Project Proposal

Project Title:

HEXAI Maze Solver with Multiple Search Algorithms

Section: BSCS-6G/L

Objective:

The aim of this project is to implement and compare various classical search algorithms (BFS, DFS,

UCS, A*) for solving a maze or grid-based environment. The project will demonstrate how each

algorithm traverses the environment to find the shortest path between a start and goal node.

Motivation:

Search algorithms are fundamental to artificial intelligence. Visualizing these algorithms in action

helps students and practitioners understand their behavior, efficiency, and use cases. This project

provides a hands-on approach to grasp core AI concepts.

Scope:

- Implement BFS (Breadth-First Search)

- Implement DFS (Depth-First Search)

- Implement UCS (Uniform Cost Search)

- Implement A* Search with a heuristic function

- Provide a text-based or graphical visualization of the search process

- Allow configurable maps or environments

- Provide performance comparison metrics (time, nodes explored)

Tools and Technologies:

- Language: Python

- Libraries: heapq, collections, matplotlib (optional for visualization)

- Environment: Jupyter Notebook or Python script

Expected Outcomes:

- A working Python application that demonstrates each search algorithm

- Comparative analysis of algorithms based on performance metrics

- An understanding of informed vs uninformed search techniques

Timeline:

Week 1: Research and environment setup

Week 2: Implement BFS and DFS

Week 3: Implement UCS and A*

Week 4: Testing, visualization, and performance comparison

Week 5: Final report and presentation

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