TRAFFIC SIGNS RECOGNITION

Avinash Kamatham

801298184

Problem Statement

Given a various traffic signs along with images dataset , we are challenged to classify traffic signs present in the image into different categories.

Motivation and Introduction

- In the world of AI and advancement in technologies, many researchers and big companies are working on autonomous vehicles and self-driving cars.
- So, for achieving accuracy in the technology , the vehicles should be able to interpret traffic signs and make decisions accordingly.

Existing Approaches and Methods I Duplicated

TEAM	METHOD	TOTAL	SUBSET
[156] DeepKnowledge Seville	CNN with 3 Spatial Transformers	99.71%	99.71%
[3] IDSIA	Committee of CNNs	99.46%	99.46%
[155] COSFIRE	Color-blob-based COSFIRE filters for object recogn	98.97%	98.97%
[1] INI-RTCV	Human Performance	98.84%	98.84%
[4] sermanet	Multi-Scale CNNs	98.31%	98.31%
[2] CAOR	Random Forests	96.14%	96.14%

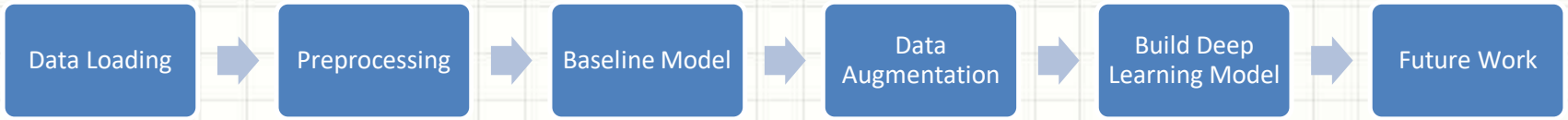
Data set

- Dataset contains different traffic signs , classified into 43 different classes.
- Size : 50,000 images
- Source : From German INI Benchmark Website.

Tools Used

- Data manipulation and preprocessing ML libraries : NumPY and scikit learn
- Visualization Libraries : matplotlib
- Deep Learning : PyTorch

Workflow


Data Loading
Preprocessing
Baseline Model
Data Augmentation
Build Deep Learning Model
Future Work

