Motion Planning HW2 report

Xie Fujing

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1. Work flow:
   (a) Complete heuristic function, tried three functions, 0 stands for Euclidean distance, 1 stands for Manhattan distance, 2 stands for Diagonal Heuristic, which can be changed by "heu_type" in launch file.
   (b) Set startPtr's id as 1, means it is in the open set, and insert it to "openSet".
   (c) Set start position in GridNodeMap to 1, means it is in openSet.
   (d) In the main loop, get the lowest cost node from openSet, erase it from openSet, and set the postion in GridNodeMap to -1.
   (e) Finish "AstarGetSucc" function, traverse all nodes next to current node, if the node is free and not in closedSet, add it to neighborPtrSets and calculate distance between this node and current node.
   (f) Transverse all neighbors of current node, if it is a new node, add it to openSet, record its parent, and calculate its gScore and fScore. If it is already in the openSet, check if this road has a lower cost, if so update its score and parent.
   (g) From the terminatePtr's cameFrom to find its parent until find startPtr.
2. Running Result
   Running result as image below.

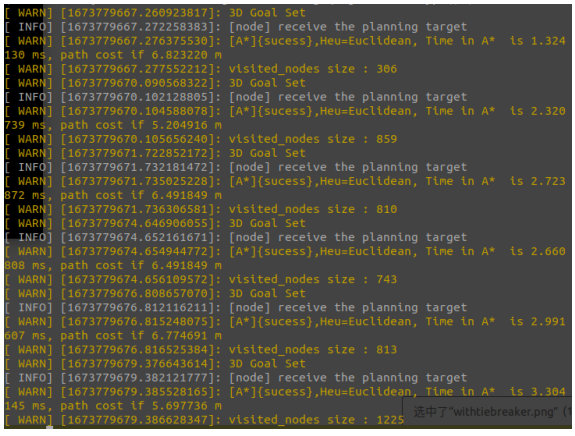


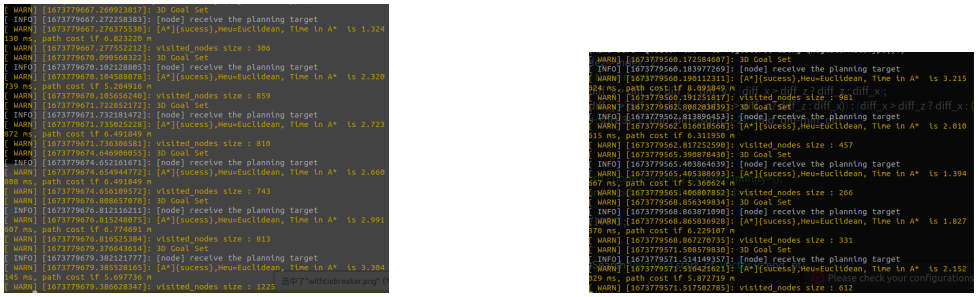
Figure 1:

3. Compare different heuristic function
   Use Diagonal Heuristic as heuristic fuction can decrease the number of visted node as can be seem from image below: 32 if use Diagonal distance as heuristic cost, 339 if use Euclidean distance as heuristic cost.

(a) Euclidean (b) Diagonal Heuristic

Figure 2:

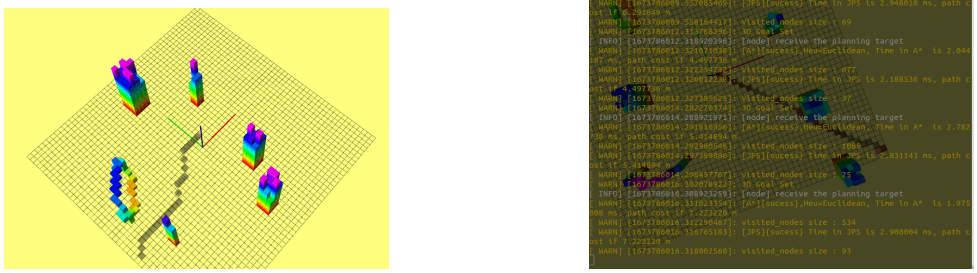
4. Tie break function influence
   The tie breaker simply return slightly different hScore, and in simple environment, it has less visted nodes.



(a) without tiebreaker (b) with tiebreaker

Figure 3:

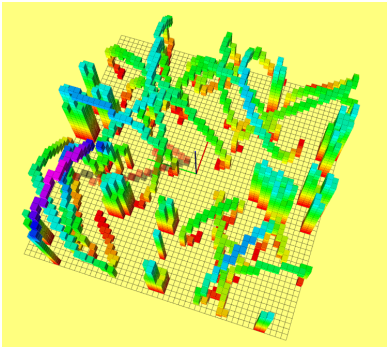
5. Compare A^* and JPS In simple environment like below, the JPS takes less time to find path.



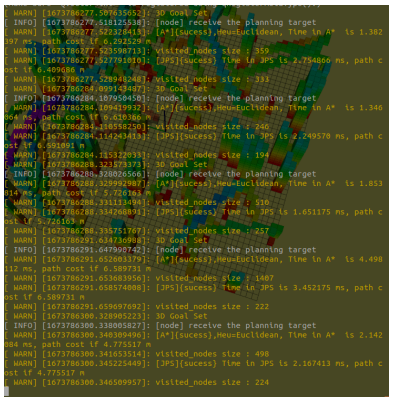
(a) simple environment (b) JPS and A^* running result

Figure 4:

But in complex environment, sometimes JPS takes more time than A^*.



(a) complex environment



(b) JPS and A^* running result

Figure 5: