Assignment: Implementing a Bidirectional Search Algorithm

Overview

In this assignment, you will implement a bidirectional search algorithm to find the shortest path between two capital cities using a provided dataset of geographical coordinates. This assignment aims to enhance your understanding of graph traversal algorithms, specifically how bidirectional search can optimize search processes by simultaneously exploring paths from both start and goal nodes.

Objectives

- To implement a bidirectional search algorithm to find the shortest path between two nodes in a graph.
- To understand and apply Python data structures such as dictionaries, sets, and queues in managing graph data.

Dataset Description:

The dataset named 'Dataset.csv', contains information about various capital cities, including their names, countries, and geographical coordinates (latitude and longitude). After downloading the dataset, ensure it is accessible via the path provided in your code setup.

Requirements:

- **Bidirectional Search Algorithm Implementation:**
  - Implement function to perform a search from a given start node to a goal node.
  - Utilize deques for maintaining the frontiers/edges of the search starting from both the start and goal nodes.
  - Track visited nodes to avoid reprocessing and manage path reconstruction.
  - Test your algorithm by finding paths between multiple pairs of cities and discuss any interesting findings.

Deliverables:

1. A brief report documenting your approach, challenges encountered, and insights gained from implementing the bidirectional search.
2. Code's .ipynb file