UDACITY

PROJECT

Traffic Sign Classification

A part of the Self Driving Car Engineer Nanodegree Program

PROJECT REVIEW

CODE REVIEW

NOTES

SHARE YOUR ACCOMPLISHMENT!

Meets Specifications

This was a great effort!
Congratulations on successfully completing this project! 🎉

The architecture that you came up with is fit for the given problem.
Keep up the good work and all the best for your future projects!

Files Submitted

The project submission includes all required files.

Dataset Exploration

The submission includes a basic summary of the data set.

Good job completing the TODOs to come up with a basic summary of the dataset.

The submission includes an exploratory visualization on the dataset.

Well done plotting the traffic signs as well as the bar chart showing the number of images for each of the class labels. This should help you decide if you should generate additional data for some under-represented class of images.

Design and Test a Model Architecture

The submission describes the preprocessing techniques used and why these techniques were chosen.

Normalization is a perfectly valid preprocessing technique to be used here. You may also refer to the following Stackoverflow post to learn about the importance of normalization - https://stackoverflow.com/questions/4674623/why-do-we-have-to-normalize-the-input-for-an-artificial-neural-network

Another technique that you may use is histogram equalization. This is a technique for adjusting image intensities to enhance contrast. For details, refer to http://docs.opencv.org/3.1.0/d5/daf/tutorial_py_histogram_equalization.html

The submission provides details of the characteristics and qualities of the architecture, including the type of model used, the number of layers, and the size of each layer. Visualizations emphasizing particular qualities of the architecture are encouraged.

- Well done using an appropriate architecture.
- Please note that a faster alternative to the `relu` activation is the `elu`. You may refer to https://arxiv.org/pdf/1511.07289v1.pdf
- Good job using dropout to reduce overfitting. For a detailed analysis of dropouts, you may refer to https://pgaleone.eu/deep-learning/regularization/2017/01/10/anaysis-of-dropout/
- You may also use Tensor Board to visualize your model - https://www.tensorflow.org/get_started/summaries_and_tensorboard

The submission describes how the model was trained by discussing what optimizer was used, batch size, number of epochs and values for hyperparameters.

- Good job using an Adam optimizer.
- All the parameters used to train the model are reasonable.

The submission describes the approach to finding a solution. Accuracy on the validation set is 0.93 or greater.

Great job discussing your approach thoroughly and achieving a validation accuracy greater than 93%.

Test a Model on New Images

The submission includes five new German Traffic signs found on the web, and the images are visualized. Discussion is made as to particular qualities of the images or traffic signs in the images that are of interest, such as whether they would be difficult for the model to classify.

- All the candidate images chosen are appropriate.
- Well done identifying some of the characteristics of these new images that might make it difficult for the classifier to classify them.

The submission documents the performance of the model when tested on the captured images. The performance on the new images is compared to the accuracy results of the test set.

Well done documenting the accuracy of the model when tested on the new images.
For further improving the accuracy, you may also try out image augmentation for balancing the dataset - https://medium.com/self-driving-cars/image-augmentation-bc75fd02a0ff

The top five softmax probabilities of the predictions on the captured images are outputted. The submission discusses how certain or uncertain the model is of its predictions.

Great job visualizing the softmax probabilities, discussing the certainties of the model's predictions as well as visualizing the feature maps.

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