Artificial Intelligence Project

Self Driving Car Simulation

1 Context

You are asked to design and develop an AI that is able to drive a car in a simplified environment. The road contains no crossing and no pedestrian. Your AI just has to keep the car on the road.

2 Simulator

To train and test your AI, you will use a simulator. This simulator is a kind of video game that makes it possible to both create training data by driving the car yourself, and test your AI by giving it the steering wheel.

You can get the simulator executable at the following address: https://github.com/udacity/self-driving-car-sim (in the "*Term 1*" section of the `README` file).

In this simulator, the car is equipped with three cameras at the front of the car and sensors to measure the speed of the car, the angle of the steering wheel and the throttle and brake activation levels.

To generate training data with the simulator:

- start the simulator in "*training*" mode,
- press the "`r`" key,
- choose a directory where data will be saved,
- press the "`r`" key to start recording,
- drive the car for 1 to 5 laps,
- press the "`r`" key to stop recording,
- wait for the data capture to complete.

Once the generation has completed, you will obtain a `.csv` file with all the generated data [1] and a directory of images.

3 Creating a model

Once the training data has been obtained, you are free to create your model as you want. Your model will, based on the central camera [2] and the speed, operate the steering wheel and the accelerator [3].

Since your data was recorded during the generation phase, the simulator is not involved in the model creation and training phases.

4 Have the simulator driven by your model

You can write the program that will drive the simulator in any programming language. The simulator behaves like a `socketIO` client. All you need to do is to create a `socketIO` server that is listening on the `4567` port to receive the simulator events and send it driving commands. You can find an example `socketIO` server written in Python in the `drive.py` file.

[1] in order: central image, left image, right image, steering wheel, accelerator, break, speed.

[2] Left and right cameras are not sent to the AI during the operation phase. It is nevertheless possible to use them during the training phase to generate disturbed views.

[3] It is possible to brake during the operation phase by sending a negative acceleration.