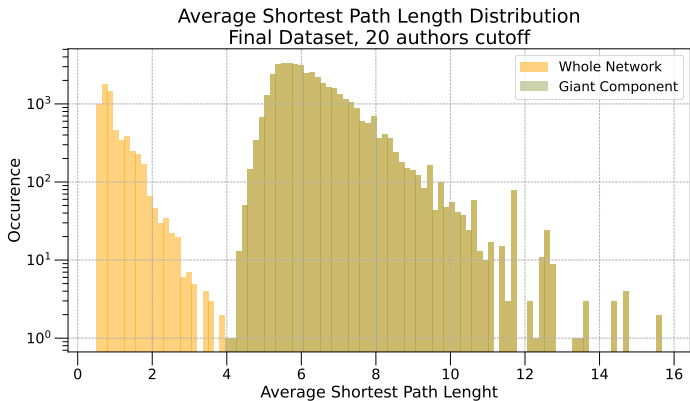
▶ This brings light to that some connections are born again

▶ Authors prefer to work with people that they already know

Purging Self Loops

Graph Representation of the Author Network
with 20 authors cutoff
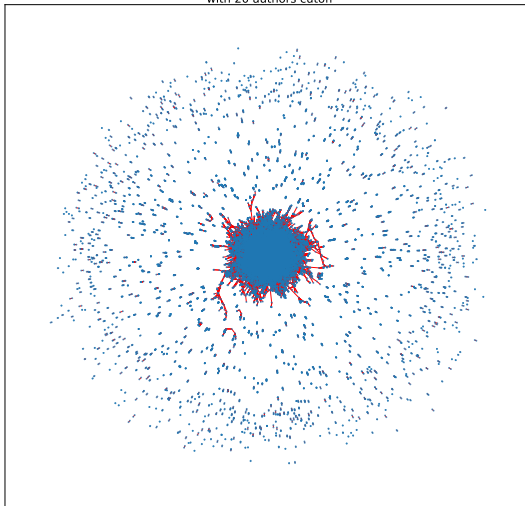
Average Shortest Path Length

Average Shortest Path Length

With the average shortest path length, we have a measure of centrality.

- ► Lower values describe nodes that are closer to the center
- ► Higher values should be investigates: they are at the edge of chains

Components in the Network

We saw that there is a giant component with most of the nodes in it. How are the smaller components structured?

- ▶ The giant component has ≈ 43000 nodes
- ▶ The smaller components have few, up to 37 nodes in them
- ▶ Components are disconnected from each other

Components in the Network

Component Size Distribution
Final Dataset, 20 authors cutoff
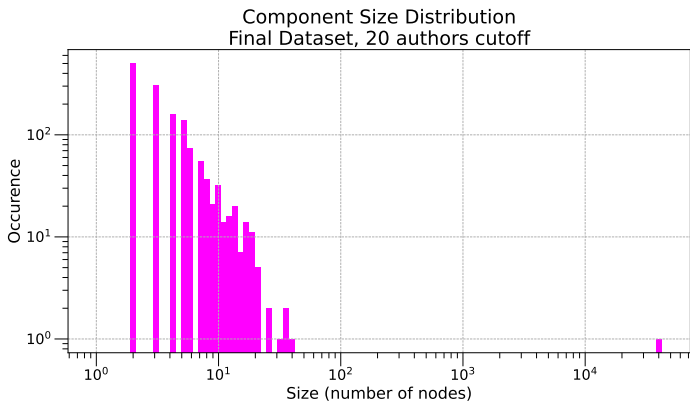
Components in the Network
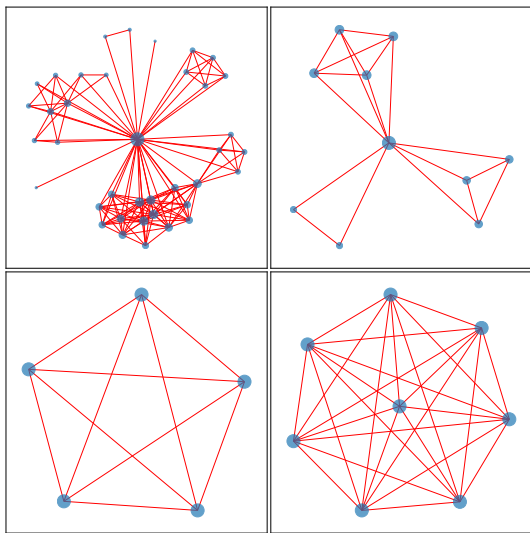
Assortativity

We can look into the structure of the network by the means of degree correlation.

It this case, K_{nn} will be used. After fitting a power-law function, we can tell the assortativity using the exponent

- ▶ Neutral: exponent is nearly zero
- ▶ Assortative: positive exponent
- ▶ Disassortative: negative exponent

Assortativity

K-NN, Degree Correlation
Final Dataset, 20 authors cutoff
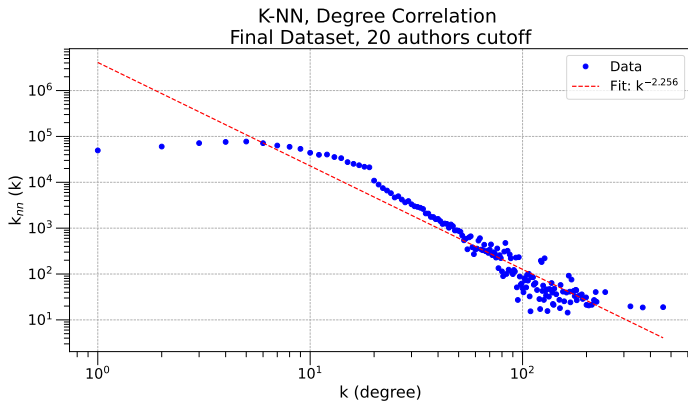
Animation of the evolution

Here!

References

[1] Albert-László Barabási. "Network Science". In: *http://networksciencebook.com* (2012).

[2] Aric A. Hagberg, Daniel A. Schult, and Pieter J. Swart. *Exploring network structure, dynamics, and function using NetworkX, in Proceedings of the 7th Python in Science Conference (SciPy 2008)*. 2008.

[3] Xiaoming Liu et al. *Co-Authorship Networks in the Digital Library Research Community*. 2005.

Thank you for your attention!