CS3310-03 F21 Project 2A

Due date: 11:59PM, Sunday, November 28

30 pts

Program in Java or C++ the following algorithms that we covered in the class to find minimum spanning tree of undirected graphs:

1. Prim's algorithm using array

2. Kruskal's algorithm using union-find set structure (Idea 3)

Sanity check. Explain how you verify the correctness of your implementation of the two algorithms.

Carry out a complete test of your algorithms for both dense and sparse connected graphs with different number of vertices eg. for $n = 10, 20, 30, \cdots$ (up to the largest size of n that your computer can handle). In order to obtain more accurate results, the algorithms should be tested many times with the same graph. The total time spent is then divided by the number of times the algorithm is performed to obtain the time taken to solve the given instance.

Write a detailed report together with graphs explaining the data sets, test strategies and explanation of the results. What are the theoretical complexity comparisons of the two algorithms ? Is one algorithm always faster than the others ? Conclude your report with the strength and constraints of your work.

Extra credit. *3 pts* if you study and use one of graph library to generate visualizations of graphs and their corresponding minimum spanning trees. One such library for Java is JGraphT.

Submission. Your report has to be typed. Also, include your code and screenshots of the results at the end of the report in one pdf file. To submit the project, you need to upload the pdf file to Gradescope. If you do it with a partner, you need to put two names on the assignment and submit it as a group assignment.

Late submission will be accepted with a penalty of 10% per calendar day.

Academic integrity. Discussions among students are encouraged, but you are only allowed to share code and report with your partner (if you work in group). You are responsible for doing your own work and for insuring that your work is protected from copying. The University's policy on Academic Integrity, as stated in the catalog, will be enforced.