INTRODUCTION TO ARTIFICIAL INTELLIGENCE  
Lab 7 – A star

1. **A star algorithm:** Find the shortest path between nodes A (source) and I (target) in the non-directed graph.

The distance (cost) between two nodes is written next to the edge connecting these nodes.

For each iteration, complete the table containing the G and F values for nodes. Then write the current list of visited nodes (closed set) and unvisited (open set) nodes.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | A | B | C | D | E | F | G | H | I | | H | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | | |
| **I iteration:**  Current node: A  Previous node: -  Closed set:  Open set: | |  |  |  |  | | --- | --- | --- | --- | | Node |  |  |  | | G |  |  |  | | F |  |  |  | |
| **II iteration:**  Current node:  Previous node:  Closed set:  Open set: | |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Node | A | B | E |  |  |  |  | | G | 0 | 1 | 3 |  |  |  |  | | F | 8 | 8 | 7 |  |  |  |  | |
| **III iteration:**  Current node:  Previous node:  Closed set:  Open set: | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Node | A | B | D | E | F | H |  |  | | G | 0 | 1 | 5 | 3 | 5 | 6 |  |  | | F | 8 | 8 | 10 | 7 | 8 | 7 |  |  | | | |
| **IV iteration:**  Current node:  Previous node:  Closed set:  Open set: | |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Node | A | B | D | F | G | H | I |  |  | | G | 0 | 1 | 5 | 5 | 8 | 6 | 9 |  |  | | F | 8 | 8 | 10 | 8 | 10 | 7 | 9 |  |  | | | |
| **V iteration:**  Current node:  Previous node:  Closed set:  Open set: | |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Node | A | B | C | E | G |  |  |  |  | | G | 0 | 1 | 4 | 2 | 8 |  |  |  |  | | F | 8 | 8 | 10 | 6 | 10 |  |  |  |  | | | |
| **VI iteration:**  Current node:  Previous node:  Closed set:  Open set: | |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Node | A | B | C | D | E | F | H |  |  | | G | 0 | 1 | 4 | 4 | 2 | 4 | 5 |  |  | | F | 8 | 8 | 10 | 9 | 6 | 7 | 6 |  |  | | | |
| **VII iteration:**  Current node:  Previous node:  Closed set:  Open set: | |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Node | A | B | D | E | F | G | H |  |  | | G | 0 | 1 | 4 | 2 | 4 | 7 | 5 |  |  | | F | 8 | 8 | 9 | 6 | 7 | 9 | 6 |  |  | | | |
| **VII iteration:**  Current node:  Previous node:  Closed set:  Open set: | **Shortest path A-I:** | | |