TRAFFIC SIGN RECOGNITION

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Abstract:

Traffic Sign Recognition(TSR) is taken under consideration to be one in each of the foremost fascinating and attention-grabbing field of research in intelligent vehicle and machine learning is utilized to manage traffic signs, warn a driver, and command certain action. The sign detection is mainly based on shape and color detection to recognize the traffic sign presented in front of the vehicle. Convolutional Neural Network(CNN) is used to for classification. This is helpful for autonomous vehicles in recognizing the sign and following the instructions as per the sign and reduce traffic and accidents taking place.

ABSTRACT(contd.,)

- It is used for the detection and classification steps. Experimental results on German environments show that our proposed system is capable of detecting all categories of traffic signs while at the same time recognizing them with high accuracy achieving comparable performance with the state of the art.

System Requirements:

HARDWARE REQUIREMENTS

► Processor: intel core i3

► RAM: 4GB

SOFTWARE REQUIREMENTS

► Language: Python 3.7

► Software: Anaconda – Jupyter Notebook

Existing Work:

We had this project using various Machine Learning techniques such as Convolutional Neural Network(CNN) and Support Vector Machine(SVM) and Recurrent Neural Networks. But in this project, we had done it using both CNN and SVM and optimize it and also to find the accurate way.

Aim:

In this project we apply the CNN techniques to detect and recognize the traffic sign, to guide the driver or the system for the autonomous vehicles.

➢ Our traffic sign recognition system consists of modules like traffic sign detection, refinement and category class classification.

➢ we identify the traffic signs using our proposed Convolutional Neural Networks (CNNs).

EXISTING SYSTEM

➤ color information enhancement or shape information enhancement methods are usually used as the pre-process stage of traffic sign detection.

➤ normally Traffic Sign Detection based labelled in a pixel manner (masks) with 10 classes.
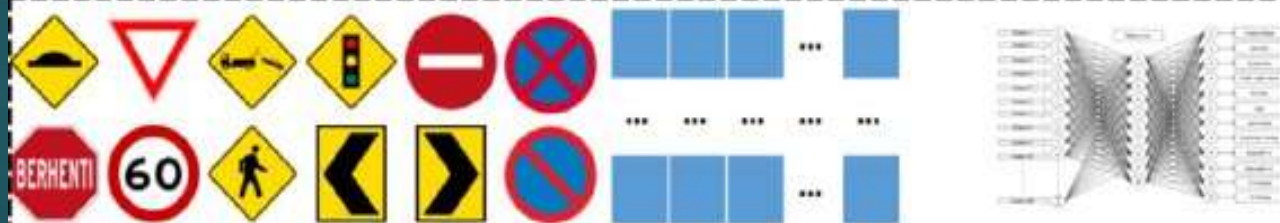
PROPOSED SYSTEM

➤ We introduced the extended version of the German Traffic Sign Detection Benchmark (GTSDB), labelled in a pixel manner (masks) with 42 classes grouped into 8 categories.

➤ It is used for the detection and classification steps.

