

Write Up: **Thanick Paiboonrungruang**

Graph Path Finder: A Tool for Graph Exploration and Analysis

Welcome to Graph Path Finder, a comprehensive software solution designed to facilitate the exploration and analysis of graphs. Graphs are fundamental data structures used to represent connections between entities, and Graph Path Finder empowers users to navigate, visualize, and derive insights from these complex structures with ease.

Graph Path Finder incorporates a road network dataset of California, where intersections and endpoints are represented as nodes, and the roads connecting them are depicted as undirected edges. This dataset enriches the analytical capabilities of the tool, allowing users to explore the intricate road network topology of California.

Features

Graph Loading: Load graph data effortlessly from external text files. Graph Path Finder intelligently constructs graphs from raw data, enabling users to analyze various network structures effortlessly.

Graph Visualization: Visualize graph structures in an intuitive manner. With Graph Path Finder's visualization feature, users can gain deeper insights into graph connectivity and relationships through clear and informative visual representations.

Shortest Path Determination: Employ the powerful Breadth-First Search (BFS) algorithm to find the shortest path between any two nodes in a graph. Graph Path Finder facilitates efficient pathfinding, aiding users in identifying optimal routes within complex networks.

Graph Saving: Preserve graph data for future reference and analysis. Graph Path Finder supports the serialization of graph structures into JSON format, ensuring data integrity and accessibility across multiple sessions.

Usage Guidelines

Graph Loading:

- Select the option to load a graph from the main menu.
- Provide the file path of the desired graph data file.
- Graph Path Finder will process the input file and construct the graph accordingly.

Graph Visualization:

- Choose the visualization option from the main menu.
- Experience the visualization of graph nodes and connections in a visually appealing format.

Shortest Path Determination:

- Opt for the shortest pathfinding option from the main menu.
- Input the start and end nodes to discover the shortest route between them.

Graph Saving:

- Access the graph-saving feature from the main menu.
- Specify a file path to store the graph data in JSON format for future use.

Sample Output

Welcome to Graph Path Finder!

Choose an option:

1. Find shortest path
2. Visualize graph
3. Save graph to file
4. Load graph from file
5. Exit

> 1

Enter start node:

1

Enter end node:

5

Shortest path from 1 to 5: [1, 2, 5]

Choose an option:

1. Find shortest path
2. Visualize graph
3. Save graph to file
4. Load graph from file
5. Exit

> 2

Graph Visualization:

Node 1: 2 3

Node 2: 1 4 5

Node 3: 1

Node 4: 2

Node 5: 2

Choose an option:

1. Find shortest path
2. Visualize graph
3. Save graph to file
4. Load graph from file
5. Exit

> 3

Enter file path to save the graph:

graph_data.json

Graph saved to file: graph_data.json

Choose an option:

1. Find shortest path
2. Visualize graph
3. Save graph to file
4. Load graph from file
5. Exit

> 5

Exiting...