

Network Scientists Analyzed

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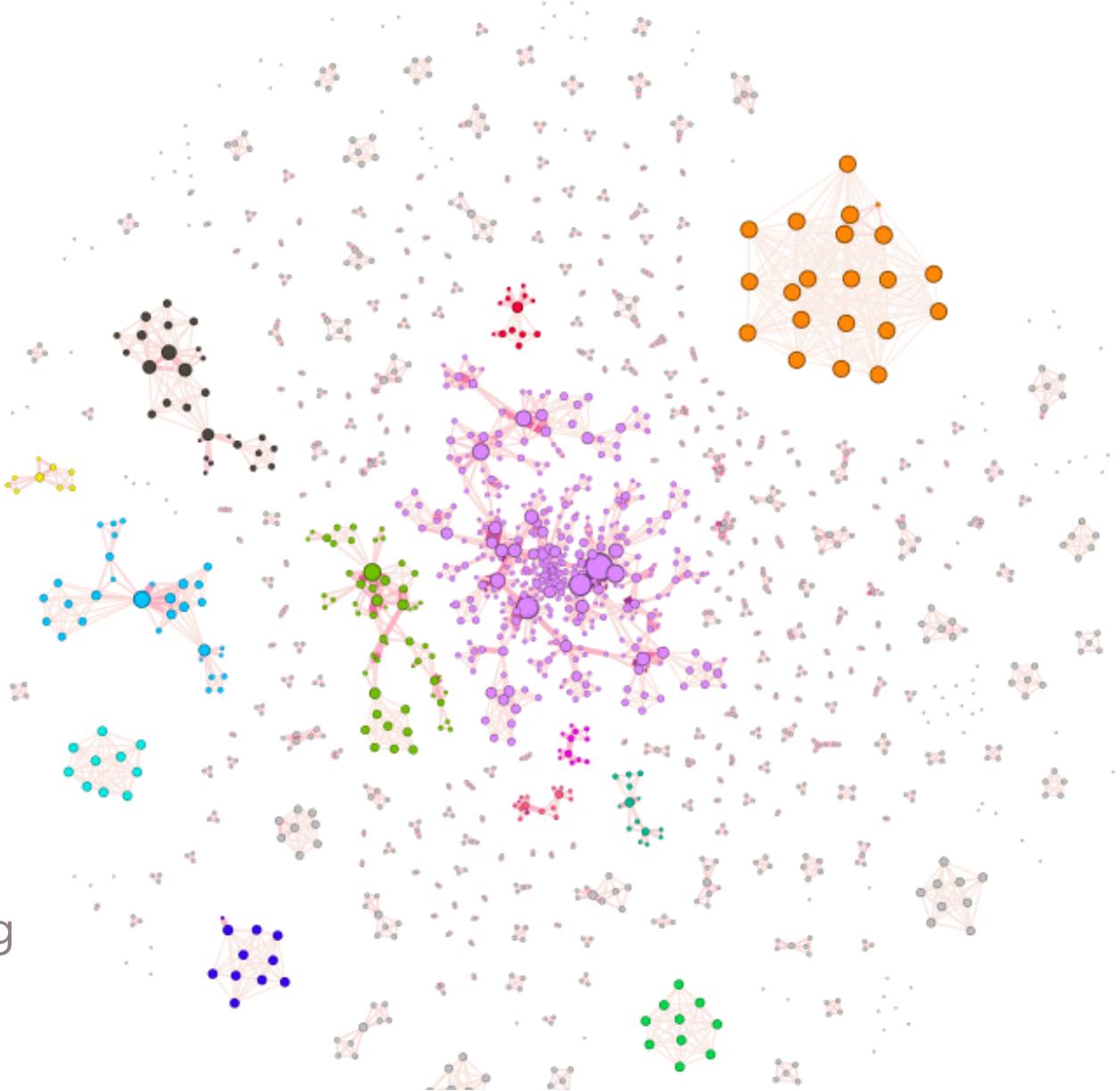




Part1: Statistical Analysis

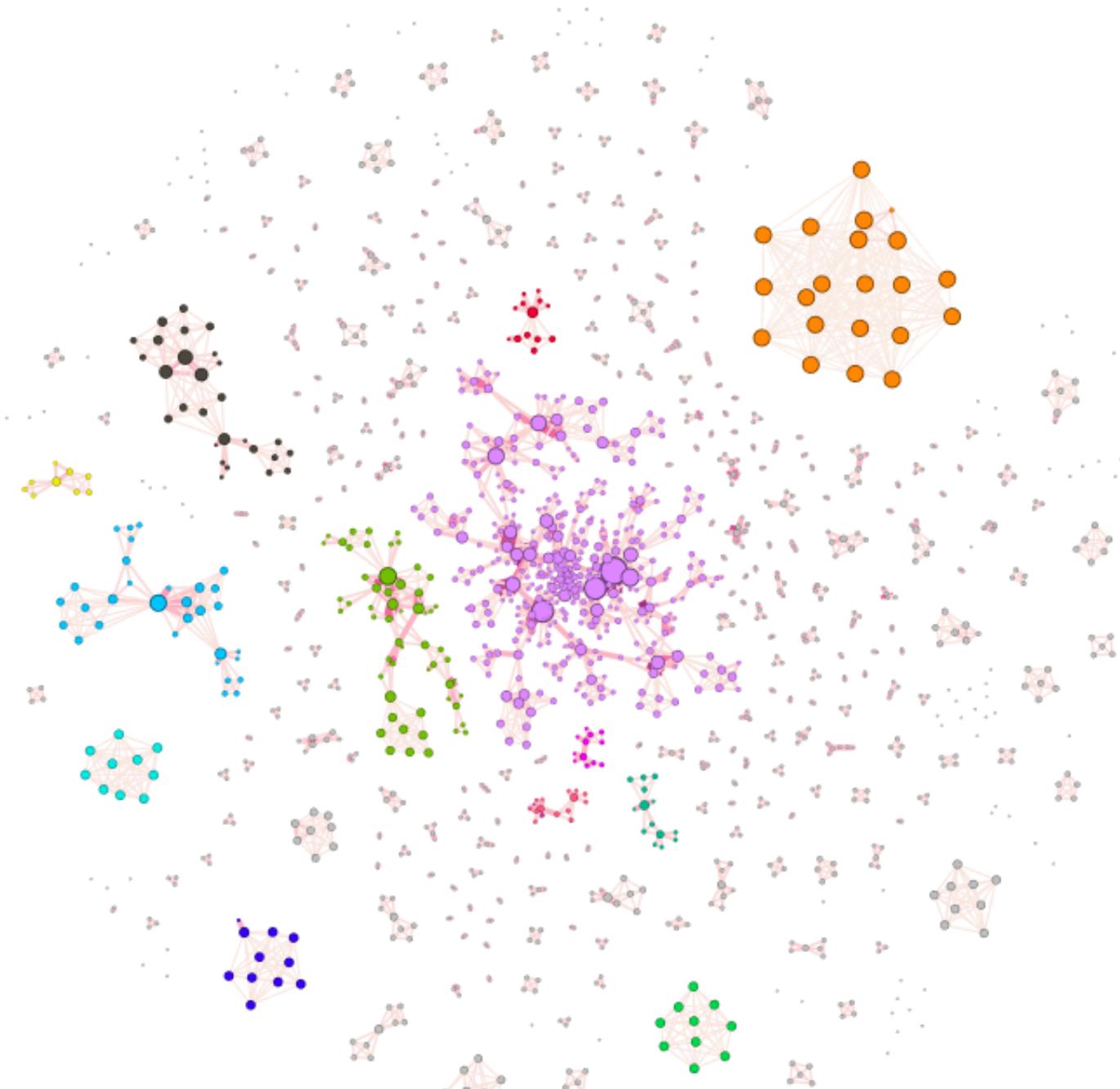
Netscience Network

Co-authorship network of scientists working on network theory and experiment, as compiled by M. Newman in May 2006. The network is undirected, weighted and the only attribute is the labels of the nodes, i.e., the authors' names. The network is divided into disconnected communities, mostly because of the nature of the research. For example, the almost-complete orange graph in the northeast of the representation is the collaboration of scientists working on protein-protein interactions.



