CSCI-665 Foundations of Algorithms

Homework 7

due Friday, May 12, 2017

Reading Chapters 24, 25, 26

1. Run the Bellman-Ford algorithm on the directed graph on Figure 24.4a page 652, using vertex x as the source (ignore the current vertex values $0/\infty$). In each pass, relax edges in the same order as in the figure, and show the d and π values after each pass.

2. Run the Floyd-Warshall algorithm on a subgraph of the graph of Figure 25.2 page 691 induced by 4 vertices $\{1, 2, 4, 5\}$. Show the matrix $D^{(k)}$ that results for each iteration of the outer loop.

Johnson's Algorithm

3. Solve exercise 25.3-1, page 704, using a reduced graph of Figure 25.2 on page 691, namely the graph induced only by 4 vertices $\{1, 2, 4, 5\}$. Show the stages of computation similarly as in Figure 25.6 on page 703.

4. Solve exercise 25.3-4, page 705.

Maximum Network Flow Algorithms

5. Interpreting the graph on the next page as a flow network, find the maximum flow from s to t, using the "Edmonds/Karp" algorithm (the second heuristic). At each stage of the algorithm when a new level graph is found you should draw (1) the flow so far and (2) the residual graph and (3) the level graph (draw three separate graphs, not a confusing mass of colors on one graph.) Mark the augmenting paths you find. Draw the final flow.

6. Solve exercise 26.2-2, page 731.

7

4

s

t

4 4 5 7 11 4

4 8

9 4

3 10 1 2 10 2

5 8

8 3

9 7