

MAZE SOLVING USING BFS, GBFS, AND A* SEARCH

INTRODUCTION

This report presents the implementation and results of solving single-prize mazes using Breadth-First Search (BFS), Greedy Best-First Search (GBFS), and A* Search (A*). Each algorithm explores the maze differently to reach the prize efficiently.

IMPLEMENTATION DETAILS

The functions `single_bfs`, `single_gbfs`, and `single_astar` take a maze file as input and perform searches using different strategies. BFS ensures the shortest path, while GBFS and A* use heuristics to improve efficiency.

EXECUTION PROCESS

To run the search algorithms, execute the following command: `python main.py`

This script will solve three maze files and print the results

RESULTS

Below are the results of solving three different mazes using BFS.

```
### BFS Solution for 1prize-open.txt:
` ``
```

```
%%%%%%%%%%
%          %P#####%
%          %  #    %
%          %  #    %
%          %  #    %
%          %  #    %
%          %%%%%#  %
%          %  #    %
%          %  #    %
%          %  #    %
%          %  #    %
%          #####  %
%          %%%%%%#####
%          #%      %
%          #%      %
```

```
**Path Cost: 45, Nodes Expanded: 513**
```

[illegible]

```
**Path Cost: 94, Nodes Expanded: 611**
```

[illegible]

```
**Path Cost: 148, Nodes Expanded: 1259**
```

...

```
**Path Cost: 45, Nodes Expanded: 149**
```

— — —

#####

[illegible]

****Path Cost: 222, Nodes Expanded: 278****

Below are the results of solving three different mazes using A* Search.

A* Search Solution for 1prize-open.txt:

...

%%%%%%%%%%%%%%%%%%%%%%%%%

```
%                %P                %
%                %#                %
%                %#                %
%                %#                %
%                #####                %
%                %%%%%%%%%#                %
%                %#                %
%                %#                %
%                %#                %
%                %#                %
%                #####                %#                %
%                #%%%%%%%%#####                %
%                #%                %
%                #%                %
%                #%                %
%                #%                %
%                #%                %
%                ##%                %
```

%%%%%%%%%%%%%%%%%%%%%%%%%

...

****Path Cost: 45, Nodes Expanded: 238****

A* Search Solution for 1prize-medium.txt:

...

%%%%%%%%%%%%%%%%%%%%%%%%%

```
%                % %                %                %                #####                %#####%
```

```
### A* Search Solution for 1prize-large.txt:
```