Network Level Measures

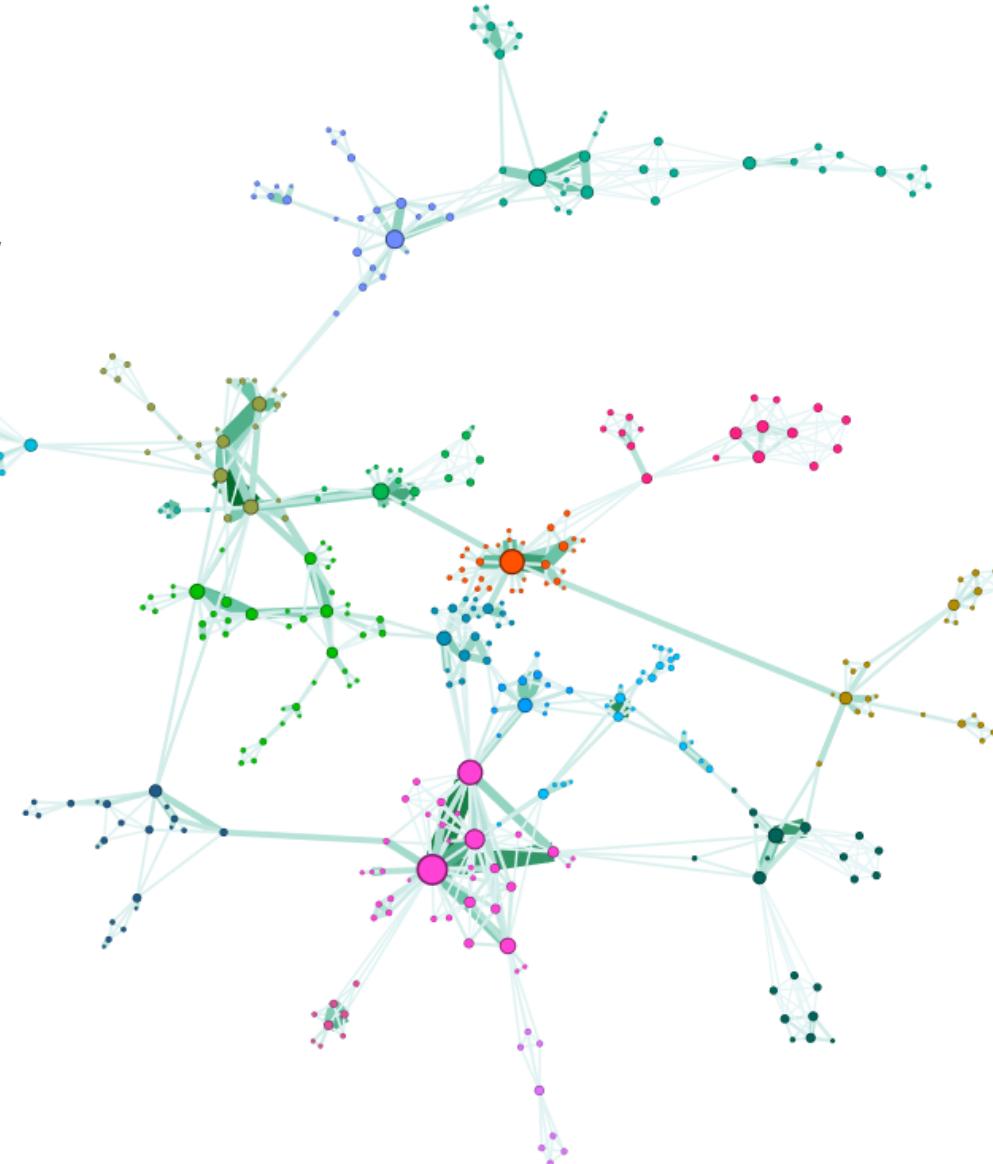
Measure	Value
network size	2'742
network order	1'589
components of one node (isolates)	128
components of two nodes (dyadic isolates)	102
componenets of three nodes or more	166
average degree	3.451
maximum degree	34
density	0.002
transitivity	0.693
average clustering coefficient	0.638



The Giant

Size of the most large connected component, a.k.a. the Giant, is 914 and its order is 379.

This network represents the main body of scientific community working on Network Science. It is made of communities connected to eachother through hubs. For example, the tail of the green community in the northeast of the representation is Finnish researchers that are connected via a Finnish scholar in Stanford University to the rest of the scientific community. The red node in the middle of the representation is Newman and the three large nodes in pink are Barabási, Jeong, and Oltvai.



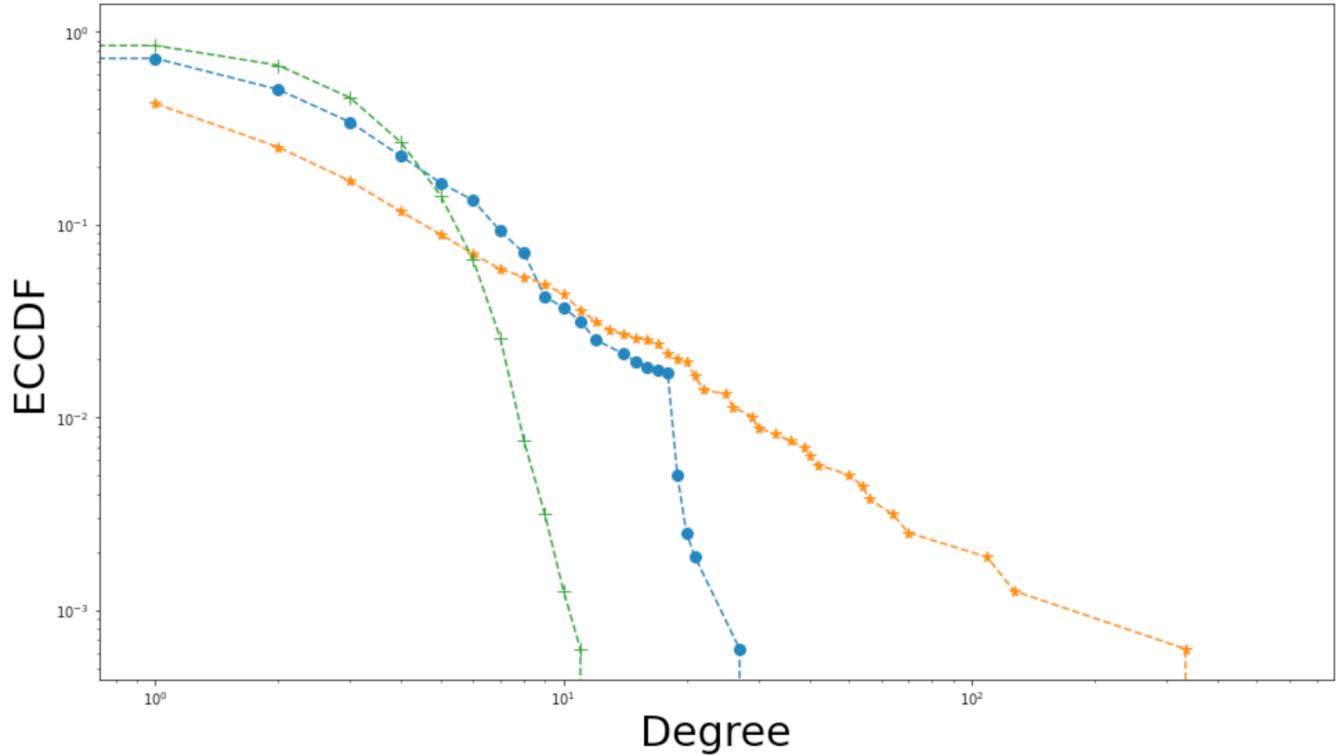
Network Level Measures

Measure	Value
network size	914
network order	379
average degree	4.82
maximum degree	34
density	0.013
transitivity	0.431
average clustering coefficient	0.741
diameter	17