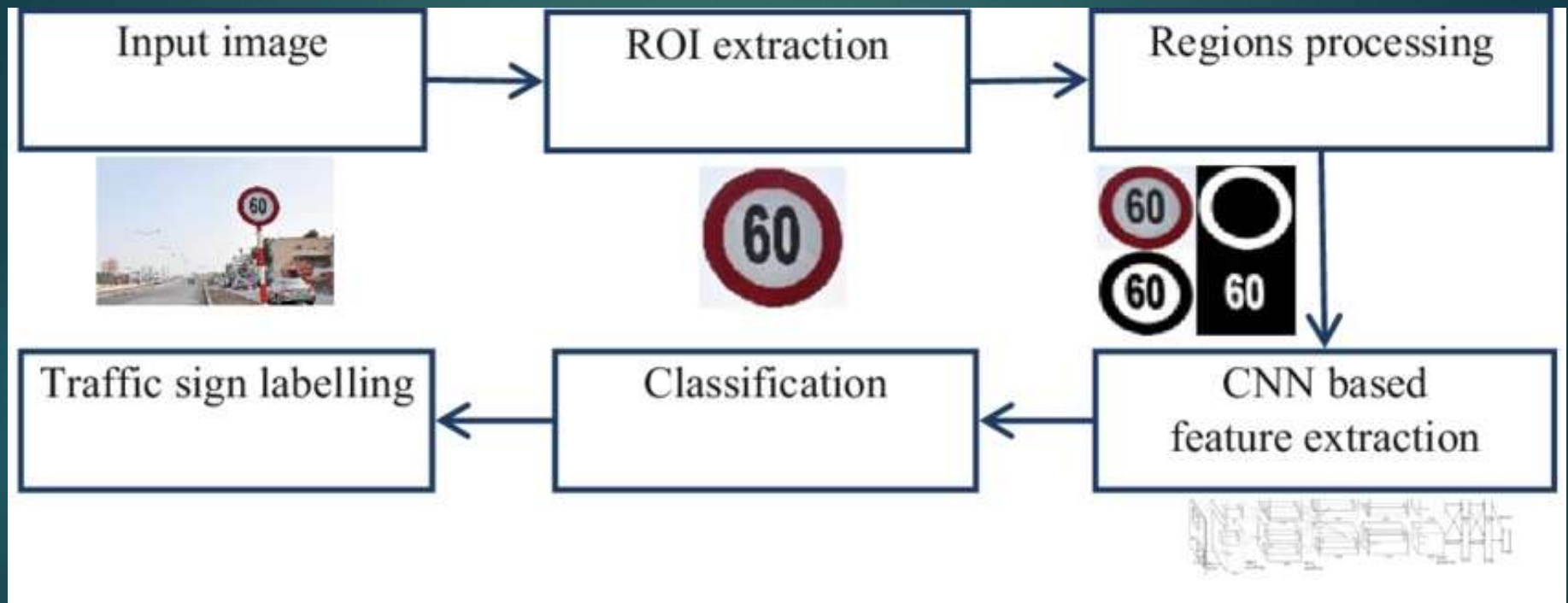## Working of Traffic Sign Recognition (TSR)

