

# Algorithms 4133

## HW2

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In this Homework Assignment, we were given a mostly-implemented program which tested the functionality of our to-be-implemented Breadth First Search, Depth First Search, and Recursive Depth First Search algorithms.

The Breadth First Search is designed to explore every node on the same level of a tree before expanding to the next depth's nodes. The queue data structure is used to implement this algorithm. Every child node discovered is added to the back of the queue, which allows us to each node on the same level before going deeper into the tree.

The Depth First Search is designed to explore every child node from the previous node before expanding to the next node on the same level. DFS goes to the lowest depth before backtracking and exploring the other subtree to its lowest depth before moving to the adjacent node.

These are the results after running the main function through terminal by executing the make file.

This program was implemented and tested on an m1 MacBook Air.

## BFS

```
((base) smlin@Samuels-Air Homework2 % make bfs
g++ -I./include/ src/linked_list.cpp src/graph.cpp src/queue.cpp src/stack.cpp src/bfs.cpp src/dfs.cpp src/rdfs.cpp src/main.cpp
-o bin/main
./bin/main bfs
Perform unit test on your bfs implementation
Path from 0 to 5 by bfs: 0 1 3 4 5

Path from JBHT to detination: JBHT -> HILL -> WJWH -> HAPG
You have to use OpenCV to visualize your map road
```

## DFS

```
((base) smlin@Samuels-Air Homework2 % make dfs
g++ -I./include/ src/linked_list.cpp src/graph.cpp src/queue.cpp src/stack.cpp src/bfs.cpp src/dfs.cpp src/rdfs.cpp src/main.cpp
-o bin/main
./bin/main dfs
Perform unit test on your dfs implementation
Path from 0 to 5 by dfs: 0 1 2 4 5

Path from JBHT to detination: JBHT -> HILL -> WJWH -> HAPG
You have to use OpenCV to visualize your map road
```

## RDFS

```
((base) smlin@Samuels-Air Homework2 % make rdfs
g++ -I./include/ src/linked_list.cpp src/graph.cpp src/queue.cpp src/stack.cpp src/bfs.cpp src/dfs.cpp src/rdfs.cpp src/main.cpp
-o bin/main
./bin/main rdfs
Perform unit test on your rdfs implementation
Path from 0 to 5 by rdfs: 0 1 3 4 5

Path from JBHT to detination: JBHT -> HILL -> WJWH -> HAPG
You have to use OpenCV to visualize your map road
```