2. Documentation for astar_algorithm.ipynb

This notebook implements the **A* Search Algorithm**, which is an informed search algorithm used for pathfinding.

Purpose and Algorithm Components

The A* algorithm finds the shortest path from a starting node to a goal node by estimating the total cost of a path using a combination of:

1. **g-cost:** The actual cost of the path from the start node to the current node.
2. **h-cost (Heuristic):** The estimated cost of the path from the current node to the goal node.
3. **f-cost:** The total estimated cost, calculated as $f = g + h$.

The implementation includes:

- **`Node` Class:** A class to hold the node's name, `g` cost, `h` cost, and its `parent` node reference.
- **`AStar` Class:** A class containing the main search logic, managing the `open_list` (nodes to visit) and `closed_list` (visited nodes).
- **Data Structures:** A sample `graph` (with edges and costs) and a `heuristic` table (with h-costs for each node) are defined.

Execution

The solver finds the path from node 'A' to node 'G'.

- **Result:** The optimal path found is `['A', 'B', 'D', 'G']`.