Home Assignment 1.2

Version 1.1

Use your networks A, B from Home Assignment 1.1 and do the following tasks.

Task 1

1. In a Python file `python/plot.py`, load your network A using your existing files `networkA.csv`, `actorLabelsA.txt`, `eventLabelsA.txt`.

   Plot your network A using the Python library *NetworkX* (see Resources). Use the *spring layout* with a suitable number of iterations such that the network is plotted in an appealing and clear way. Color the nodes representing actors red and the nodes representing events blue. Include labels for nodes. Save the graphics in a file `visualNetworkA.png`.

2. Develop an Octave function `calcParticipationRates(network)` that calculates the average size of events and the average rate of participation.

Task 2

1. Like in Task 1, produce a visual representation `visualNetworkB.png` of your network B. Color all nodes green and include node labels.

2. Develop an Octave function `isConnected(network)` that determines whether a given network is connected.

3. Develop an Octave function `degreeDistribution(network)` that calculates the degree distribution of a given network. Plot the degree distribution of network B in a graphics file `networkDegreesB.png` using Octave plotting functionality.

4. Develop an Octave function `getNumEdges(network)` that calculates the number of edges and an Octave function `smallWorld(network)` that calculates the average path length L and the clustering coefficient C of a given network and apply them to network B.

Include all your results and plots from Task 1 and Task 2 in a file `report.pdf`. Briefly interpret all of your results: Is your network a small world network? Why/why not? How is this related to the values of L and C?

Provided files

`http://www.kmi.tugraz.at/staff/markus/courses/SS2010/707.000_web-science/ass12.zip`

- `script.m` contains interface descriptions for the required Octave functions. Your Octave functions must comply with these interfaces!

Structure of your repository

- `report.pdf` (contains your results, plots, and interpretations)
- `python/`
  - `plot.py` (program to plot your networks using the data files in `octave/`; shall be executable by invoking `python plot.py`)

- `octave/`
  - `calcParticipationRates.m`
  - `isConnected.m`
  - `degreeDistribution.m`
  - `getNumEdges.m`
  - `smallWorld.m`
  - `networkA.csv`
  - `networkB.csv`
  - `actorLabelsA.txt`
  - `eventLabelsA.txt`
  - `nodeLabelsB.txt`
  - `visualNetworkA.png`
  - `visualNetworkB.png`
  - `networkDegreesB.png`

Your file `report.pdf` and every source code file has to have a header containing your name and matriculation number.

Submission

Home Assignment 1.2 is due **April 19, 2010 12:00** (high noon).

The due date is a *soft deadline*. That is, your score on the assignment will be rated 100% if you hand in the assignment before 12:00. The following 12 hours are suitable for a submission as well, *but* your points will be rated 66%. Read: 1/3 of your points will be substracted if you hand in your assignment between 12:00 and 23:59. 24:00 is the *hard deadline*; if you hand in anything after 24:00 you will not receive any points.

Submission is done using the SVN version control system. (See instructions on the course website.)

Policies

- No external Octave packages are allowed.
- Your code will be tested with independent datasets in an automated way, assuming your functions comply with the interfaces in the provided file `script.m`.
- Your code and report will be checked for plagiarism.

Resources

- NetworkX: `http://networkx.lanl.gov`
  - Installation: `http://networkx.lanl.gov/install.html`
  - NumPy: `http://sourceforge.net/projects/numpy/files/`
  - matplotlib: `http://sourceforge.net/projects/matplotlib/files/matplotlib/`
- MatLab/Octave:
  - `http://www.math.umn.edu/~lerman/math5467/matlab_adv.pdf`
  - `http://www-mdp.eng.cam.ac.uk/web/CD/engapps/octave/octavetut.pdf`
  - `http://en.wikibooks.org/wiki/Octave_Programming_Tutorial`