Data Structures and Algorithms
Project Assignment 2

October 9, 2017

Abstract

Using your web app already designed please incorporate all this problem set as call backs to provide intelligence for your web application. Please read through the problem set 4 times and understand it before proceeding with the implementation. You might also have to customize your widgets in the app to accomodate this problem set, you don't have to be rigid even after the first presentations. If a particular widget does not exist on the app please include it and ensure it fits into your app nicely. Aim at making your interfaces look better and accomodative of this problem set.

1 Intended Learning Outcome

- Learn how to implement basic data structures (Queues, stacks, trees, linked lists, graphs), sorting (at least 5 sorting algorithms), searching algorithms (linear and binary search).

- Learn practical implications those algorithms as the input becomes bigger.

- Learn how the growth rate, the rate at which the cost of an algorithm grows as the size of its input grows for data structures.

- Identify an algorithms that apply to a particular problem.

2 Course Content for Solving Problem Set 1

- Foundamentals of analyzing algorithms

- Foundamentals of efficient algorithm design: divide and conquer

- Growths of Functions

- Simple sorting algorithms

- Recursion

- Basic data structures

3   Moral Ethics

This is a team project of up to 8 students. You may discuss approaches to problems among different groups; however, the actual details of the work (coding, answers to concept questions, etc.) must be an individual group effort. Projects that are judged to be the result of academic dishonesty will, for the student's first offence, be given a mark of zero with an additional penalty equal to the weight of the design project also being applied. You are responsible for reading and respecting the Makerere University's policy on pragiarism.

3.1   Grading

For each project there will be a demonstration of the working project. A report will be submitted describing your design and system developed as the final product in week 14 where a link to the web app will also be provided for grading. Use any programming language of your choice. All the books we provided for reference have implementations of the algorithms. You can also utilize the Internet to research.

4   Problem Set

For each of basic data structures (Queues, stacks, trees, linked lists, graphs), sorting (at least 5 sorting algorithms), searching algorithms (linear and binary search), look around your environment and implement either a demo or visualization to demonstrate the application of that algorithm. For example for a graph a demonstration of how to get the short route from Makerere to Luzira. There are about 4 routes to reach Luzira from Makerere each with its own challenges. Another example would be for a bank, its first come first serve, a demonstration of a queue. Another example would be imagine playing a guessing game, which algorithm would you choose to give you a faster

response? Another one would be suppose you have built a family tree and a new baby is born how would insert him on the tree or if a family member is dead how would you delete that family member? ETC. There are many examples of real life application of data structures and algorithms. Using any of your choice and through research Try to demonstrate as many of those algorithms as possible. Start with those you have already covered. Those you have not covered yet leave them for now.

(a) Develop each case and deduce the computing times to execute(insert, delete or update etc) the algorithm.

(b) If more than one algorithm applies for an application comment on the performance of each algorithm. For example for searching algorithm with the application being guessing game, i would simply compare linear and binary algorithms on the guessing game and each return the time it takes to return the result.