EAST WEST UNIVERSITY

Assignment -01

Simulation of Robotic Grid Solving Problem using A* and IDA* Algorithm

CSE366: Artificial Intelligence
Section 02
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Github Link: https://github.com/os-car-war-thy/AI_submission_A-/tree/main

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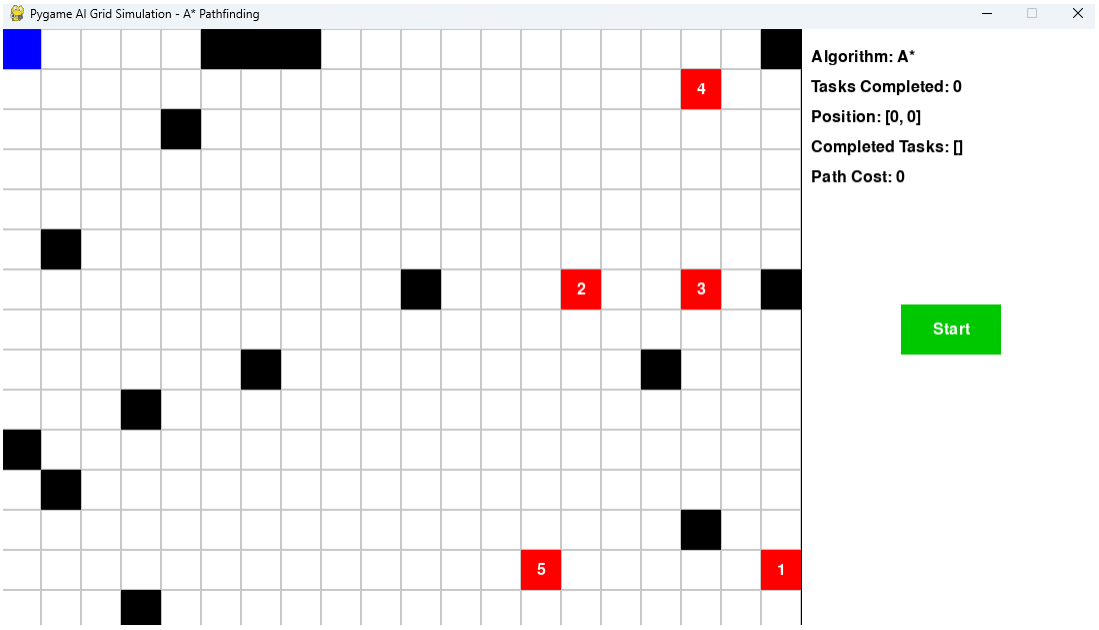
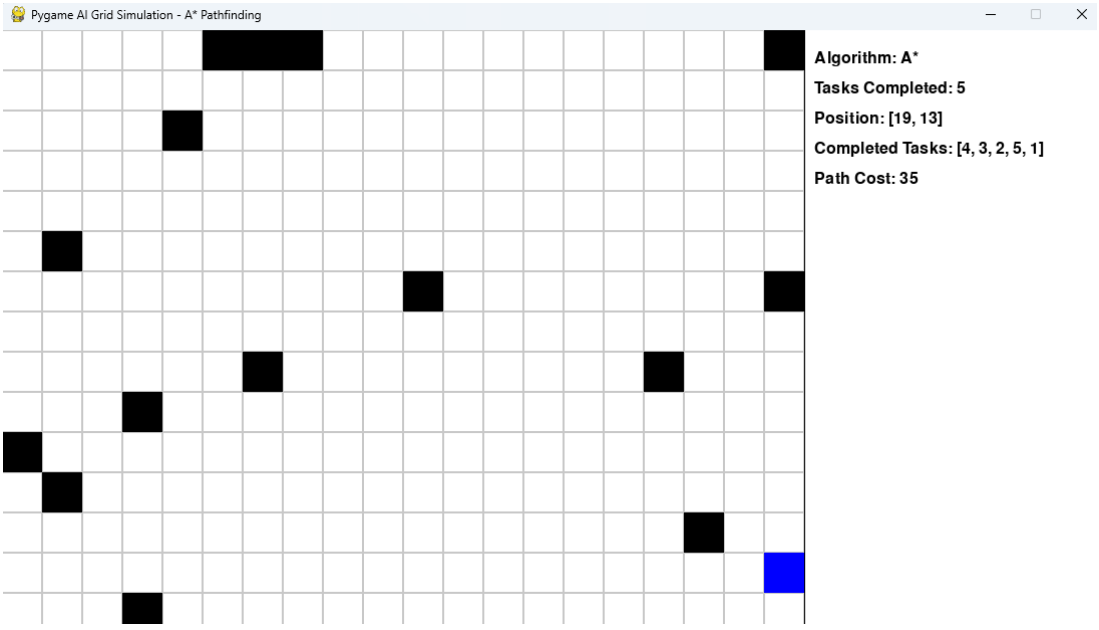
A* Algorithm:

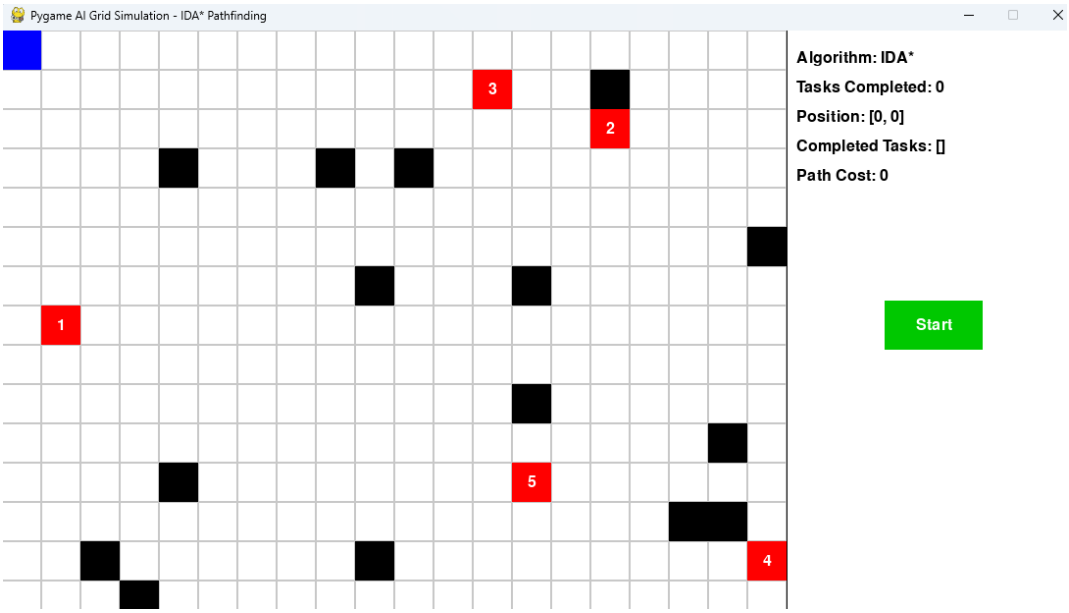


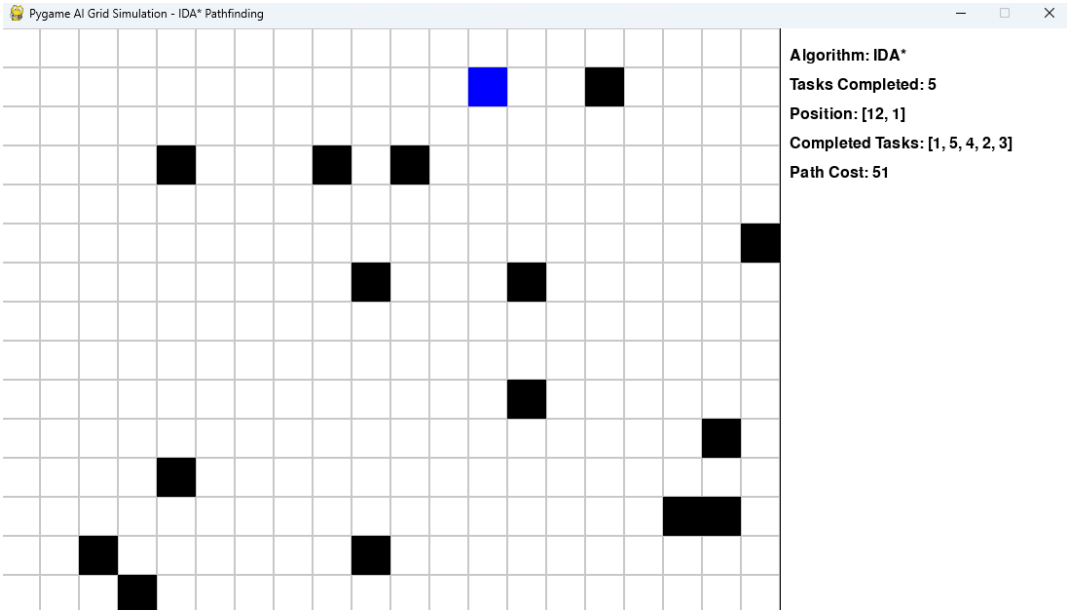


A* algorithm uses heuristic estimates to prioritize node exploration. It employs a priority queue, considering the cumulative cost and heuristic estimation (e.g., Manhattan distance), to guide search efficiently toward the goal.

- Total Cost f(n)= g(n)+h(n)
- A* can use lots of memory:

IDA* Algorithm:





IDA* combines Depth-First Search and iterative deepening with heuristic pruning. Initially, it sets a threshold based on the heuristic and deepens this threshold iteratively.It explores nodes until a solution is found or it exceeds the current threshold, adjusting iteratively.

- g(s) + h(s) <= Threshold
- Complete + optimal,
- Might be costly time-wise – Revisit many nodes
- Lower memory use than A*

- **Heuristic Function Admissibility:**

Manhattan Distance is the minimum number of steps required in an empty grid. It never overestimates because adding barriers only increases the actual cost, never decreases it.

Challenges & Solution:

For too large a problem, the system could miss out reaching a solution.