Camera → Input Frame → Sign Detection → Sign Registration → Feature Extraction → Recognition → Output
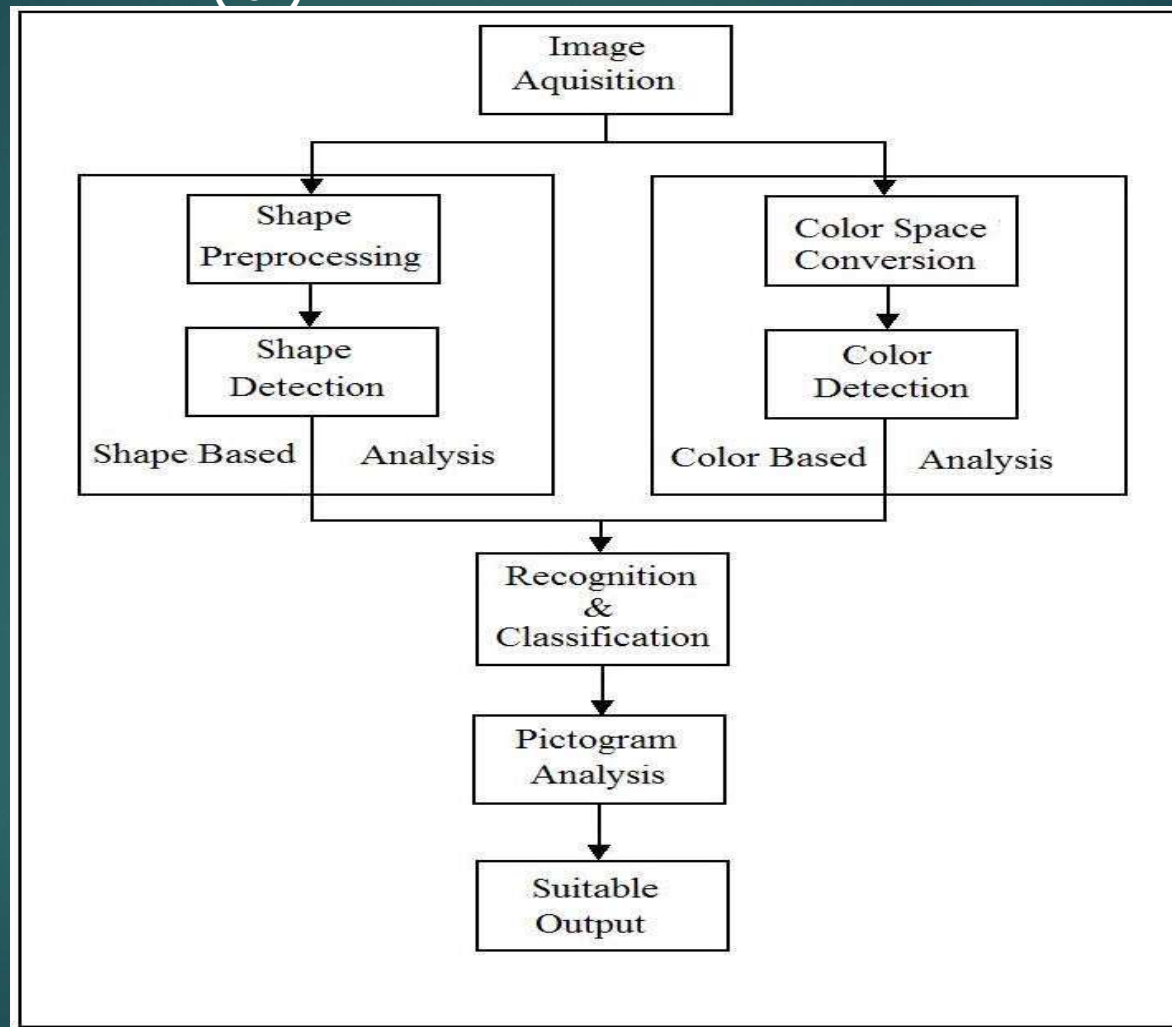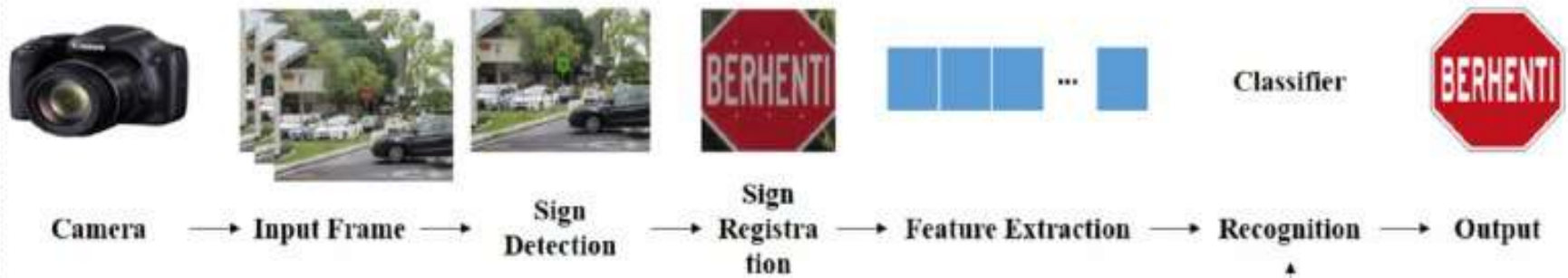
Classifier

Classification or Recognition Phase

Road and Traffic Sign Database → Feature Extraction → Artificial Neural Network

Classifier Learning Phase

CONVOLUTIONAL NEURAL NETWORK(CNN)

A Convolutional Neural Network (CNN) is a type of Deep Neural Network which driven from biologically driven model. It is used in image recognition and processing that is specifically designed to process the pixel data.

Convolutional layers are set of filters applied to given image. A convolution converts all the pixels in its receptive field into a single value.

Pooling layer is a kind of down sampling layer which is used to reduce the dimensions of the features in the input image taken.

