CSCI 230 -- Lab 11

Graph Algorithms

Due:_____

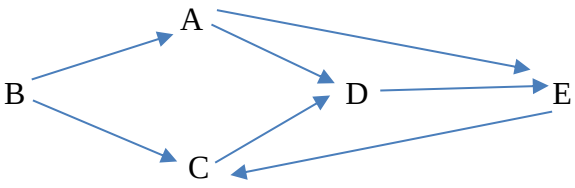
Feel free to discuss and help each other out but does not imply that you can give away your code or your answers! Make sure to read all instructions before attempting this lab. You can work with a lab partner and submit one lab package for your group.

You must use an appropriate provided template from Canvas or my website (zeus.mtsac.edu/~tvo) and output "Author: Your Name(s)" for all your programs. If you are modifying an existing program, use "Modified by: Your Name(s)".

Lab question 1: Does Dijkstra's algorithm perform a DFS or BFS on a graph? Explain.

Lab question 2: Explain the concept of "Transitive Closure" on a digraph. Provide a reason for performing a transitive closure on a digraph.

Use the following digraph to test exercise 1 and exercise 2. Use 0 for vertex A, 1 for vertex B, and so on. Set up a simple matrix for both exercises.



Exercise 1: Given a matrix representing a digraph (0 and 1), implement Transitive Closure for a digraph. Test it out on a simple example above. Print both original matrix and updated matrix.

Exercise 2: Given a matrix representing a weighted digraph (0 for non-edge and a positive integer representing a weight for that edge), implement a shortest path algorithm for a graph (preferably Dijkstra's algorithm). Test it out using digraph above. Find the shortest path from B to E using the following weights:

- <B, A>, 3

- <B, C>, 4
- <A, D>, 5
- <A, E>, 10
- <C, D>, 2
- <D, E>, 3
- <E, C>, 6

Extra Credit: Print out the path how to get from source vertex to a destination vertex for exercise 2. *Hint: need to store the vertex that you use to update the distance and you can backtrack from destination back to source vertex*.

Online Submission: Submit one PDF file via Canvas includes status, answers to lab questions, output and source code for all required programs.