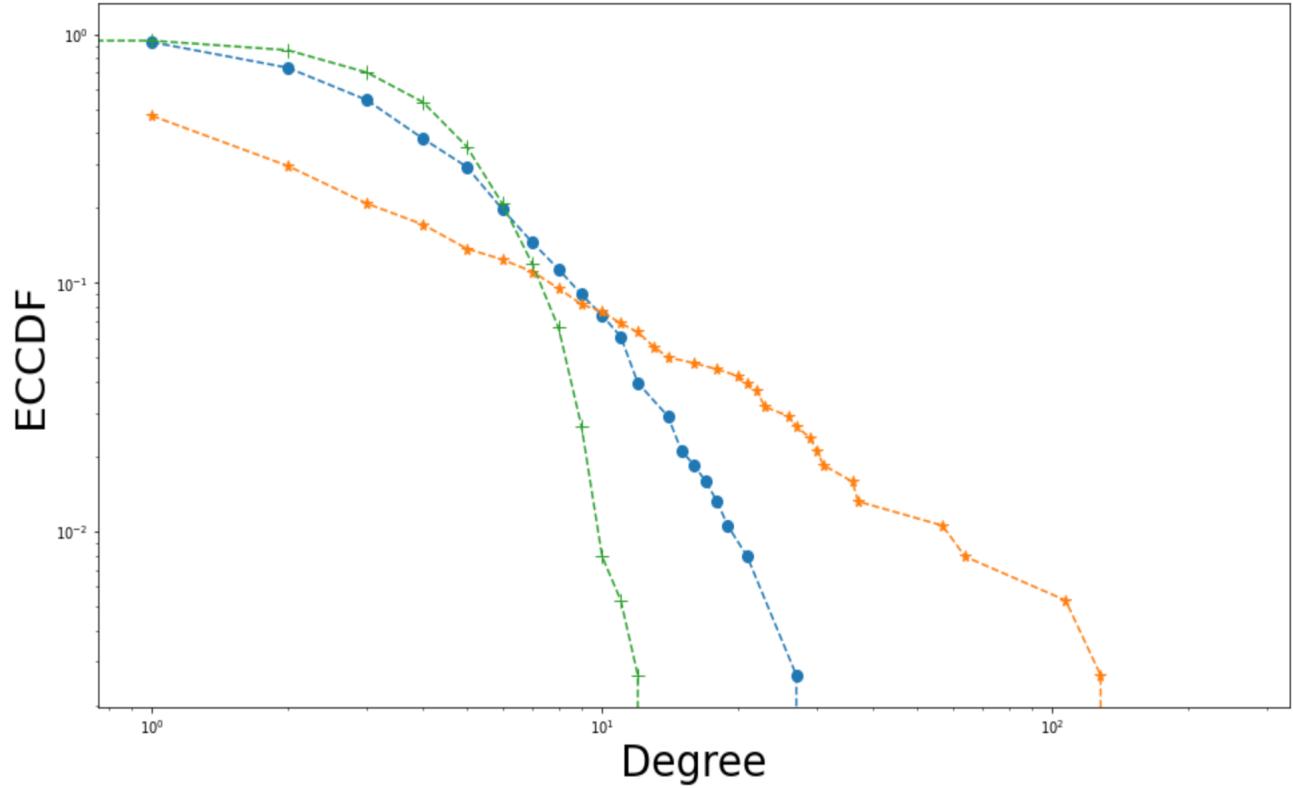
Distribution of Degrees

The distribution of degrees in our network is shown by blue color, while the Erdős-Rényi model with the same size and order is shown by green and the Barabási-Albert model with the same size and order is shown by orange. The degree distribution of our network is something in between.



Distribution of Degrees

The distribution of degrees in the largest connected component is almost the same as the network itself. The giant is shown by blue color, while the Erdős-Rényi model with the same size and order is shown by green and the Barabási-Albert model with the same size and order is shown by orange. The degree distribution of our network is something in between.



Growth of the Network

We don't have the temporal dimension of the co-authorship data, but we can reconstruct how may the network grew using the metrics in hand. In this animation we used degree centrality to show the growth of the largest connected component of the network (the Giant). We start from the nodes with higher degree centrality and step-by-step add nodes with lower degree centralities.



Growth of the Network

In this animation we used betweenness centrality to show the growth of the Giant. We start from the nodes with higher betweenness centrality and step-by-step add nodes with lower betweenness centralities.



Growth of the Network

In this animation we used closeness centrality to show the growth of the largest connected component of the network. We start from the nodes with higher closeness centrality and step-by-step add nodes with lower closeness centralities.



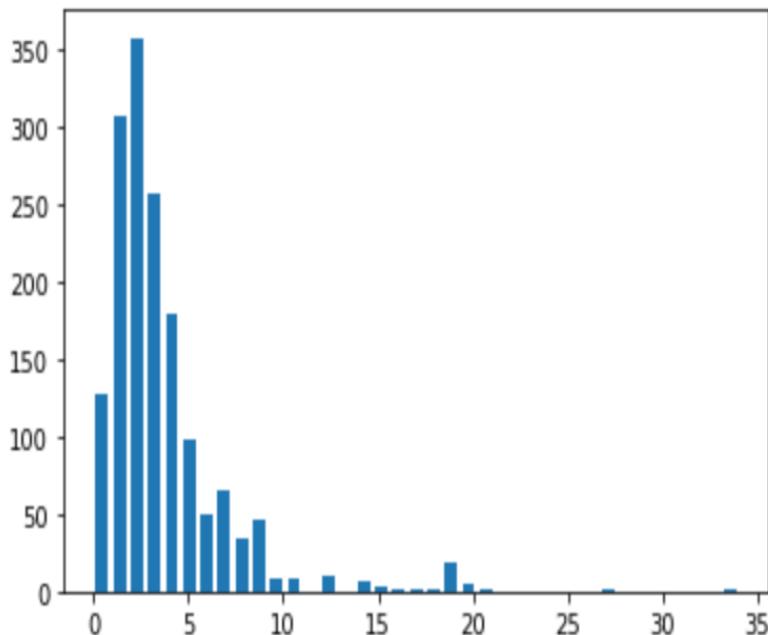
Growth of the Network

In this animation we used a little different metric to reconstruct the growth of the network. Here we used clustering coefficient to show the growth of the largest connected component of the network (the Giant). We start from the nodes with higher clustering coefficient and step-by-step add nodes with lower clustering coefficient.



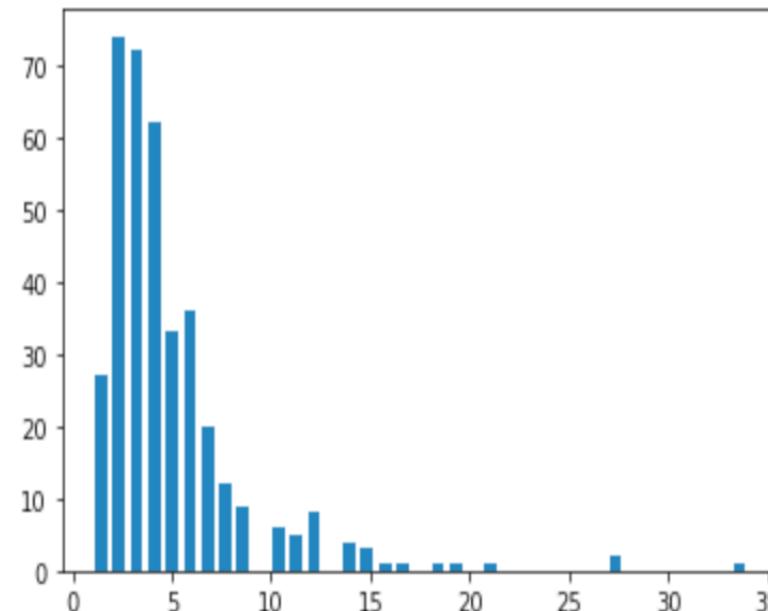
Degree Distribution

Netscience



As degree increases, the count decreases which makes the graph as a scale-free network.

