Algorithms Course Graph Project

Project Description: Navigation Application Group project
This group project challenges you to research and deliver an implementation of widely used graph algorithms, a key skill in modern software development. It earns up to 30 study points. There are 15 study points for delivering the application and documentation and 15 for the presentation.

Deliverables:
In this project, your group will develop a navigation application that uses graph theory algorithms to provide directions between two points on a map. The application will be able to handle different types of maps, including street maps and indoor maps of buildings, and will provide both textual and, optionally, graphical directions to the user. It should be based on your own data (eg from a Neo4j database) or can use publicly available data such as the Google Maps or TomTom APIs.

1. **Code:** Write code for the navigation application using a programming language of your choice. The code should include implementation of graph theory algorithms such as Dijkstra's algorithm and depth-first search, as well as data structures for representing the maps and their connectivity. Please comment the code with detailed explanatory comments. You may choose to use a library for the algorithms but you should use the source code and comment it. Alternatively you can write your own implementation

2. **Documentation:** You should write documentation for your navigation application, including a design document (development environment, architecture etc that explains what it is doing). The documentation should also include provide a clear and comprehensive explanation of the algorithms you used.

3. **Presentation:** Prepare a 10 minute presentation of your navigation application, which you will present to the class. The presentation should include a demonstration of the application's functionality, a discussion of the algorithms, and an overview of the performance. Your presentation should be done as a group and all group members should participate.

Project Milestones:

1. **Design Document:** In this milestone, you will create a design document that specifies the architecture, data structures, algorithms, and user interface of your navigation application. You may want to get feedback from me about the design.

2. **Code Implementation:** In this milestone, you will write the code for your navigation application, using the design document as a guide. You should implement the graph theory algorithms, data structures, and some sort of user interface. You should have some tests that show the application functions as intended.

3. **Documentation:** The documentation for your navigation application includes technical documentation, and any other supporting materials. You should revise and refine the documentation as you go and you can ask for feedback on it from me at any point.

4. **Presentation:** Prepare a presentation of your navigation application, which you will present to the class. The presentation should demonstrate the functionality of the application and provide an overview of the design and implementation. Everybody in the the group will take part in the presentation and although not compulsory a slide deck is usually a good idea.

5. **Conclusion:** The navigation application project gives you an opportunity for students to apply your research into graph theory algorithms and data structures to a real-world problem. It will also help you to continue developing job related skills in software development.. The project can be interpreted to suit your own interests and you can extend it for example by adding further layers of information such as points of interest on the route etc.