GTDMO - 4th assignment
Group 1

Consider the graph stored in the file graph1.gml, containing a sample of a population composed by 70 persons. For each person the age, the gender, and the name (anonymised, identified by a number from 1 to 70) have been registered.

The persons are forming the nodes of the graph and there is an (unoriented) edge between two nodes if the two persons are used to spend more than 5 hours per week together, in person or on social media, videoconference, etc.

Identify if are there communities in the graph, and analyse if the members of each community have some common characteristics.

Are there any hub nodes, that is any node with a particularly big number of connections to the others?

Imagine now that a fake news spreads in the population represented by your graph, starting from one single person, that we consider 'infected by the fake news' at time 0. At each time step, each non infected person v_i becomes infected (that is receives the fake news) with probability

$$P(infection\ of\ v_i\ at\ time\ t+1) = \begin{cases} 0.2 \cdot n_i(t) & \text{if } n_i(t) \leq 5 \\ 1 & \text{otherwise} \end{cases}$$

where $n_i(t)$ is the number of infected neighbours of v_i at time t.

Are you able to simulate the spread of the fake news in the population?

Is there any difference in the mean speed of the spread if the infection starts from each of the identified communities?

Remark 1: In order to solve the assignment you may use R, Python, Matlab or any other softwares/languages that you may know. I don't need that you insert the codes in the report, but you have to explain what you did. The package iGraph (`https://igraph.org/`) can be useful. Versions for different languages are freely available.

Remark 2: The delivery of this assignment is due by December 10, 2020. By the same date you also need to fill in the Peers Evaluation form at this link

`https://docs.google.com/forms/d/e/1FAIpQLSdoCPnSec0quvpR84CVTyizSRoKqavdHjsGE6S`
`viewform?usp=sf_link`

Please remember to evaluate your group mates on the basis of their participation to the group, and not on the basis of their previous knowledge or competences