Project 1: Gephi

Interactive visualization and exploration for all kinds of networks

Due 11:59pm EEST October 22, 2022

General Instructions

Your answers should be as concise as possible.

Submission instructions: You should submit your answers and code in a compressed directory uploaded via `https://eclass.aueb.gr`

Submitting answers: Prepare a short description of your answers and personal choices on this project in a single PDF file named *hw3.pdf*

Submitting code: Prepare a compressed directory containing a *.gephi* file with your network and the directory created using the *SigmaExporter* plugin.

Problem

Gephi is an open-source visualization and exploration software for all kinds of graphs and networks.

1 Visualize the communities of a sample network from facebook

This project requires that you import a network into Gephi, resize and color its nodes by measuring statistic and applying filters to highlight certain attributes, visualize it using a drawing algorithm, and export it to a web application that enables interactive network display.

To begin with, you must install a plugin that is available in Gephi named *SigmaExporter*. To do so, click on Tools → Plugins and select and install the aforementioned plugin from the *Available Plugins* tab.

Then you have to import the network specified in the file 'facebook.gdf' that is provided to you with this project.

Next you ought to perform the following:

- Measure the degrees of all nodes and resize the nodes according to their in-degree.
- Find:
  - the network's diameter,
  - the individual with the largest betweenness centrality,
  - the communities existing in the network.
- Color the nodes according to the communities you discovered.
- Select an individual in the network as your best friend and apply different colors to the edges of:
  - this node,
  - the nodes in its ego network with depth 1,
  - the nodes in its ego network with depth 2, and
  - the remaining nodes.
- Apply a layout than enhances the visualization of your network (ForceAtlas, Fruchterman Reingold, Yifan Hu and their variations are excellent choices).

In this step you have to make sure that the resulting visualization is aesthetically pleasing with regard to the following:

- Nodes are not overlapping,
- Sizes of nodes clearly indicate differences in in-degree of nodes and are appropriate with regard to the edge thickness and the distance of nodes, and
- Colors are highly contrasted.

Finally, you need to export the network using the *SigmaExporter* plugin. If the latter is installed properly, you can use it through File → Export → Sigma.js template. Remember to fill in the title and author fields appropriately.

HINT: Coloring the nodes of the various ego networks can be achieved using the ego network filter. By which order should you do the coloring to achieve the desired result?

CAREFUL: Your report should clearly specify the individual you chose as your best friend, along with her in-degree, out-degree, and PageRank value.

HAVE FUN!: The facebook app `Netvizz` enables you to extract networks from user activity in *groups* or *pages* in GDF format. Moreover, `NodeXL` allows you to extract networks from Twitter. We encourage you to experiment with apps such as the aforementioned and work on a network of your choice instead of the one that is provided with this project. You will undoubtedly be able to uncover fascinating details by exploring a network you find interesting with the help of Gephi!