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Deep Learning for Autonomous Driving Laboratory
Summer term 2018

Project 4: Exercise 3

Topics: Training End-to-end driving networks

Submission deadline: Friday June 1, 2018

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Task 1: Train End-to-end driving networks

In this project you will tackle end-to-end driving using imitation learning, which resembles supervised learning but for reinforcement learning tasks. The paper of reference for this project is "End-to-end Driving via Conditional Imitation Learning", see https://arxiv.org/pdf/1710.02410.pdf. It shows how to train a small scale car to drive around housing blocks. The key idea is to still give high-level commands (from a planner or a user) to the car, but let the car perform the low-level actions in an end-to-end manner.

In this task you will train both network architetcures depicted in Figure 3.1 of the paper in PyTorch. Use the data augmentation you implemented previously and try to follow the paper's training regime as closely as possible to reproduce their results. You can look up the Tensorflow implementation of the authors if you have questions when defining the network in PyTorch.

- Implement and train the network *command input*. Use data augmentation.
- Implement and train the network *branched*. Use data augmentation.
- Implement and train the network *branched* and do some ablation studies, i.e. not using data augmentation or training a non-conditional network.
- Optional: try inputing multiple image frames. Try using a recurrent architecture to model the temporal domain, i.e. LSTMs.

In order to evaluate the trained models, compute the average and median error for the steering angle and acceleration on the test set. Visualize both outputs for every image in the test set. Show the loss curves for training and validation sets.

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