Data Loading

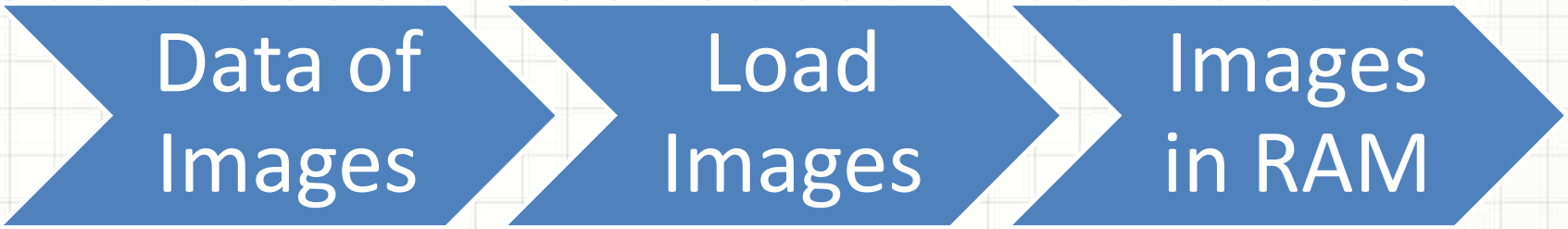


Image Pre-processing

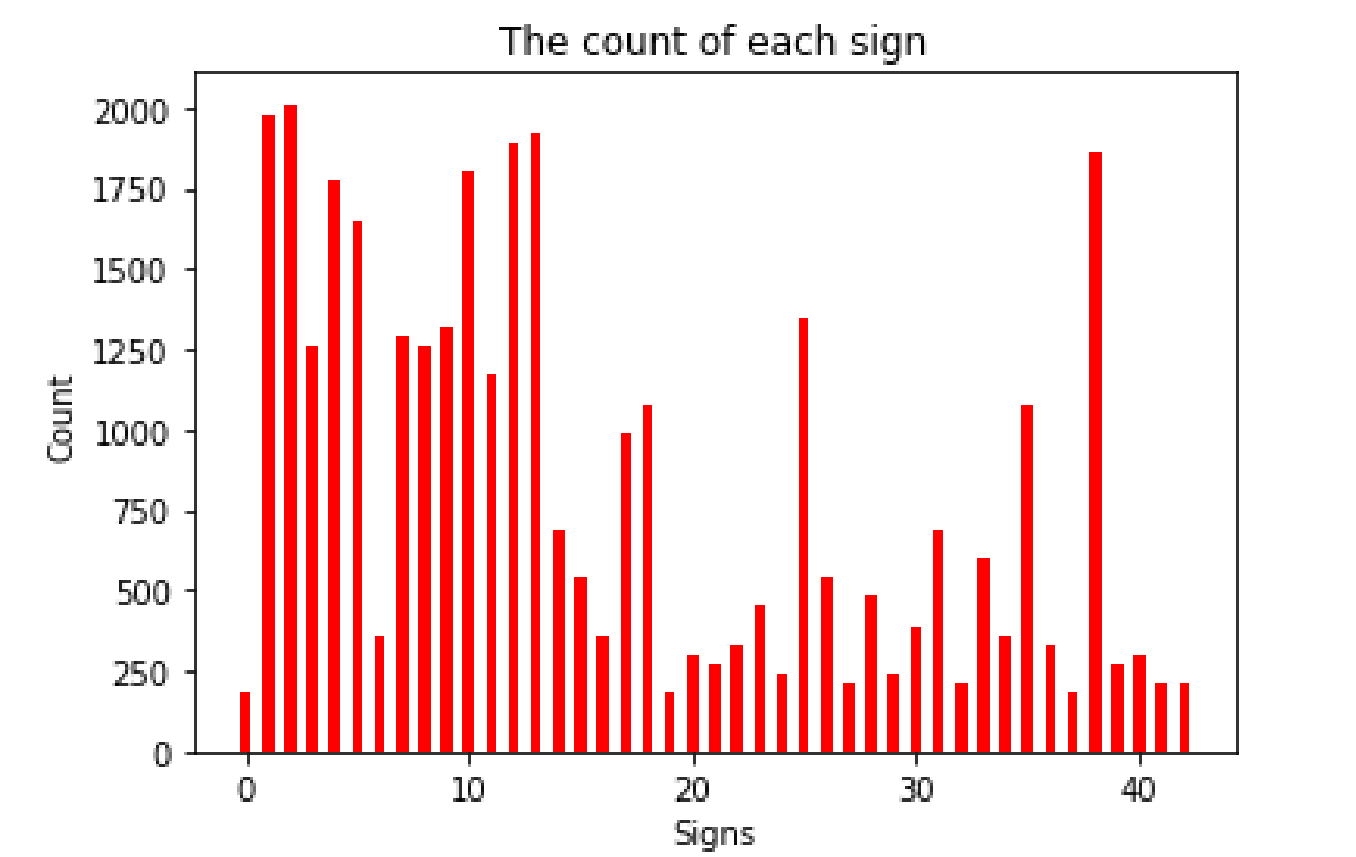
- Set height and width to be 32*32
- Normalization , Divide by 255

Model Pre-processing

- Splitting the data
- Sets the labels and check the distribution.
- Labels Encoded

Sample Images for each Label

Class Imbalance Struggle



Convolution Neural Network Baseline Model

- Hyper Parameter

Hidden layer :

- Two convolution Layers
- Three simple NN Layers

Kernel size : 5

Activation Function:

- Relu
- Softmax

Optimizer:

