



Question 1

Needs Grading

Discuss the properties of the degree distribution of both networks.

Selected Answer: .

Correct Answer: Both networks follow a power law.
for Mathematics, the exponent is -2.4
for Neuro-Science -2.1 (so it falls more slowly).

The average degree of both networks increases over time, as new authors arrive and new collaborations are established.

✓ The average degree in M is smaller as mathematicians tend to work in smaller groups.

Response Feedback: [None Given]



Question 2

Needs Grading

Discuss the properties of the shortest path lengths in both networks.

Selected Answer: .

Correct Answer: ✓

The average shortest path decreases over time for both networks.
This effect is not in line with observations on other increasing networks where the average separation increases with a growing network

Two possible explanations are given:
1. Authors keep on publishing and collaborating with their peers. This process creates new links and paths and thus lowering the separation
2. Due to the fixed starting point of the data set. Existing links between authors might not be captured and only become visible after re-established collaboration

Response Feedback: [None Given]

Question 3

Needs Grading

Discuss the properties of the global and local clustering in both networks.

Selected .

Answer:

Correct ✓

Answer:

Local clustering:

This measure is decaying over time. This means that the number of open triangles is increasing more rapidly than the number of closed triangles. This can easily be explained by the new authors that connect to one or a few existing authors. Each entrance of a new author created a set of open triangles. New collaborations of existing authors might close some of these triangles but might also result in a set of new open triangles.

Global Clustering: This paper proposed to use the average of the local clustering of all nodes as a measure of clustering for the whole network. This is not the global clustering or transitivity as introduced by Wasserman and Faust. Since this paper uses the average of the local clustering, this value is decaying as well.

The interconnectedness in NS is higher than in M resulting in a higher clustering coefficient

Response [None Given]

Feedback:

Question 4

Needs Grading

Can you explain the relation between the evolution of the degree distribution, separation and the clustering coefficient? Especially the latter two show a particular pattern over time. Is this what you would expect?

Selected Answer: .

Answer:

Correct Answer: ✓

Answer: Degree is increasing over time while separation and clustering are decaying.

The relation between the dynamics of degree and separation seem logical. The degree increases as new connections between existing authors are established. As a consequence of these new connections, the separation decreases.

The fact that both separation and clustering have the same temporal pattern is not that straightforward. An opposing direction of the effects is more likely. However, in this case, new connections between more centrally located authors leads to the emergence of open triangles without distorting the separation. In fact, these new connections can even serve as bridges and lower the separation even further.

In addition, we cannot ignore the constraints set by the limited dataset. The links that already exist before 1991 are not encoded in the network and newly published papers after 1991 might given the impression of newly created co-authorship links which also implies new open triangles. However, these new connections can in fact close triangles that existed already and thus have a inverse effect on the clustering coefficient.

Response [None Given]

Feedback:

Question 5

Needs Grading

Can you explain what the roll of preferential attachment is for both new and established authors in the collaboration networks?

Selected Answer: .

Correct Answer: ✓

Several phenomena play a role in establishing preferential attachment.

Established researchers can attract more funds and thus engage more junior researchers. This leads to a broadening of the network through the addition of newcomers linked to senior researchers.

Senior researchers look at other senior or established researchers for collaboration.

Response [None Given]

Feedback:

