Siddharth Prabhu

PA06

Project Report

In this project I found the shortest number of rotations of a board required to cross a river using Dijkstra's algorithm. I created an adjacency matrix of structures of size [rows x (col + 2)] where there were two extra columns to denote the start bank and the end bank. Each structure and a right,left,up,and down edge as well as pointers to the up,down,right, and left nodes. All the initial right edges were set to 2 rotations, all the down and up edges weights were set to 1. The initial edge from the start bank to another node was set as 0. While reading the text file, all '1' 's marked in the file, set the respective vertical edge weights to 0 as no rotations of the board were needed to cross them. Once the edge weights were set, all nodes were placed in a priority queue. Dijkstra's algorithm was run to determine the shortest path, as the node with the minimum distance value was extracted from the queue and the distances of nodes adjacent to it were set.

Building the priority queue had a time complexity of O(n), and dequeing the minimum value took O(logn) complexity where n is the the number of nodes.

The time complexity was found to O(V log V) to make the queue and extract the min value, and O(E log V) to run Dijkstra's algorithm, where refers V to the nodes and E its edge nodes.