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Biological Computation – Ex1

We wrote the assignment in python.

GitHub repository: https://github.com/yaelMuchtar/Biological-computation-exercise-1

Our code uses the library networkx for graph manipulation. We use it mainly for the function is_isomorphic that checks whether two graphs are isomorphic, but we also use functions like "subgraph" and "is_connected".

How the code works:

Question 1:

We have a recursion for going over all the possible ways to connect n vertices (basically going over each cell in the connectivity matrix and deciding whether to add the edge or not), with the assumption that there are no self edges (the diagonal of the connectivity matrix is zero).

This take a lot of time ($O(2^{n^2})$).

Question 2:

First we calculate all the motifs of size n.

Then a recursion is going over all the subgraphs of size n and for each connected subgraph finds the isomorphic motif.

a) the code is attached as a python file

c) for n=4 the running time is about 7.75 seconds, and for n=5 the running time is over an hour.

d) according to our rough calculation it would take at least 95 days to run the code for n=6.

b) the output for n = 1, 2, 3, 4 is:

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n=1
count=1
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n=3
count=13
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