Instruction for Project 3

Contest Week

1. Introduction

In Project 3, you will compete against other teams using records from the simulation. You are allowed to use any algorithm, such as Gaussian Process Regression and Reinforcement Learning. Like Project 2, you will use 720-dimensional LiDAR scan data to predict the action for your rccar. You may create new files to define classes or train models but make sure to upload all files required for running '{TEAM_NAME}_project3.py' to GitHub. If you want to use specific Python modules, let the TA know so they can be installed on our evaluation server. If you plan to use deep learning modules, we kindly ask you to use PyTorch.

2. Large File

We recommend you not to use too large model because it may not run in real-time speed when running real world RC car. Again, if the model size is too big for it to be uploaded on Github, please upload the model file to Goole Drive and follow the instructions below.

2.1 Google Drive

1. Go to Google Drive and upload your model file.
2. Set the file to be 'Anyone with the link' and copy the link.

3. The copied link will have a form as follows.

> https://drive.google.com/file/d/**1q5mGgVg3STfRtw8VQBsv**/view?usp=sharing

Your 'FILE_ID' is the part between '/d/' and '/view', highlighted in red. Get your 'FILE_ID' from the link.

4. Inside the 'model_link.json' file in '~/project/IS_{TEAM_NAME}/project/model_link.json', replace "my_model.pkl" and "GOOGLE_DRIVE_FILE_ID" part with your model name and ID.

> ex) "my_model.pkl": "GOOGLE_DRIVE_FILE_ID"
>
> → "our_model.pkl": "1q5mGgVg3STfRtw8VQBsv"

3. Setup

Don't forget to change your 'setup.py' to add project3 on ros2 package.

```
'RLLAB_project3 = rccar_bringup.project.IS_RLLAB.project.RLLAB_project3:main'
# Replace RLLAB with your team name
```

4. Random Map Generation

In our class repository (https://github.com/rllab-snu/Intelligent-Systems-RLLAB), you can find 'random_trackgen.py' file added in 'maps' folder. By running this code, you can randomly generate maps to use for training your model.

```
cd [your-workspace-folder]/maps


# you need to use different seed to make different maps.
python random_trackgen.py --seed your_seed --name your_map_name
```

Inside the 'random_trackgen.py' file, you can change the following parameters in the "create_track" function to create more dynamic maps.

```
def create_track(checkpoints=None):
    CHECKPOINTS = 16
    SCALE = 6.0
    TRACK_RAD = 900 / SCALE
    TRACK_DETAIL_STEP = 21 / SCALE
    TRACK_TURN_RATE = 0.6
    WIDTH = 6.0
```

5. Static Obstacle Spawn

For evaluation, maps with obstacles will be used, so fine tuning the model or training a model with obstacles may be a good start. To spawn obstacles within the loaded tracks, use obstacle arguments like below. Be aware, if you try to load too many obstacles, the simulation may fail to be rendered.

```
ros2 run rccar_bringup RLLAB_project3 --mode train --num_obstacles=10
# Replace RLLAB with your team name, Change the number of obstacles
```

You can monitor your model's performance and scores on the leaderboard which is available on our website. Your algorithm will be tested on 5 unknown maps. For each map, rankings are determined based on 2 criteria in order (1. waypoint, 2. lap time), and points are awarded accordingly: 1st place gets 20 points, then 17, 14, 11, 9, 7, 5, 4, 3, 2, 1. Your team's final ranking is determined by the sum of all the points across 5 maps. The leaderboard will display your team's best performance based on the highest overall score.

To evaluate your code in a local PC, follow the instructions described in the class repository (https://github.com/rllab-snu/Intelligent-Systems-RLLAB). To evaluate your code on the server, commit and push your codes on github and make a query on our project web server. Before you add any queries to the server, please ensure that your model file has been properly uploaded either in your github repository or in your Google Drive.

After a short maintenance period, the server will be open starting 11/28 Friday, and Project 3 is due **12/3(Wed) 23:59 KST**. Late queries **will not be submitted**.

Have fun!!