

Q. 5

CS-E5740 Complex Networks, Answers to exercise set 7

Marco Di Francesco, Student number: 100632815

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Problem 1

Wrong 90th percentiles. Note that $\text{CCDF}(x) = P(X > x)$. So $\text{CCDF}(x) = 0.1$ means there are 10% of the data points are above x . This is equivalent to saying 90% of the data points lie below x , which is exactly what the 90th percentile is.

- a) Look at figure 1 and 2. The 90th percentile of the weight is about 10^{-3} , of the degree is about 10^{-2} , of the strength is about 10^{-2} . They can be read by looking from the beginning of the distribution to the 90% of it.

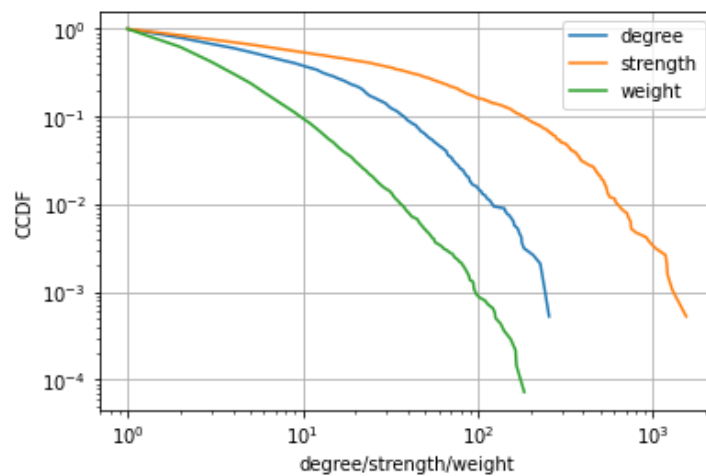


Figure 1: Exercise 1 part a plot 1

Plot the exponential distributions
in Fig. 1 too -0.5

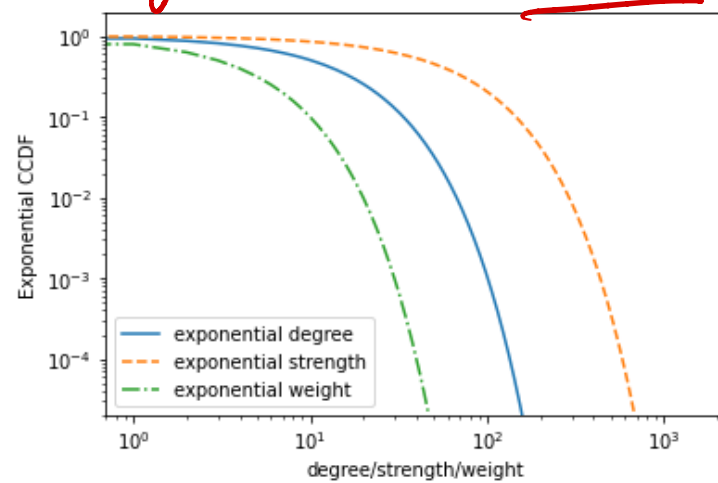


Figure 2: Exercise 1 part a plot 2

This is not an expected answer to the problem, but you have a point here. When looking at the trend, it would be better to use the logarithmic axis because the concentrated data points in small values make it harder to distinguish the trend in that region.

-1.5

- b) Look at figure 3 and 4. Linear representation is better because we are able to get more information of the concentration for the lower values, while in logarithmic representation the gap is too large and we do not understand the trend.

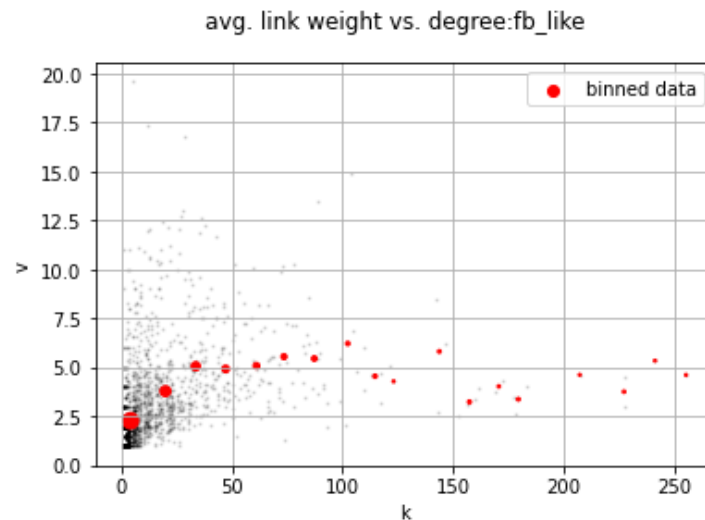
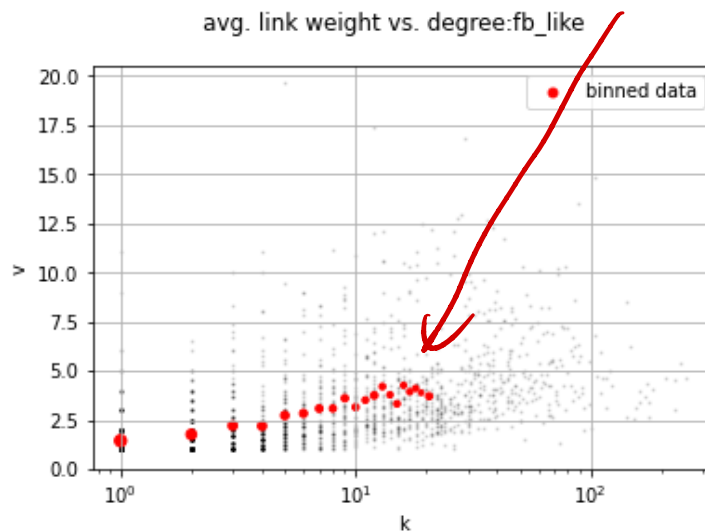


Figure 3: Exercise 1 part b plot 1

Incorrect bin average plot



-1

Figure 4: Exercise 1 part b plot 2

- c) Look at figure 5. Used 20 bins. There is an increasing tendency, so the Granovetter hypothesis holds.

Incorrect bin average plot -2

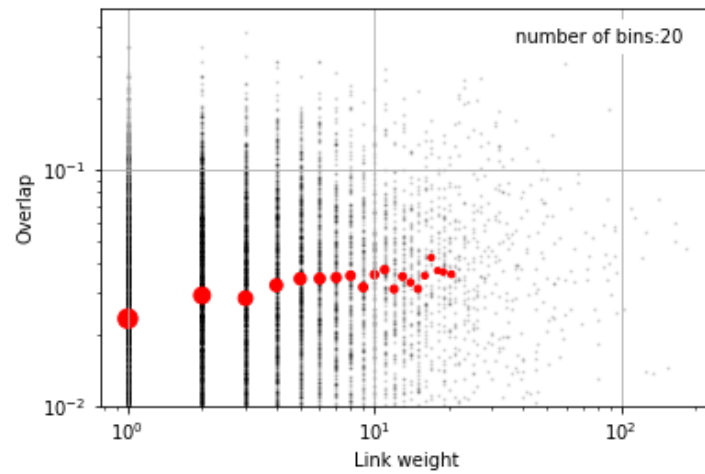


Figure 5: Exercise 1 part c

Problem 2

a) $N=279$, $L=2088$, $D=0.053$, $d=4$, $C=0.64$

b) Look at figure 6.



Figure 6: Exercise 2 part b

c) Look at figure 7. Would be better to use the Maximal Spanning Tree because connects all the hubs, compared to the Minimal that connects the smaller airports.

d) They share 44 links. No, it does not share a similar network, indeed it shares less than half of the links.

Incorrect -1

Why would this be? -0.5

No visualization of
the thresholded network -1

minimum_spanning_tree



maximum_spanning_tree

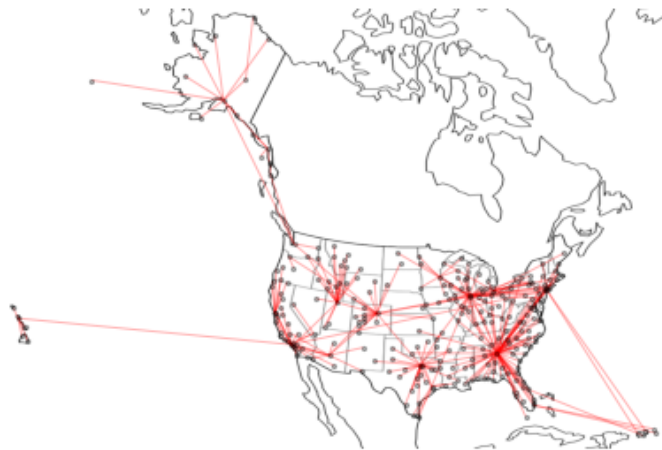


Figure 7: Exercise 2 part c