Giant

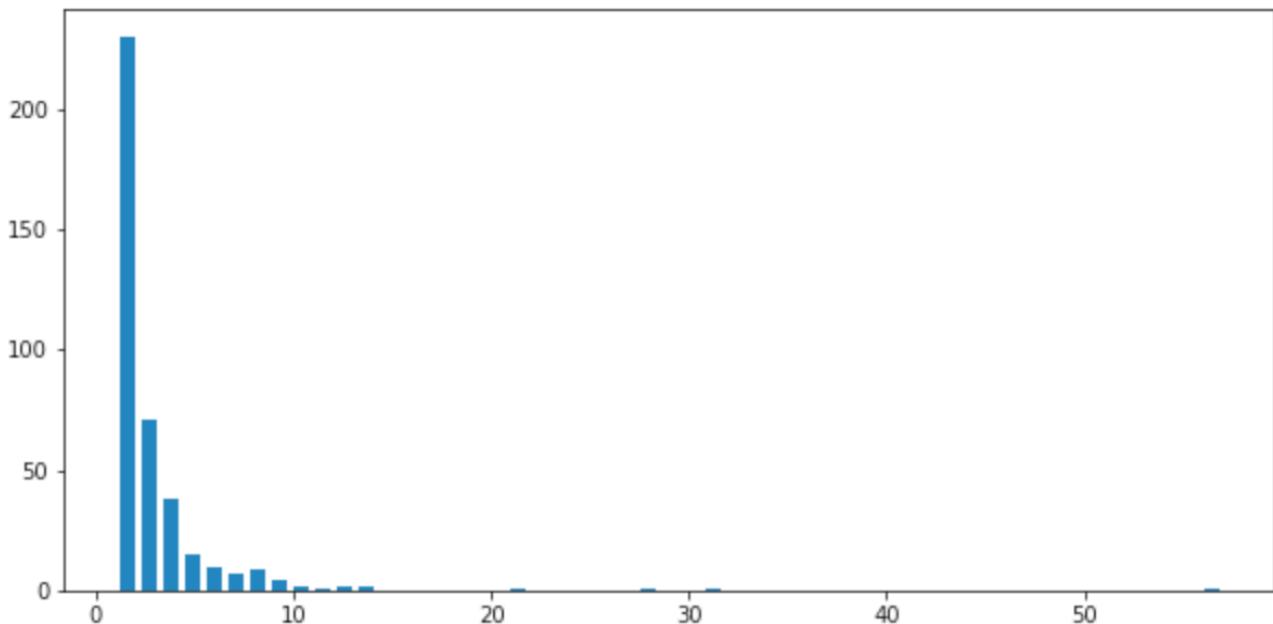


As degree increases, the count decreases which makes the graph as a scale-free network.

Connected Components

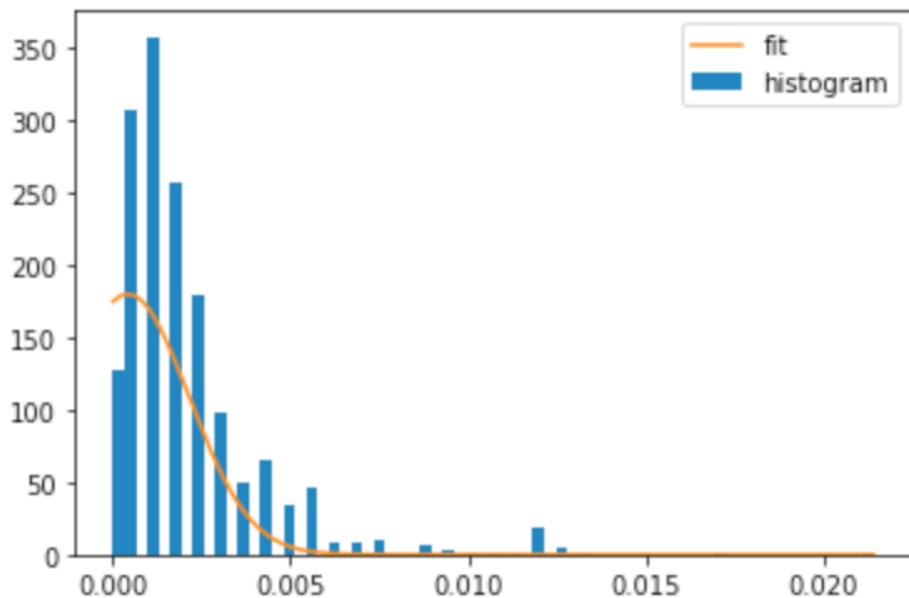
Number of connected components are 396 and the largest component has around 375 nodes that contains about 24% of the nodes.

Size distribution of the components are more like that of the World Wide Web, where the largest component has around one quarter of the nodes.

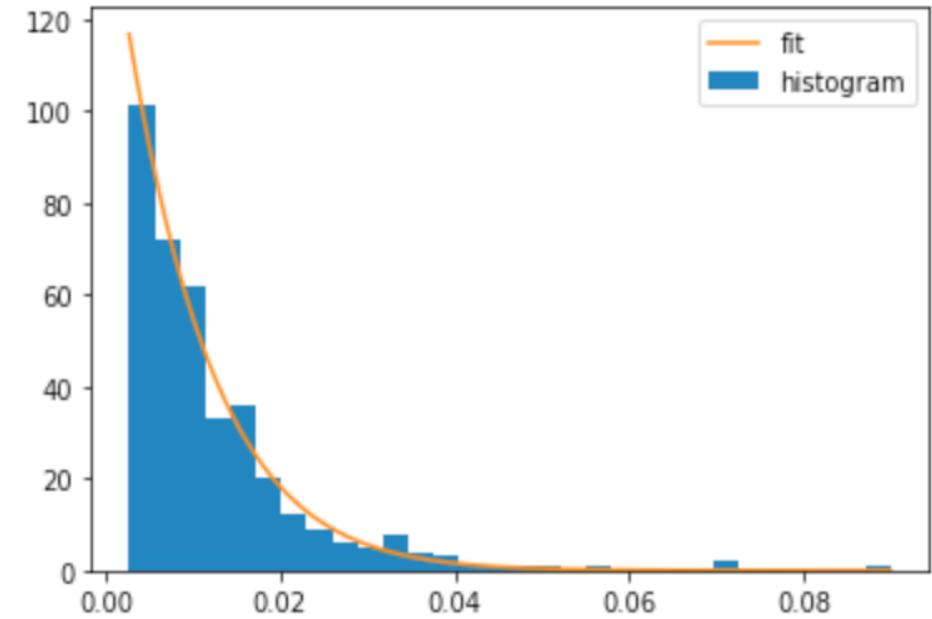


Degree Centrality

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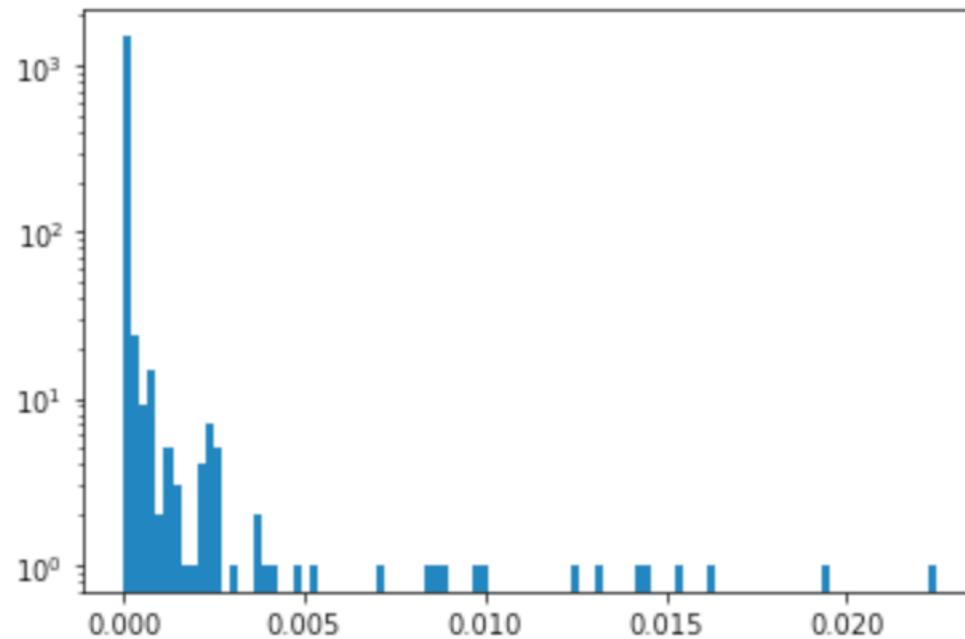


- Giant

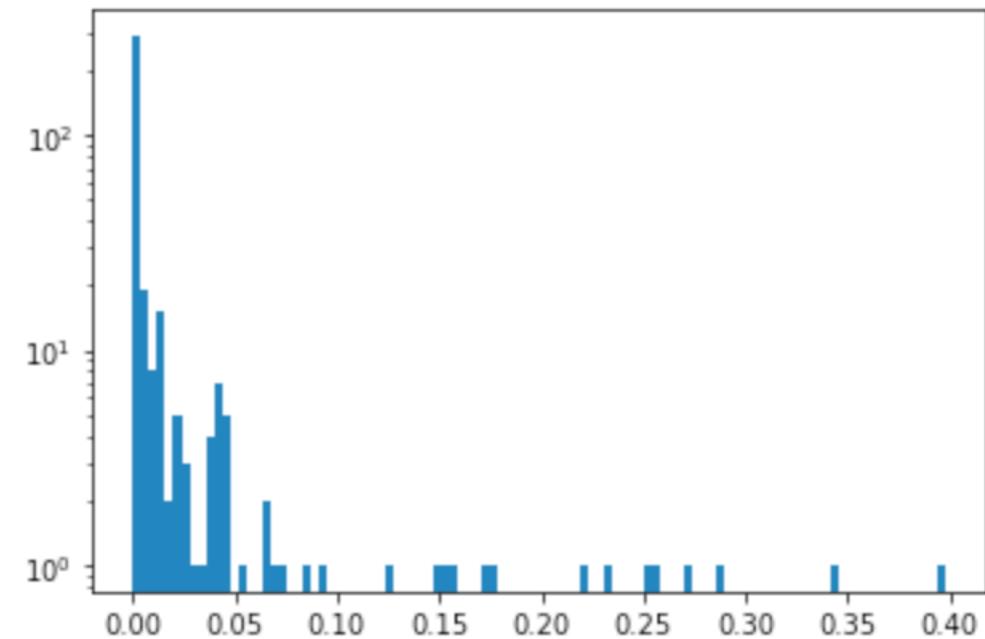


Betweenness Centrality

▪ Netscience

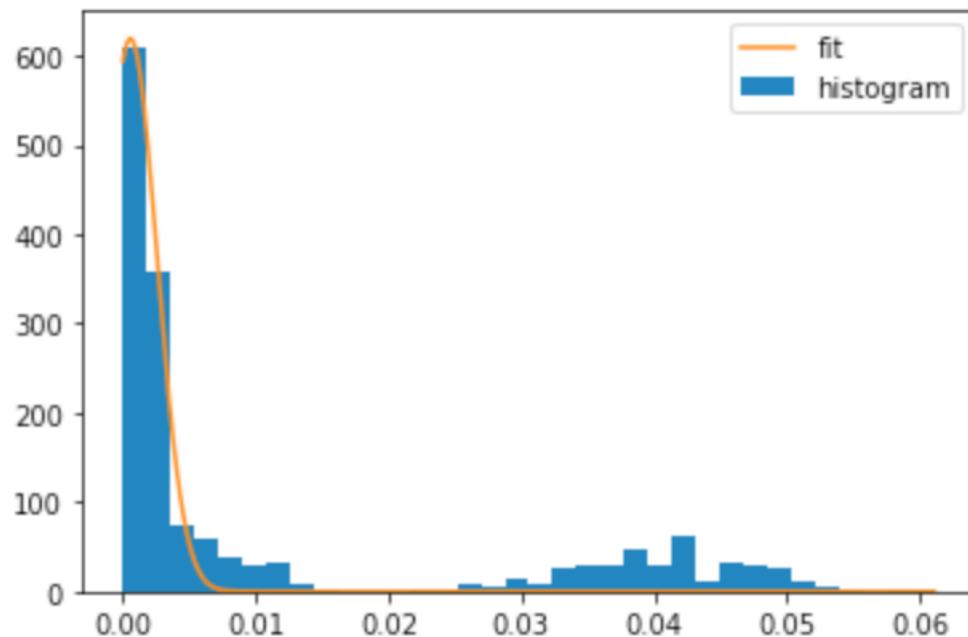


▪ Giant

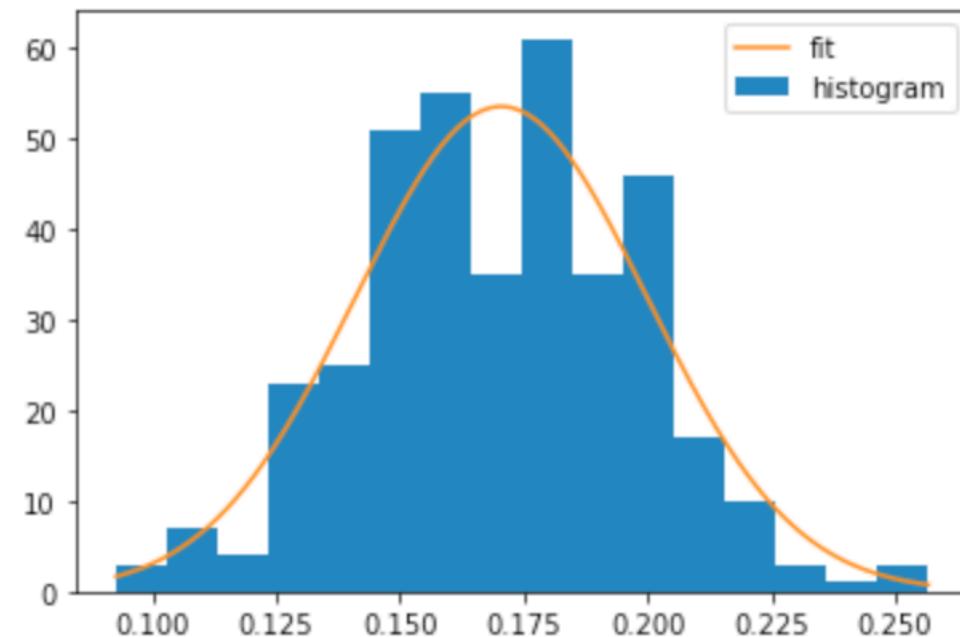


Closeness Centrality

- Netscience

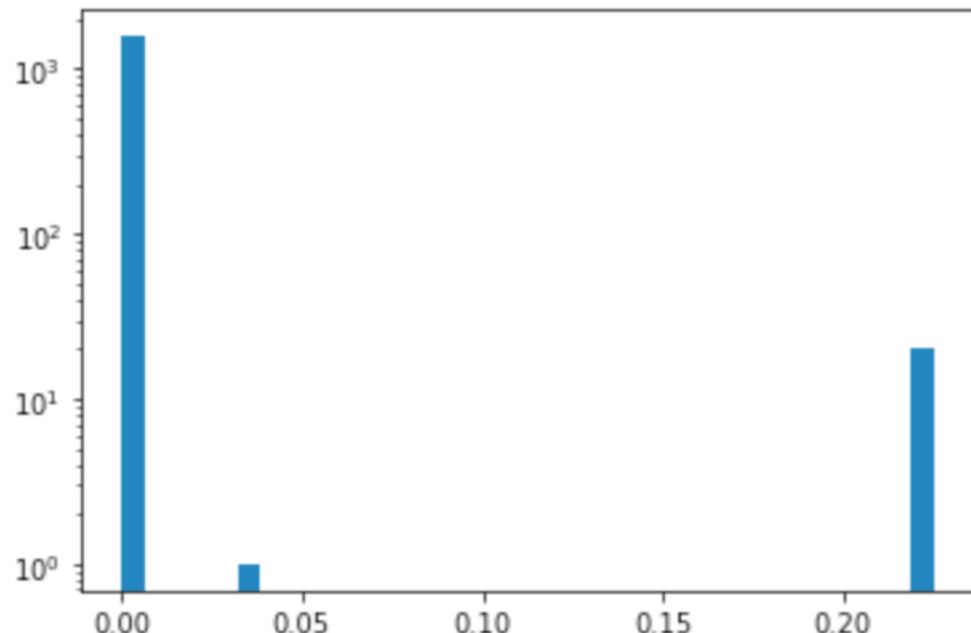


- Giant

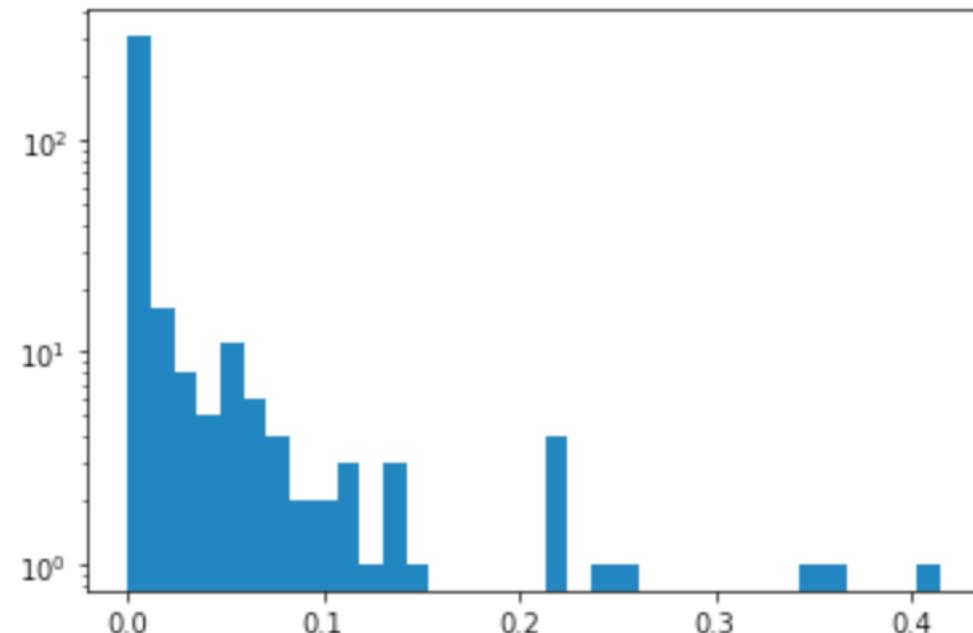


Eigenvector Centrality

- Netscience

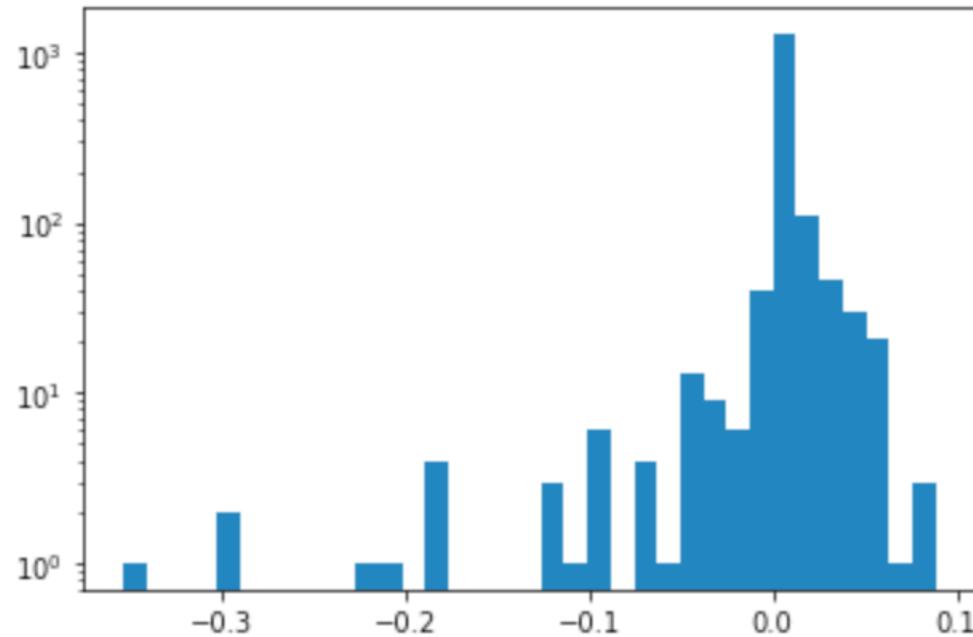


- Giant

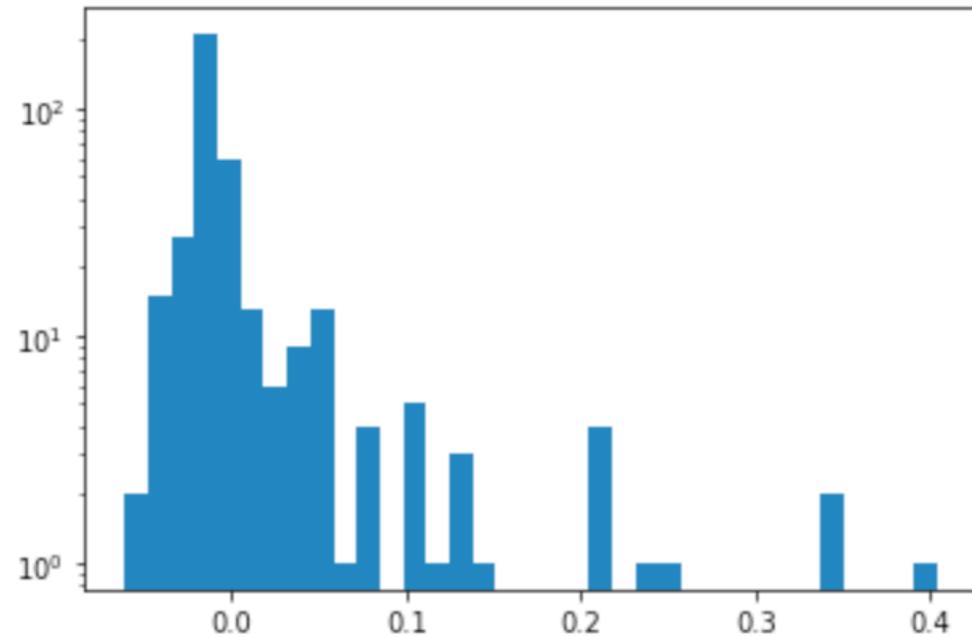


Katz Centrality

▪ Netscience

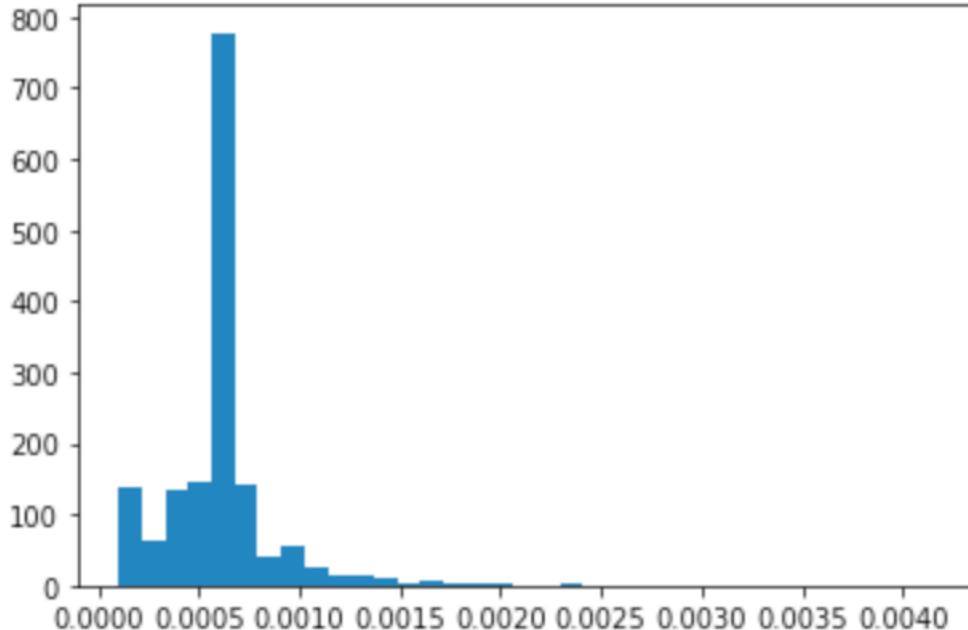


▪ Giant

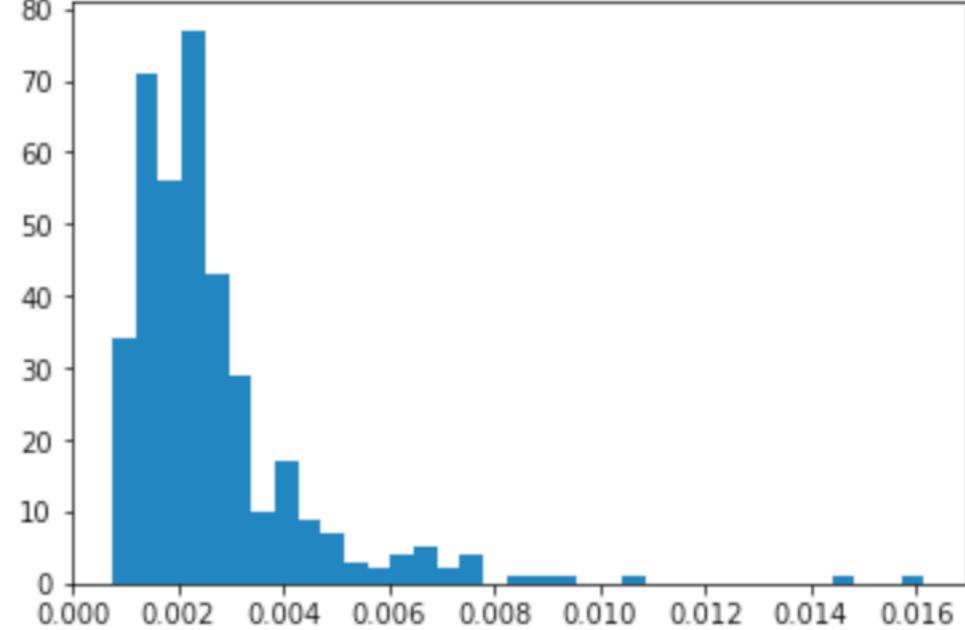


Pagerank

■ Netscience

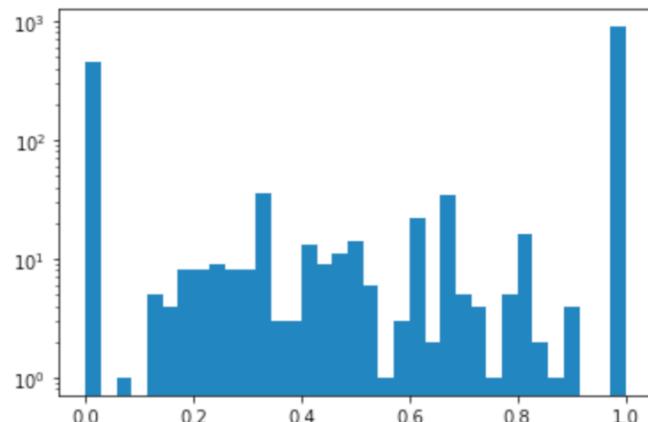


■ Giant

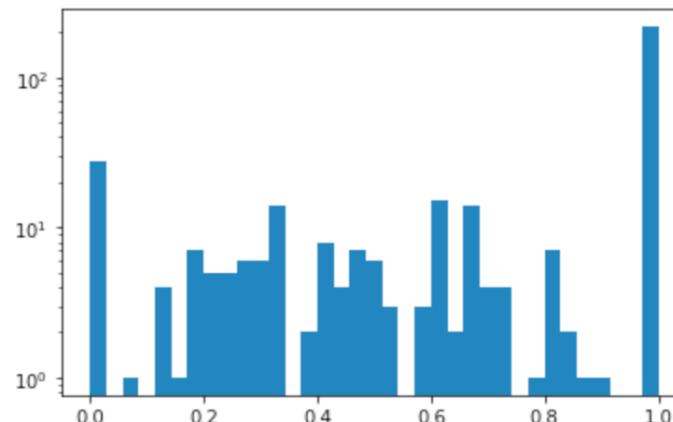


Clusters

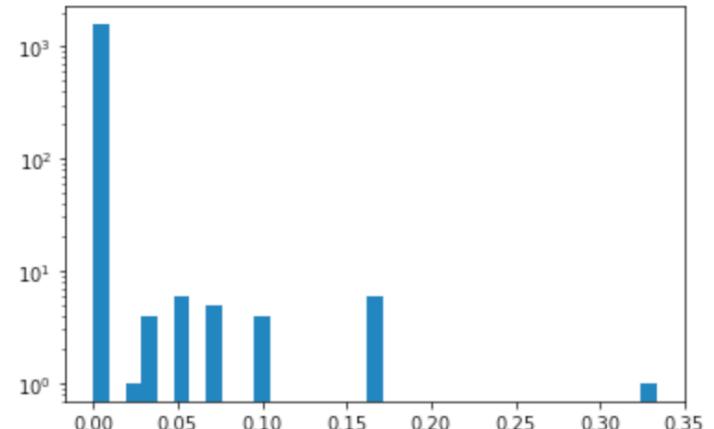
▪ Netscience



▪ Giant

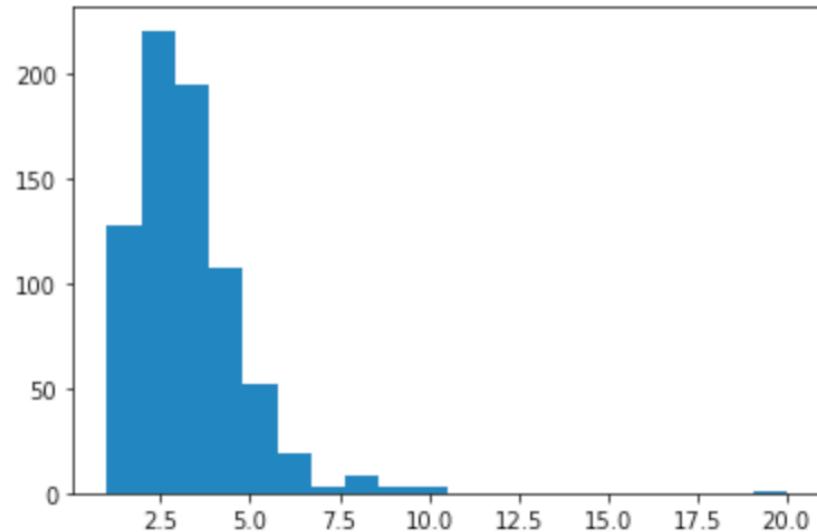


