Today’s vehicles have drastically taken the next big step of offering a driverless vehicle to ease the journey of transportation and, artificial intelligence techniques have made this possible. The pixels of the images are used as the input and then a model is designed.

The aim of this project is to understand CNN [1] and then implement it on software to navigate a car without human supervision. The designed model should fit over the dataset resulting in correct prediction of steering angle. Feature extraction is done using a combination of multiple CNN layers. The extracted features are learned using Fully connected layers. The model is later trained using Linear and Lasso regression. The trained model should be robust to change lanes, take accurate turns and learn the important aspects of road.

The total number of epochs considered for this project are 30. One Epoch is defined as one traversal of the model defined above, over the trained dataset. Each epoch comprises of 450 steps. After the training is performed, it is validated on the validation split at each step. The validation loss is calculated at each step and training is realized. Validation loss is defined by the difference between predicted by the model and actual values for an output class. The logs created while training are used for visualization. The steering wheel image is rotated as per the predicted angle. Actual and predicted values are displayed on the screen and can be compared.

The above graph depicts the loss observed by the model at each step throughout all the 30 epochs. The values in between are abrupt but overall, the plot received is a decreasing curve. The descending curve is an ideal one, as it tells us that the loss is decreasing continuously, and the data is being validated correctly. As seen from the figure above the car is about to take a right turn and the imported steering wheel image is appropriately steered towards right. This happens due to the angle value predicted by the system. The logs created while training, drive the steering wheel to the appropriate angle. Similarly, all the validated dataset is visualized frame by frame and displayed on the GUI screen. The steering wheel image is rotated as per the predicted values obtained for each image.

Summary/Conclusions

In this project, we succeeded in the task of navigating the car using Convolutional Neural Networks without human intervention. The neural network is iteratively trained to extract the predicted values obtained for each image. The prediction of steering angle was carried out through series of Convolution and Fully connected layers. The Linear regression along with lasso regression was used to calculate the loss between predicted and actual steering angle values.

Key References


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