CSC 382 Analysis of Algorithms

Assignment III

1. (10 points) **Find M Shortest Paths on a Tree**

   Here is a checklist for helping you complete this assignment:

   - ☐ In this project, you need to implement an M shortest paths algorithm over a tree graph.
   - ☐ To begin with, you first generate a random tree with 1000 (or 10000 if it holds) nodes. (3 points)
   - ☐ Apply random weights (could be a float number between 0 to 1) on each edge of this tree. (1 point)
   - ☐ Randomly select a leaf as the source and all the other leaves are the targets. If there are plenty of leaves, then you can randomly select some of them as your targets; If there are not many leaves, then you can additionally include some internal nodes as your targets.
   - ☐ Use a best-first algorithm to find the 10 shortest paths from the source to the targets. (3 points)
   - ☐ Use a depth-first algorithm to find the same 10 shortest paths. (3 points)
   - ☐ Add pruning technique for the depth-first algorithm. (3 points bonus)
   - ☐ Warning: No points for using graph search algorithms, such as Dijsktra or Bellman-Ford.
   - ☐ Due Date: 5/11/2023