This cycle takes place until it reach Fully Connected Layer.

A Fully connected layer is the layer where each and every node is connected to the other in the acquisition.
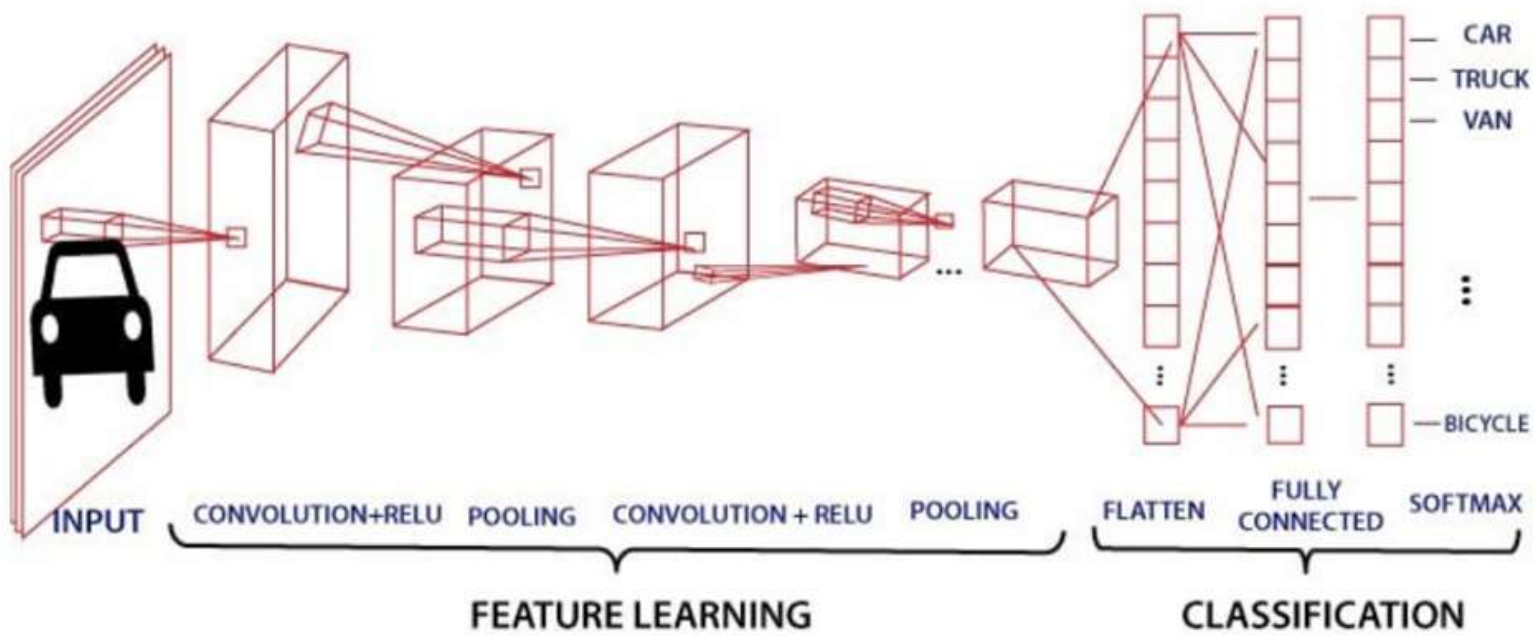
CNN Model

