report v0.tex

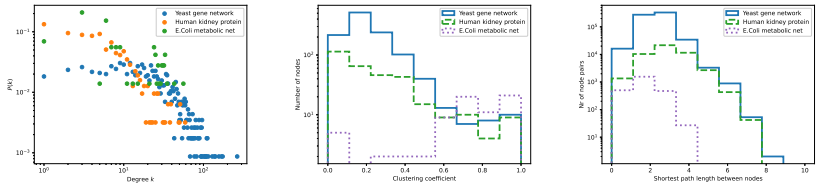
Henrik Linder

November 13, 2022

1 Task 1: Determining overall structure

1.1 Theory

1.2 Results and discussion



(a) (b) (c)

2 Task 2: Comparison against random networks

2.1 Theory

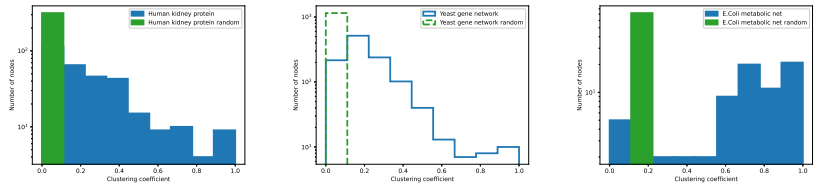
The Erdös-Réyni (ER) random network follows a simple algorithm.

1. Create a network with N nodes
2. For each node n_i, connect n_i to $n_j \neq n_i$ with a probability p.

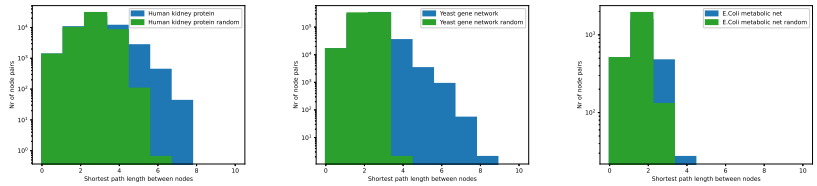
Given this generation algorithm, the average number of degrees (connections to another node) for any one node is

$$\begin{aligned} \langle k \rangle &= (\#\text{Possible connections }) \cdot (\text{ Prob. of connection}) \\ &= \left(\sum_{n_i \neq n_j}^{N} p \right) \\ &= (N-1)p. \end{aligned} \tag{1}$$

2.2 Results and discussion



(a) (b) (c)



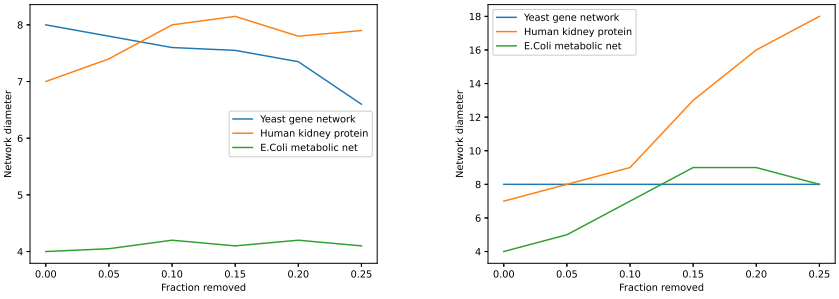
(d) (e) (f)

3 Task 3: Robustness in biology

3.1 Theory

The diameter of a network is defined as the longest of all shortest paths in the network.

3.2 Results and discussion



(a) Randomly removing nodes. (b) Removing top nodes.