

Finding the Optimal Rotation Angle of a Steering Wheel

CS464 – Introduction to Machine Learning

Section 1 – Group 14

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1. Introduction:

In this project, we will try to estimate the rotation angle of the steering wheel of a car given the trajectory and road images. The dataset that will be used is obtained from Medium – Udemy’s open sourced 70-minute drive videos from Mountain View, CA, USA [1]. From this data, for a given trajectory, we are to establish the steering wheel angles in radians in order to stay on the given path. The data set is provided such that the GPS coordinates, latitudes and longitudes, of the vehicle is provided with addition to the steering wheel angles for that particular path. Using these images for a trajectory, we will apply training algorithms such that the correlation between the images will be one of the determining factors for deciding to the correct or optimal angle of the steering wheel. We will start by processing the images by applying kernels such as Laplacian of Gaussians or Sobel to resize the images and detect the edges for the given path and apply regression and decision techniques to find the angle for a simulated path. The below image represents an example from the dataset that will be used for training and testing:



(Figure 1: Images from Mountain View, CA [1])

2. Achievement Plans by the Milestones

There are two milestones for the presentation of this project which are the Progress Demo and the Final Demo. For the Progress Demo on 7th of April, we are planning to have achieved the following:

- Processing the dataset so that the images are shrunk to the relevant images for road and edge detection. This will shorten the training time of the algorithms that will be applied to obtain the results.
- Separating the trajectories for training data and test data.
- Deciding for the methodologies to be used for estimation of the steering wheel angles.
- Conducting researches about mathematical derivations to estimate the steering wheel angles given image and given road width and speed as these are also provided in the dataset and will be used as features.
- Decide on the work load assigned to group members

For the Final Demo, we are planning to have done the following:

- Obtaining results from the decided methodologies in progress part.
- Comparisons of the used algorithms with respect to their estimation accuracies.
- Discussion about the techniques used.
- Demonstration of the results.

3. References

[1] O. Cameron, "Open Sourcing 223GB of Driving Data," *Medium*, 05-Oct-2016. [Online]. Available: <https://medium.com/udacity/open-sourcing-223gb-of-mountain-view-driving-data-f6b5593fbfa5>. [Accessed: 16-Mar-2019].