

Network Science Programming Hw 2

Question 1 (20 pts): Please implement the recursive betweenness (in first step you should implement modified bfs) centrality algorithm that we have covered in the class (As you will remember, the algorithm is $O(n^4)$).

Question 2 (30 pts). Please design and implement a modified Floyd-Warshall algorithm (again, use modified BFS) to find the betweenness centrality for each node. The algorithm should be $O(n^3)$.

Question 3 (30 pts). Please implement Newman's betweenness centrality algorithm.

Question 4 (20 pts). In this question you will measure the runtime performance against varying node counts and degrees. Please generate random graphs with 20 nodes, 40 nodes, 60 nodes and 80 nodes. Also please generate random graphs having 4, 8 and 12 average degrees. Measure runtime for each setup. Plot 2 graphs:

- First one shows the performance of both algorithms against varying node counts, (average degree is fixed to 8).
- Second one shows the performance of both algorithms against varying degrees, (node count is fixed to 60).

Please provide necessary comments by comparing these algorithms. Please provide a report related to your homework. In your report, please explain your findings with necessary screenshots from your programs.

Deadline: 30.December.2015, 23:59

Submission: Please send your homework (report and source codes) to these e-mails:

murat.kurt@ege.edu.tr
muratkurtube@gmail.com

Assoc. Prof. Dr. Orhan Dagdeviren
International Computer Institute
Ege University