PROJECT PIPELINE

- Loading the data

- Dataset exploration and visualization

- Data preprocessing

- Data augmentation

- Designing, training and testing a CNN model

- Using the model on new images/Training

- Analyzing probabilities
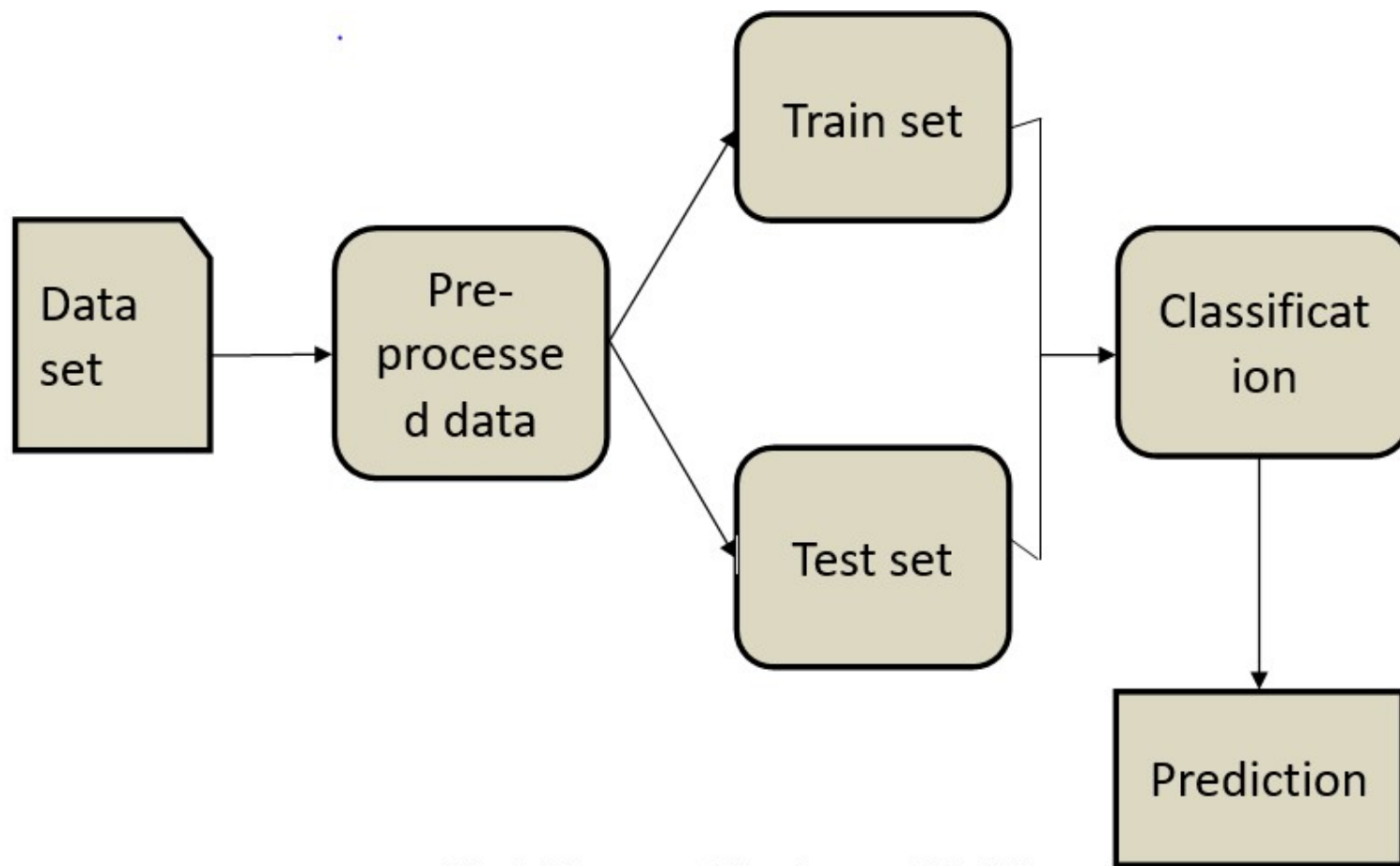
Block Diagram of the Proposed Model

DATA SELECTION AND LOADING

▶ The data selection is the process of selecting the German Traffic Sign Recognition Dataset (**GTSRB**).

▶ In this project, German Traffic Sign images used to find traffic sign.

▶ The dataset which contains the information about German traffic sign image of test, train in two dataset contain traffic sign images.

```
plt.ylabel(rand_img.shape[0], fontsize = 20)#height of image
```

DATA PREPROCESSING

▶ Image Data pre-processing is the process of getting rescale data from the dataset.

   ▶ Resize image dataset

   ▶ Getting data

▶ Resize image dataset: Rescale the German Traffic Sign image size into 200.

