Part1. A)

Explain in your report why the first move of the agent for the example search problem from Figure 8 is to the east rather than the north given that the agent does not know initially which cells are blocked

Sol:

From A, the possible blocks for the agent to move are E4,E3,D2 and f,g,h values are as follows.

|  |  |  |  |
| --- | --- | --- | --- |
| Open List | G | H | F |
| E1 | 1 | 4 | 5 |
| D2 | 1 | 4 | 5 |
| E3 | 1 | 2 | 3 |

As E3 has the least f-value, it will be chosen to expand.

From E3, the possible blocks for the agent to move are D3 and E4 and f,g,h values are as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| Open List | G | H | F |
| E1 | 1 | 4 | 5 |
| D2 | 1 | 4 | 5 |
| D3 | 2 | 3 | 5 |
| E4 | 2 | 1 | 3 |

As E4 has the least f-value, it will be chosen to expand.

From E4. the possible blocks for the agent are E5 and D4 and f,g,h values are as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| Open List | G | H | F |
| E1 | 1 | 4 | 5 |
| D2 | 1 | 4 | 5 |
| D3 | 2 | 3 | 5 |
| E5 | 3 | 0 | 3 |
| D4 | 3 | 2 | 5 |

Therefore E5 will be picked and also the goal is E5.

The path traced is   
A->E3->E4->E5 (with the agent’s knowledge about the surroundings at state A)

B)

A\* algorithm works based on the current knowledge of the agent. The agent assumes that the states(i:e the neighbouring blocks) it sees can be the only possible blockers and the remaining region is unblocked. While assuming this agent starts on the computed path of the finite grid cell, where it faces the blocker in the region it did not explore yet. From the blocked stage the path to goal is again constructed using A\*, this is repeated for as long as a path is impossible to construct.

Lets say number of unblocked cells =n;

Number of moves that an agent can take to reach the goal can be at max n

Moves<=n

The number of A\* searches at max can be the number of assumed unblocked states (i:e every state is assumed unblocked is actually blocked)

Number of A\* iterations <=n

Therefore, the number of moves until the agent reaches the goal can be

Moves \* Number of A\*iterations <= n\*n = n^2