CPSC 460/560 AI, Project 1 – A*

The A* algorithm is a pathfinding and graph traversal algorithm widely used in computer science and artificial intelligence, particularly for finding the shortest path between two nodes in a graph. It is an informed search algorithm, meaning it uses heuristics to guide its search, making it more efficient than uninformed algorithms like Breadth-First Search or Dijkstra's algorithm in many scenarios. [Google AI]

Objective

Implement the A* search algorithm to find optimal paths in a grid-based maze environment. You will compare your A* agent to uninformed search strategies (e.g., BFS) and analyze the effect of different heuristics on performance.

Requirements

- Implement A* search using a priority queue (heapq).
- Define an admissible heuristic function (e.g., Manhattan distance).
- Parse and visualize the solution path in a text or grid environment.
- Compare the performance of A* to BFS.
- Reflection on heuristic impact and performance.

What to submit: Your Jupyter notebook (see the template)