

Project-2 Car ND-Traffic-Sign-Classfier

1. Data Summary:

German Traffic sign dataset was used to train the model. The dataset is divided into train, valid and test sets. Each image is of 32*32 size with rgb components. There are **43** different image classes to be classified.

Number of images for each of them are following:

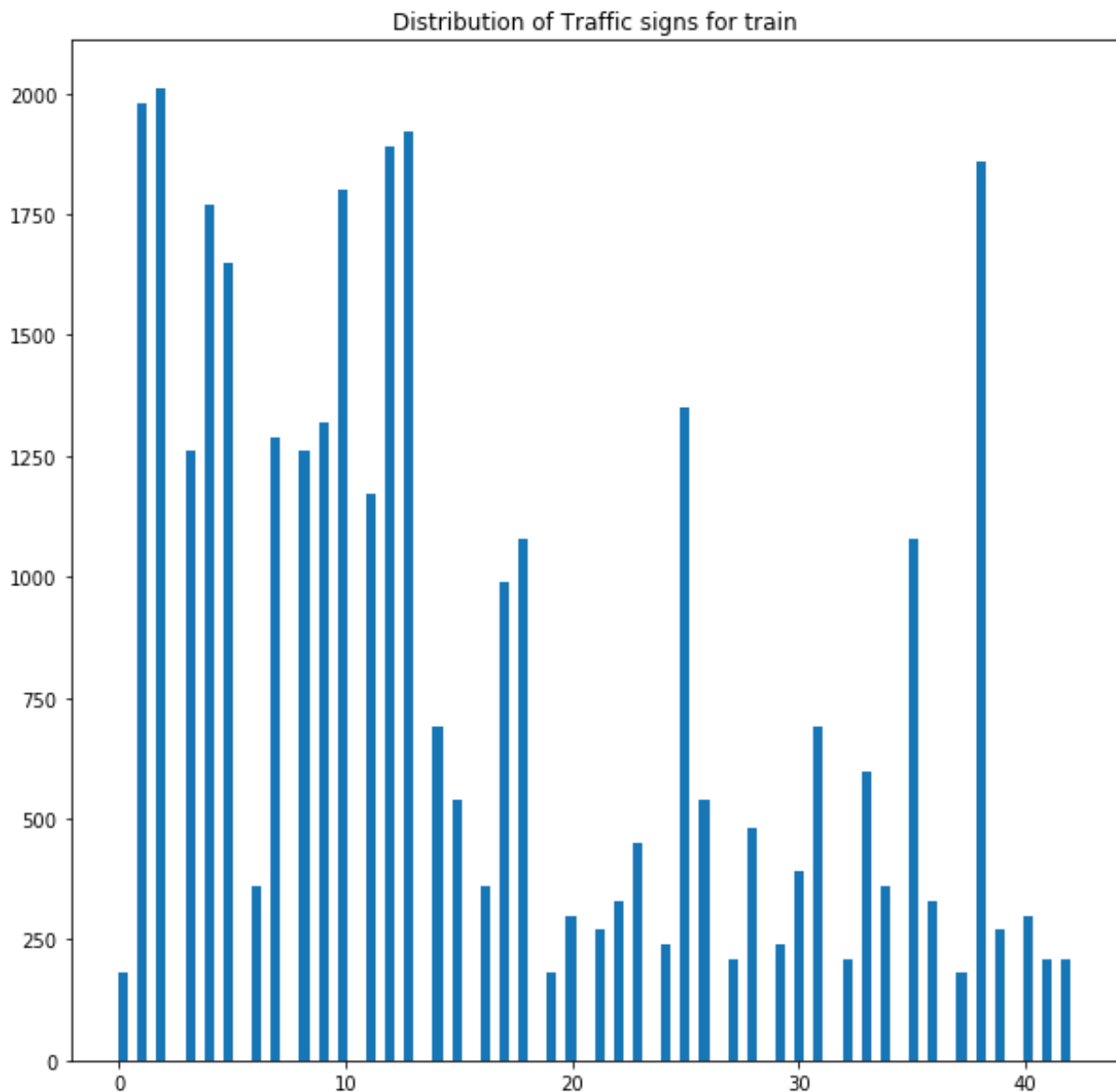
Training set: 34799

Validation set: 4410

Test set: 12630

2. Data Exploration:

This chart is showing the distribution of training class labels.

