Home Assignment 1.5
Version 1.1

1. Link Analysis & Search (**week 6**):
    a. Develop a MatLab function `page_rank.m` that calculates the primitive page rank for every node in a given *directed*, unweighted one mode network.
    b. Create a directed network B_{dir} derived from your undirected network B where each undirected edge is replaced by a directed one. The direction of the edge is determined by the alphanumeric ordering of your node labels (e.g. "`gabi`" ➔ "`mstrohm`", and "`123MUSTERMAN`" ➔ "`ALEXMUSTER`", but "`456MUSTERMAN`" ➔ "`123MUSTERMAN`", ignoring upper and lower case)
    c. Apply `page_rank.m` to your Network B_{dir} for 10 iterations (k_0-k_9) and list the page ranks for all the nodes in your network.
2. Network Evolution (**week 8**, *slides are already available on the website*):
    a. "Grow" your network B with the following two methods `random_grow.m` and `barabasi_albert_grow.m` to approximately double its node size via
        i. 1) random introduction of nodes to the network
        (use MatLab random number generation to identify nodes to link to)
        ii. 2) Barabasi / Albert Model
        In both methods, introduce m=3 edges per iteration.
    b. Plot the degree distribution before and after "growing" it, what is the difference between the two generators?
    c. Attack your original network B (deletion of nodes) via
        i. Random attacks, `random_attacks.m`
        ii. Informed attacks (highest degree nodes), `informed_attacks.m`
    d. Show the impact of your attack on the connectivity of the network by plotting the size of the largest component over the number of nodes attacked
    e. Infect your network (percolate) with an epidemic
        i. Using a simple SI model
        ii. Choose a suitable rate of reproduction (~~infection rate~~)
            1. Doing 11 trials
                a. Start infecting the network at the node with the highest degree (`informed_infection.m`)
                b. Start infecting the network at 10 random nodes (`random_infection.m`)
    f. Compare I) the number of iterations and II) the resulting number of infected nodes for each iteration (highest degree vs. avg. of random nodes).
3. Document your observations in your report.

Detailed interface descriptions are provided in a separate file (see below).

Provided files:
http://www.kmi.tugraz.at/staff/markus/courses/SS2009/707.000_web-science/provided-files4.rar

- Script4.m: contains interface descriptions for the required MatLab functions

Submission:
Home assignment 1.5 is due in week 9, **Deadline is Monday 11.5.2009 12.15pm**

Your submission "wswt_ass1_5_<YOURMATR.NR>.zip" should be structured as follows:

wswt_ass1_5_<YOURMATR.NR>/report.pdf	# contains your results and interpretations. # Make sure to include your **name** and **Matr. Nr**. # on the first page of your report
wswt_ass1_5_<YOURMATR.NR>/matlab	page_rank.m random_grow.m barabasi_albert_grow.m random_attacks.m informed_attacks.m informed_infection.m random_infection.m

Policies:

- No external Matlab packages are allowed.
- Your MatLab code will be tested with independent datasets and checked for plagiarism.

Resources:

- MatLab
  - http://www.math.umn.edu/~lerman/math5467/matlab_adv.pdf

Home Assignments: Status and Outlook

This home assignment concludes the analytical home assignments HA1.x, which were focused on the "*Science*" aspect of "Web-Science". These home assignments were designed to introduce you to REST, network acquisition from the web, network metrics and analysis, social network analysis, affiliation networks, Galois lattices, link analysis and network growth analysis and simulation. By completing these assignments, you should have acquired the basic skills necessary for independently conducting web-analytical tasks.

Home assignment 2 will be focused on the "*Engineering*" part of "Web-Science". In teams, you will work on an innovative social-search Mashup based on the Yahoo BOSS API. The details of this home assignment will published in week 9, a tutorial regarding the Yahoo BOSS API will be held by Daniel Lamprecht at the beginning/middle of May. Deadline for this assignment will be about Mid of June. Home assignment 2 concludes your course work for this course. The final exam will be held in Week 14.