

Lab-4 Problem Statement

Given a graph, Write a function to find the shortest path between the start and end node

Graph structure -

Understand the graph structure with the help of pictures in the data folder

And all the nodes are in a square of side length n . There are $n*n$ vertices in the square.

Each node is connected to at most 4 neighbors. And, each node has a coordinate (x, y)

The graph is connected i.e. there exists a path between any 2 nodes in the graph

Graph information is written in txt file. graph_10.txt is for the graph in a square of side length 10

Text file:

Side length

node₀ (x_0, y_0) // coordinate

node₁ (x_1, y_1)

...

node _{$n^2 - 1$} (x_{n-1}, y_{n-1})

node₀ n₀₁ n₀₁ // neighbours

node₁ n₁₁

...

node _{$n^2 - 1$}

This text file is loaded as a Graph class.

Task:

Implement the shortest path function to find the shortest path between the start vertex and the end vertex in a graph

Arguments:

graph, start_vertex, end_vertex

Returns:

List of nodes that form the path (Format - [start_vertex, node1, node2, ..., end_vertex])

Instructions to run:

python3 shortest_path.py <graph_file>

Output:

Time taken to run your algorithm

Length of the path

Path

The given path exists/does not exist in the graph

Also, the path added to the graph is saved as plot_n.png

Note: The shortest path may not be not unique, but the length of the shortest path is.