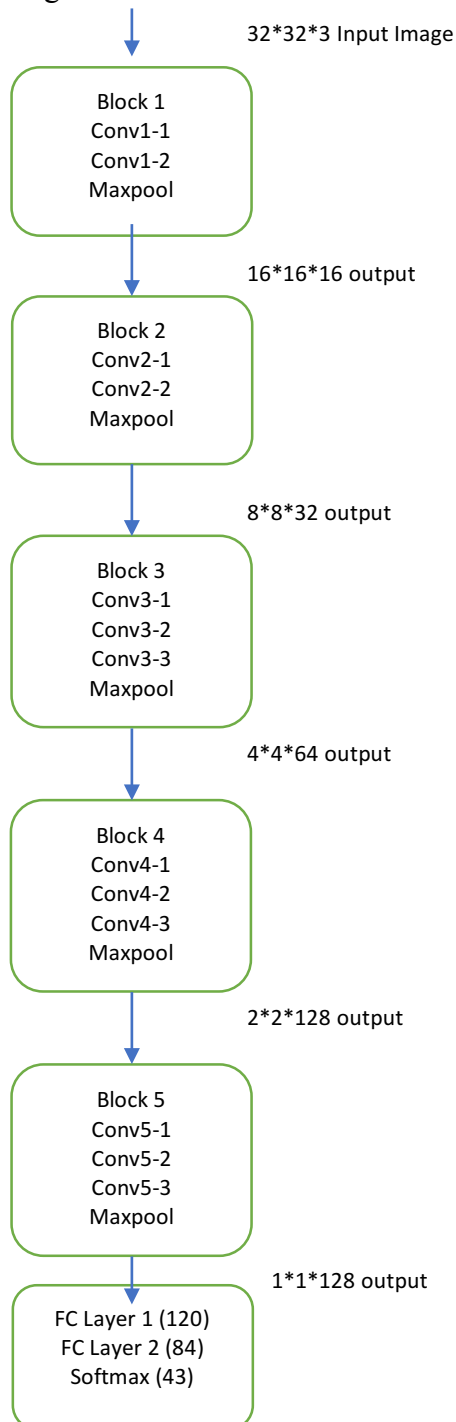


3. Design and Test a Model Architecture:

For pre-processing, all the images were normalized by scale of $1/255$. All the 3 color components were used in the model.

Model Structure:

I used the VGG-16 model architecture. I have to change the number of filter sizes as opposed to the original VGG-16 structure.



RELU activation was used in the model.

Batch Size: 256

Epochs: 200

Dropout Rate: 0.5

Stochastic Gradient Descent was used for optimization with decay rate of 0.001.

Model was trained on GPU k-80 titan. I have access to my grad school computing environment (NYU HPC computer). After the training, model weights were saved on to the file and then later restored on my personal machine.

Training Accuracy:99.54

Validation Accuracy:96.4

Test Accuracy: 94.7

Many hyper-parameters were tuned to get better accuracy.

Different batch sizes were tried from 32-256.

Decay rate was altered from 0.01-0.0001

Number of filters per convolutional layers were changed from the original VGG model. Model accuracy was very low with high number of filters. This is because of the smaller image size used for training.

###Test a Model on New Images



Model was able to predict 4 out of 6 images correctly i.e. 66.7% accuracy

No passing image is not able to be detected properly by model.

Prediction Probabilities for each image:

Image1: Model was able to easily detect this image with 95% accuracy.

Image2: Model was not able to detect the “No Passing” image. Model is not able to clearly distinguish the 2 different colors within the same image (Red and black). Also, position of the sign is on the extreme right. Training data has all the signs at center.

Image3: Model was not able to detect the “No Passing” image. Model is not able to clearly distinguish the 2 different colors within the same image (Red and black). Also, position of the sign is on the extreme left. So, positioning of the signs may affect the prediction.

One solution could be re-train the model with data augmentation. New images with different positioning of the signs i.e center, left or right can be added to the training.

Rest all the images very easily detectable by the model.

Image4: 1.0

Image5: 1.0

Image6:1:0