- SGD
- Learning Rate : 0.001

Epochs : 20

Class Weight: Balanced

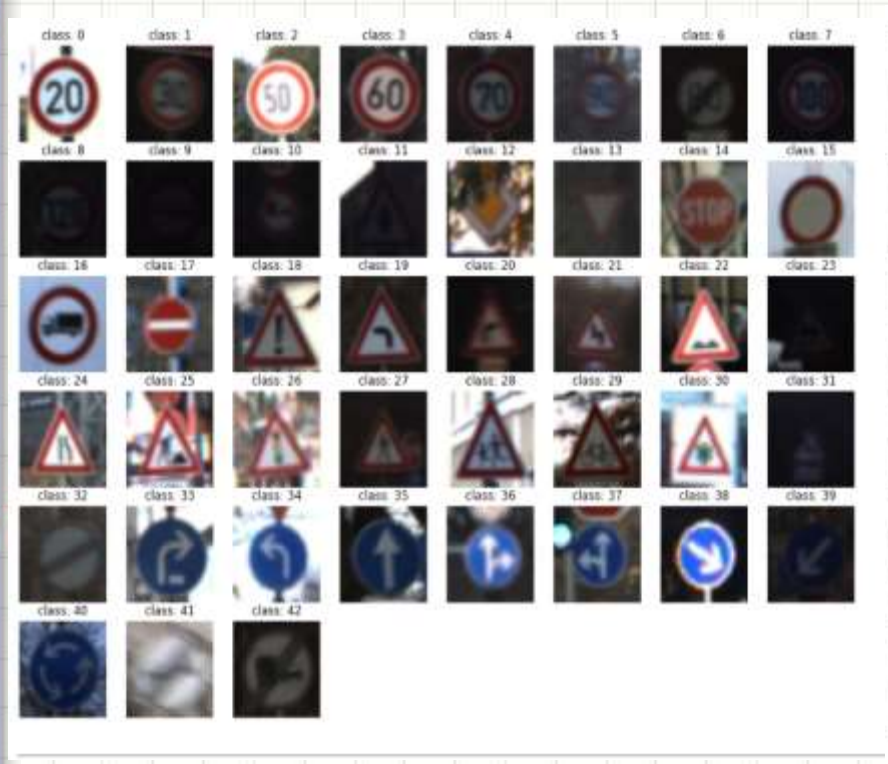
Val Accuracy : 84.8

Test Accuracy : 85.0

84%
Val Accuracy

85%
Test Accuracy

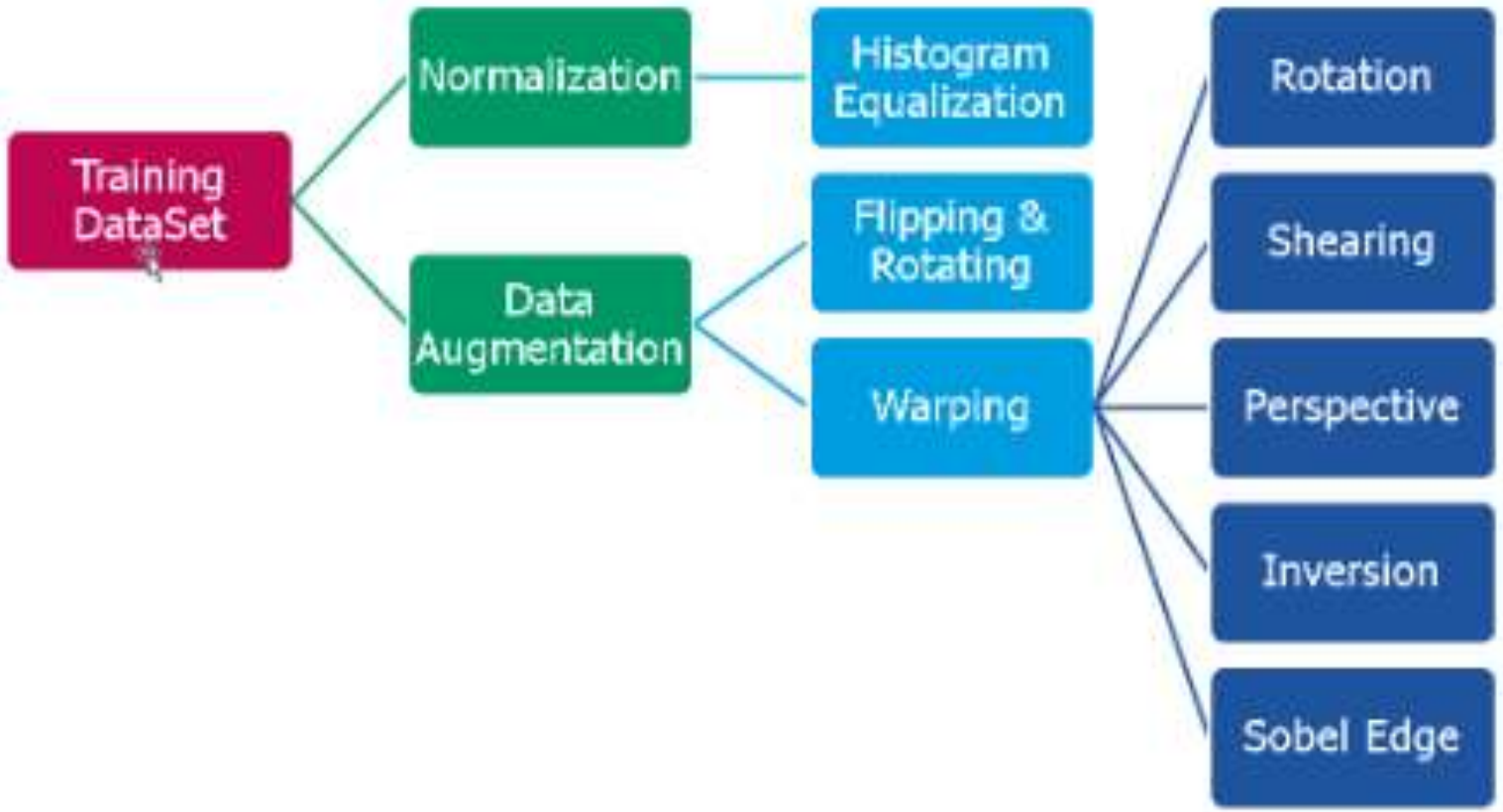
CLAHE and Gray Scale



Baseline Model(CLAHE and Gray Scale)

- Val Accuracy : 90.658
- Test Accuracy : 87.458

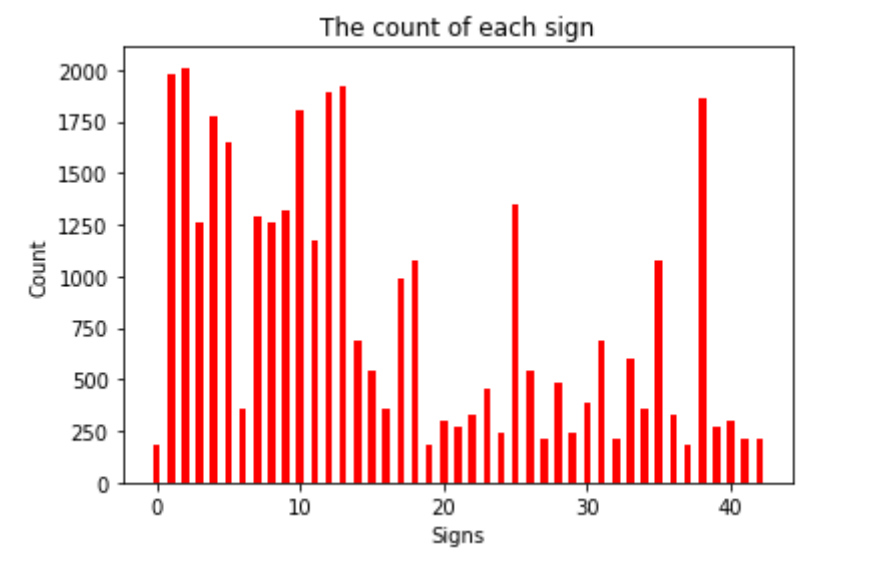
Data Augmentation Techniques



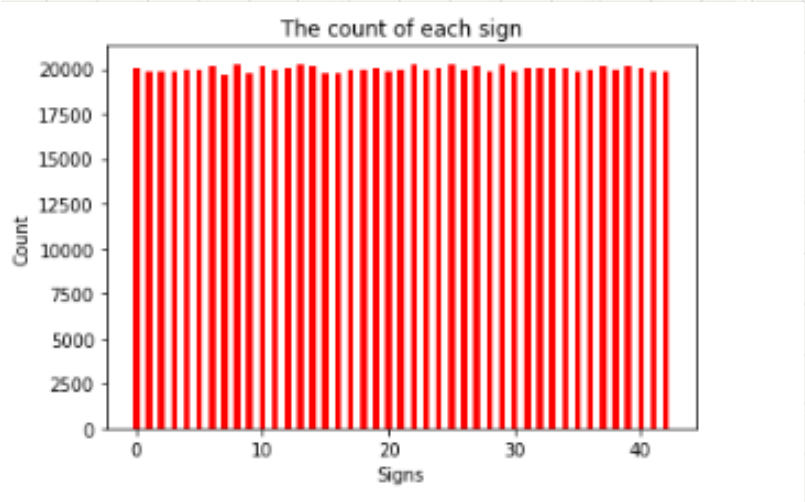
Sample Images after Data Augmentation

Comparison of image count

- Before Data Augmentation



- After Data Augmentation



Baseline Model results (after data augmentation)

- Val Accuracy : 95.578
- Test Accuracy : 93.793

Future Work

- Deep Learning model need to be implemented.
- Increase the accuracy of model further to 99 to 100% percent with the help of Spatial transform networks which can yield high accuracy on test data.
- Fine tuning with Hyper parameters of the model to increase the accuracy.
- Deploy the model as a web application using Flask framework.

Thank You