

Assignment 2:

Assignment Title: Real-World Application of Search Algorithms: Finding Shortest Paths Between two cities on a Map (choose Algerian region)

Assignment Description:

In this assignment, you will explore a real-world application of search algorithms by implementing a program to find the shortest path between two cities on a map. The process involves utilizing open-source tools and libraries to transform map data into a graph representation, applying a search algorithm to find the shortest path, and visualizing the result.

Assignment Tasks:

If you prefer other tools, you are free to use them; these examples are not exhaustive.

For this assignment, you will start by getting map data from **OpenStreetMap** for a region with multiple cities. OpenStreetMap has free and detailed map data. Once you've exported the map data in a suitable format, you'll use a Python library called **OSMnx**. This library helps you transform the map data into a graph, where intersections or landmarks are nodes, and roads or paths between them are edges. Next, you will use a chosen path algorithms like A* search. These algorithms find the shortest route on a map. You can choose the best one based on the map's characteristics and what you need. Then, you will implement your chosen algorithm using Python, with help from libraries like **NetworkX** for graph operations. After that, you will visualize the shortest path between two cities on the map.

You can use tools like **matplotlib** to show the map with the shortest path highlighted in a different color. Finally, you will test your program with different city pairs to make sure it works well. You will also discuss any challenges or limitations you encountered and how you solved them.