Homework of Motion Planning for Mobile Robots

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Abstract

Matlab implementation of A* algorithm。

Keywords: A*, MATLAB

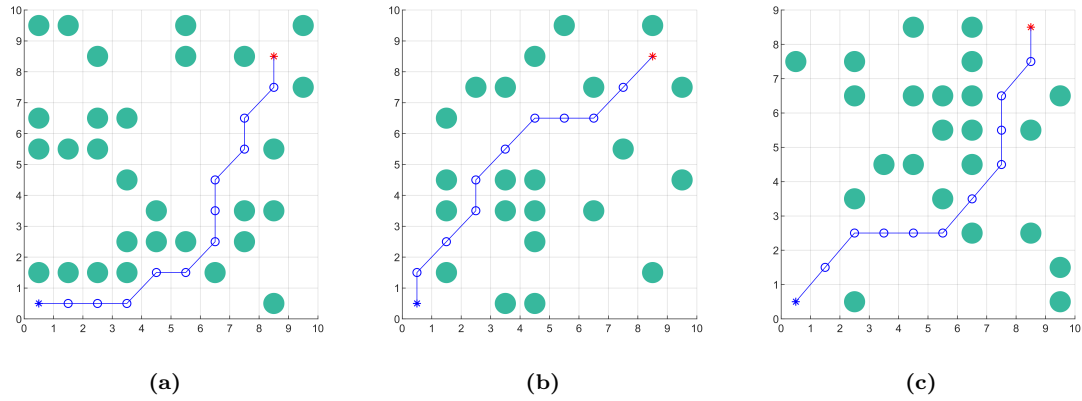## 1. The path in different random maps

| (a) | (b) | (c) |

Figure 1: path

2. Result analysis

The pseudocode of A* algorithm is：

```
OPEN // the set of nodes to be evaluated
CLOSE // the set of nodes already evaluated
add the start node to OPEN

loop
    current = node in OPEN with the lowest f_cost
    remove current from OPEN
    add current to CLOSE

    if current is the target node //path has been found
        return
    foreach neighbour of the current node
```

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```
    if neighbour is not traversable or neighbour is in CLOSE
        skip to the next neighbour

    calculate h_cost, g_cost and f_cost of neighbour

    if neighbour is not in OPEN
        add neighbour to OPEN
    elseif new path to neighbour is shorter
        update cost and set parent of neighbour to current
```

Note that the heuristic is Euclidean.

3. Comparison of different heuristic functions

For a flat grid map that can move in eight directions (including diagonally), it is more appropriate to use Diagonal Heuristic as the heuristic function. The calculation speed is the fastest, with an average of 0.053410s. Manhattan and Euclid are slower, 0.058713s and 0.060269s respectively