▪ Erdős–Rényi model

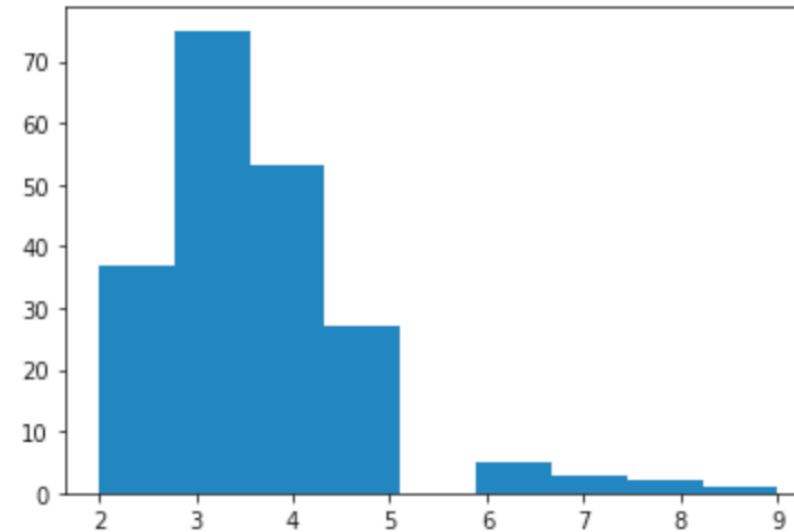


Maximal cliques

■ Netscience



■ Giant



Part2: Inferential Analysis

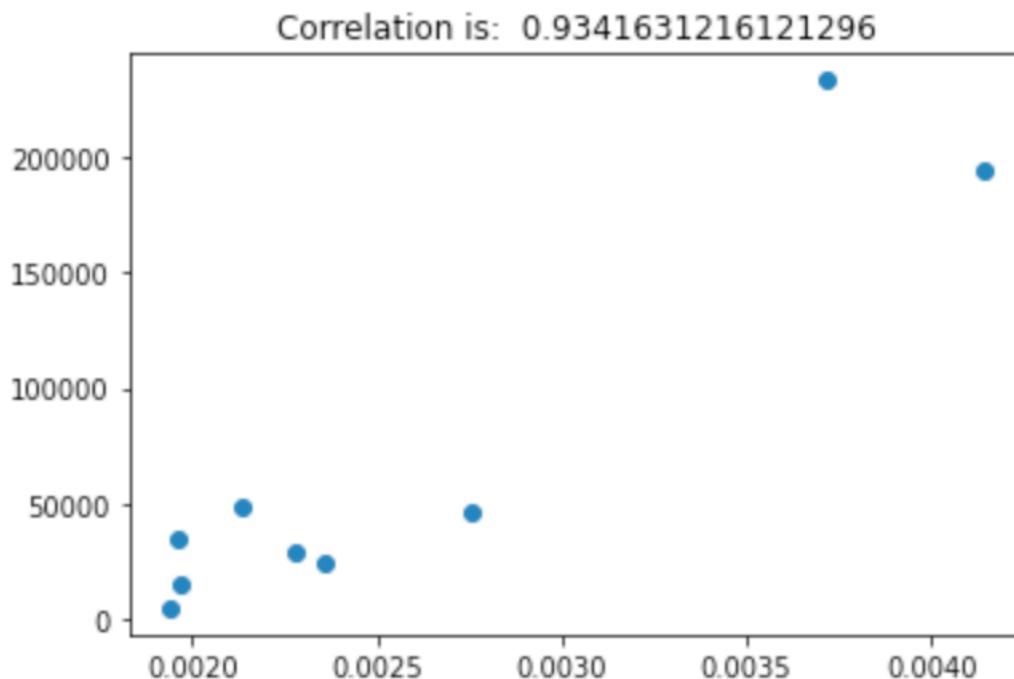


Citations and PageRank

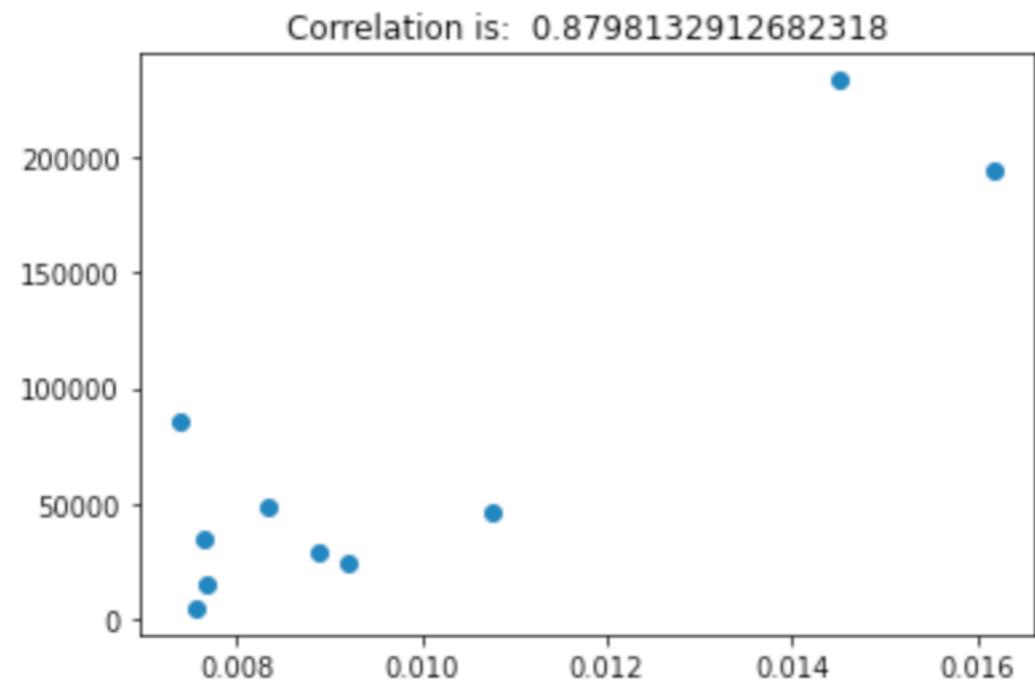
- In this part we will take a look at the relation between different metrics of centrality and different productivity measures of Scientometrics (h-index, i10-index, citations and all these three metrics since 2015).
