ENPM - 661

PLANNING FOR AUTONOMOUS ROBOTS

Project - 3

Implementation of A* algorithm on differential drive robot

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Steps to Run the program

Python Modules:

The following modules are used in the program

1)numpy
2)math
3)time

Install all the above mentioned modules in the **python3** version for running the program.

Run Steps:

First keep all the following files in one folder:

1) vrep.py (C:\Program Files\V-REP3\V-REP_PRO_EDU\programming\remoteApiBindings\python\python)

2) ConnectionCheck.py

3) vrepConst.py (C:\Program Files\V-REP3\V-P_PRO_EDU\programming\remoteApiBindings\python\python)

4) rrl_map. (V-Rep Scene)

5) Turtlebot2 (V-Rep Model)

6) Astar_TurtleBot.py (submitted file)

If you are running in the **Ubuntu version 16.04**:
- ➢ Install python-3
- ➢ Install all the above mentioned modules in the **python3** version for running the program.
- ➢ Open the V-Rep.
- ➢ Open the RRL Map V-Rep scene and import the TurtleBot model in V-Rep.
- ➢ Use the LUA Script mentioned in the file " **script.lua** " that you provided us

instead of the already existing LUA script in the V-Rep scene.

➢ By keeping the V-Rep open, Run the submitted '.py' python file ("Astar_TurtleBot.py ").

➢ Then feed the inputs in the console as per requested. Example Picture for giving the input is provided below,

1) A-Star Differential Drive Robot (Sample input)

```
"C:\Users\PRASANNA MARUDHU\venv\Scripts\python.exe" "K:/Semester 2/ENPM 661 - Planning/Projects/Project3/Sim V-Rep/
Please feed the Following Information for Path Planning
Enter the Start node 'X' value in Centimeter: 40
Enter the Start node 'Y' value in Centimeter: 40
Enter the Goal node 'X' value in Centimeter: 423
Enter the Goal node 'Y' value in Centimeter: 632
|
```

➢ Then press 'Enter'.

➢ The program will run and shows the simulation video of the algorithm. (Please be patient until the program runs to obtain the goal path, it will take nearly 3 minutes for obtaining the optimal path)

➢ Once the execution is completed, the obtained optimal path output will be shown in the figure .

➢ Please close this figure and immediately V-Rep Simulation will run in V-Rep.

➢ You can observe the movement of robot tracking the path and reaching the goal node.

If you are running the code in **pycharm IDE:**

➢ Open the V-Rep.
➢ Open the RRL Map V-Rep scene and import the TurtleBot model in V-Rep.
➢ Use the LUA Script mentioned in the file " **script.lua** " that you provided us instead of the already existing LUA script in the V-Rep scene.
➢ By keeping the V-Rep open, Run the submitted '.py' python file ("Astar_TurtleBot.py ").
➢ Then feed the inputs in the console as per requested. Example Picture for giving the input is provided below,

2) A-Star Differential Drive Robot (Sample input)

```
"C:\Users\PRASANNA MARUDHU\venv\Scripts\python.exe" "K:/Semester 2/ENPM 661 - Planning/Projects/Project3/Sim V-Rep,
Please feed the Following Information for Path Planning
Enter the Start node 'X' value in Centimeter: 40
Enter the Start node 'Y' value in Centimeter: 40
Enter the Goal node 'X' value in Centimeter: 423
Enter the Goal node 'Y' value in Centimeter: 632
|
```

➢ Then press 'Enter'.
➢ The program will run and shows the simulation video of the algorithm. (Please be patient until the program runs to obtain the goal path, it will take nearly 3 minutes for obtaining the optimal path)

➢ Once the execution is completed, the obtained optimal path output will be shown in the figure .

➢ Please close this figure and immediately V-Rep Simulation will run in V-Rep.

➢ You can observe the movement of robot tracking the path.

Inference:

- ❖ The A-Star python file for differential drive robot is submitted along with the ReadMe file.
- ❖ The nodes are given unique ID in order to enable the search for the node with minimum cost faster which supports in the faster computation.
- ❖ The Maximum time for code execution is 5 minutes.

"Please contact me if you face any difficulty in running the program"