

CSCI 665 Foundations of Algorithms
SPRING 2019
Lab Assignment II

Project Problem

Complete one of the following project problems.

Write programs to implement the Kruskal's Minimum Spanning Tree algorithm with and without using the Union-Find Data structure.

Execute your sorting programs for the following sets of graphs:

- a. Set_1: Node connectivity less than 10
- b. Set_2: Node connectivity more than $n/2$
- c. Set_3: Random Graphs

Presentation of Results: Measure and compare CPU times and present the final results for graph sizes 40, 60 and 100. Present your results using tables and write a 1-page report.

Code for generating graphs is available on MyCourses. You can choose to use it, write your own graph generating code or use an existing one.

OR

Write a program that constructs Huffman code for a given English text and encode it. And write a program for decoding an English text that has been encoded with Huffman code. Experiment with your encoding and decoding programs for 50 different texts, each text having a minimum of 50 words and at least one page in length. What range of compression ratios do you get? Can you improve the compression ratios by using some estimates of frequencies instead of actual frequencies? You are encouraged to look into published literature for ideas to improve the compression ratio.

Presentation of Results: Measure CPU times and compression ratios. Present the final results for the different texts and write a 1-page report.

Required Submissions: **a one page summary report including the algorithm, the code, sample data and code to generate data, results in tables, and instructions for executing your code.**

*Results: Each data point should be an average of 10 or more reruns of the execution.

Programming Language and Data Structure: **Your choice**. Please mention your choices and provide a justification in the summary report.

Assignment submissions are due by **4:30 PM April 02, 2019**.

PLEASE NOTE THAT your PROGRAMS WILL BE TESTED WITH DIFFERENT DATA SETS.