- The data gathered from Google Scholar page of the some of scientists presenet in the network.
- Since the most significant correlation was between PageRank and citations, the rest are out of the scope of this presentation.

PageRank and Citations

Netscience

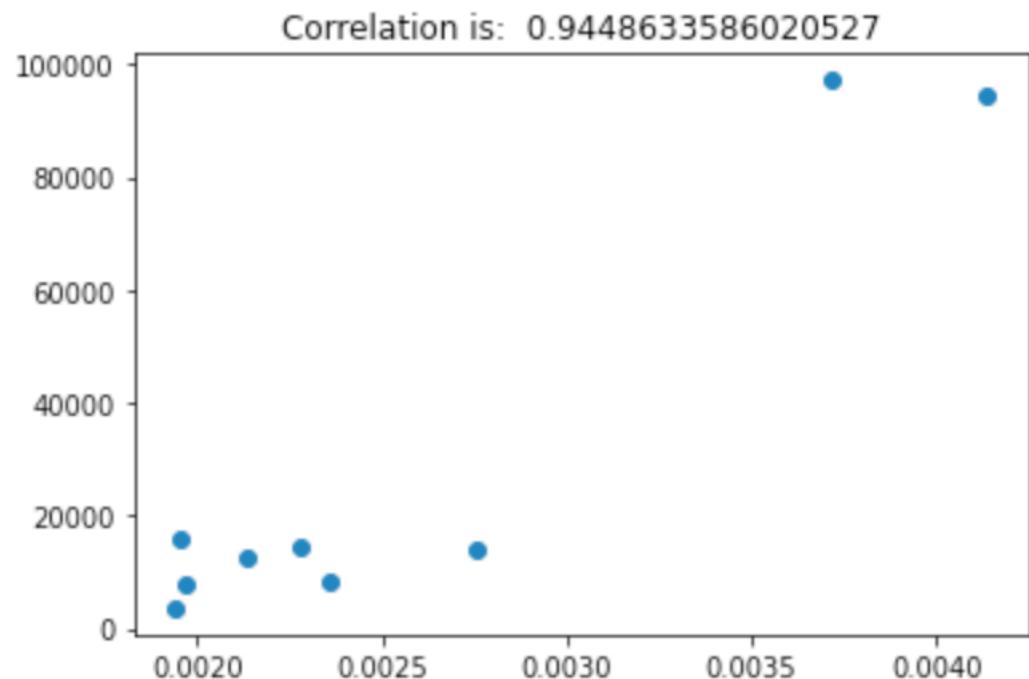


Giant



PageRank and Citations since 2015

Netscience



Giant

