

Submission of proposal for MTE innovative project for Data Structure(SE 201)

Topic

A locality management system that uses graph data structure to organize, manage and know the relationship of components(houses, shops etc) inside a locality.

Introduction/Project brief

This project involves coding a menu driven program in which the user will be given options to add multiple components(namely houses and shops) into a locality. This program will be designed using graph data structure and some algorithms to work on the graph.

This so called locality will act as our main graph and the components will be the different vertices inside the graph.

The user will be given the options to define the number of components and also the distance between these components in the locality.

As these components will act as vertices the distance between these components will act as weighted edges of these vertices.

After all the input is taken from the user, the formed graph will be analyzed with the help of some algorithms and user will be given options to retrieve various information about the locality like shortest distance between any two components and much more.

All in all, the program converts the multiple inputs given by the user to a map for a locality and enables the user to retrieve some very useful and interesting information about the locality and its components.

Objective

There are mainly 3 objectives for this project.

1. To understand and implement complex data structures like graph, linked lists and stack into a program and understand how they work together.
2. To understand the real world implementation of such data structures and how they can impact and help in improving our day to day activities.
3. To improve, sharpen and get a in depth knowledge about data structures in general and learn to use them properly and efficiently with C++ programming language.

Project System Configuration/Software Requirement

To build this very project I am using a MacBook Pro 2019 and the tool/text editor I am using is Visual Studio code.

On the completion of the project, the program can run on any operating system that has a text editor/IDE that can compile and run C++ programs.

Programming Language and data structures to use

The programming language that I will be using for this project will be C++.

Data structures that will be used are graph, linked list, stack and array.

In addition to that standard template library in C++ will also be used to implement vectors in the program.

Proposal Methodology/Innovative idea

For the completion of this project, I will be using my programming knowledge to implement some the complex data structures like graph, linked list and stack to create a user friendly and intuitive program.

I also want to explore the uses and real world implementations of data structures and ultimately gain in-depth knowledge about them.

As for innovation, the implementation of data structures to solve day to day problems or use them to make our lives easier seems like a very interesting, challenging and worth while goal to me.

That's the very reason I chose this topic.

References

For the completion of this project I learned/will need to learn a lot of new techniques/concepts and implement them.

Some of those, I learned in the past couple of days trying to figure out what ideas I can and what ideas I cannot successfully implement in my project.

An example for that would be learning the basics of graph data structure and implementing Prim's and Kruskal's algorithm in the graph to understand whether I could implement my ideas with graph data structure or not.

This was rather challenging as I went on to learn graph data structure from scratch and had to grasp a lot of concepts in a very short span of time.

However online platforms like YouTube and websites like stackoverflow.com and [geeksforgeeks.org](https://www.geeksforgeeks.org) really helped me through the process and I most certainly will get more help from them for the completion of my project.

I also learned the basics of data structures during the lockdown period when classes had not commenced. I was able to learn about some of the of the data structures like array, linked list, stack, queues and tress from the web, some of which I will be implementing in my project.

To learn and implement graphs I am yet again using the web and along with that I am also referring to our recommended course book Data Structures with C by Seymour Lipschutz.

I will also be referring to the notes I created during our lectures and the presentation notes provided by our course instructor for SE 201 Mr. Sanjay Kumar.

Conclusion

This project brings great opportunities for me as I will be able to sharpen my coding skills and develop a basic knowledge about using data structures for real world applications.

It is also to be noted that this project will be build with main purposes being learning and demonstrating the the use of data structure in real world scenarios but the actual implementation of this program in the real world might be limited as in real world scenarios a lot of factors like user interface, user experience, better defined and organized inputs/outputs have to be considered which might not be possible with my current skill level. However this could be a good starting point and hopefully enough to be within the scope of the MTE innovative project for Data Structure.

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