▶ Getting data: That categorical data is defined as variables with a finite set of rescaled values. That most deep learning algorithms require array input and output variables

Feature extraction

➢ Data splitting is the act of partitioning available data into two portions, usually for cross-validator purposes.

➢ One Portion of the data is used to develop a predictive model and the other to evaluate the model's performance.

➢ Separating data into training and testing sets is an important part of evaluating data mining models.

➢ Typically, when you separate a data set into a training set and testing set, most of the data is used for training, and a smaller portion of the data is used for testing.

CLASSIFICATION

▶ A Convolutional Neural Network (ConvNet/CNN) is a Deep Learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other.

Distribution of images among different classes
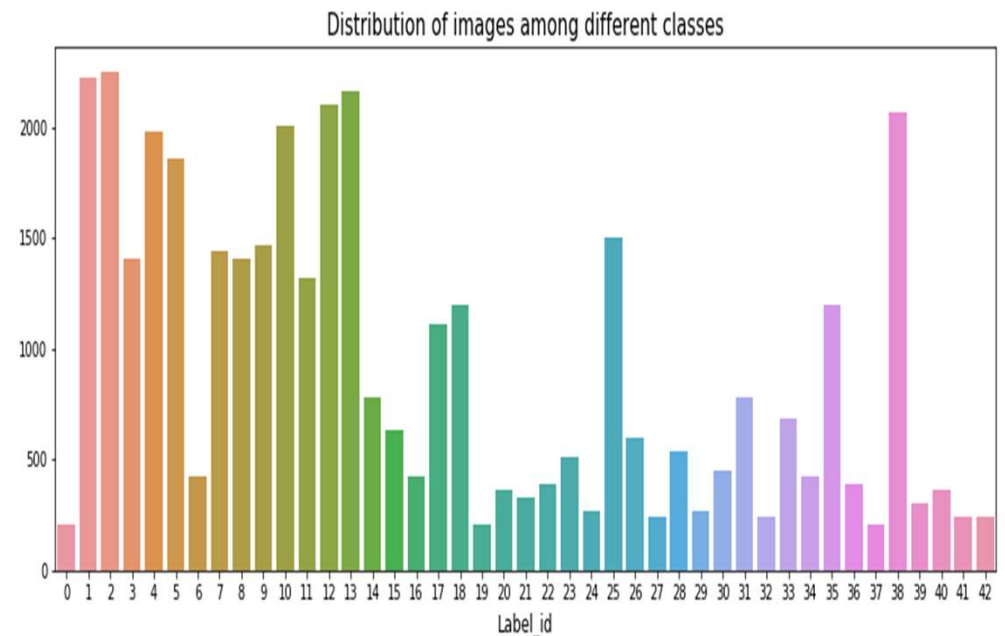
Advantages:

- Traffic sign recognition system can be used to reduce the chances of accidents to take place.

- It can be helpful for driver in assisting the fore coming signs.

- It can be helpful for keeping an eye on the speed limit of the vehicle and control the speed of the vehicle

Dis-Advantages:

- Broken or damaged traffic signs
- Bad weather condition
- Sensor/camera damage
- Improper light in surroundings
- Irrelevant signs on Roads
- Speed limits on back of other vehicles

Bending   Cutting   Cracking   Fading

Peeling   Vandalism   Other damage form

Conclusion:

- In this project, various deep learning models were compared not just in terms of their classification accuracy, but also in terms of their prediction speed.

- Support Vector Machine(SVM) do not perform well as compared to Convolutional Neural Networks(CNN) in terms of both accuracy and evaluation time for image classification purpose.

- We have got 99.31% of accuracty in the CNN model.

Future Works:

▶ In our present project we are doing on traffic sign recognition with the help of CNN.

▶ Our future work is to improvise the recognition based on the climatic conditions as the system is unable to recognize the pictures captured clearly due to some of climatic situations like fog, snow, dust, etc.

▶ And also to differentiate between the actual traffic sign and the irrelevant signs present on the road, which is one of the major drawback of our project.