A Report on <u>Traffic Sign Classification</u> (Machine Learning model)

1. <u>Introduction</u> -

Traffic signs provide valuable information to drivers and other road users. They represent rules that are in place to keep you safe, and help to communicate messages to drivers and pedestrians that can maintain order and reduce accidents. Neglecting them can be dangerous.

Most signs make use of pictures, rather than words, so that they are easy to understand and can be interpreted by people who speak a variety of languages. For this reason, it's important that you know what each picture represents, and that you use them to inform your driving. Failing to do so could result in a serious accident or a fine.

1.1 **Problem Statement –** We have to develop a model which would help people learn about one of most underrated, yet very important part of our daily life, a traffic sign. This model has been made using deep learning libraries TensorFlow and its high-level API, Keras. The objective of this model is to attain an accuracy so strong that an individual should be able to use this model without any hesitation.

1.2 **Purpose –** In the past and recent times, there have been many road accidents where the main reason for these being inadequate knowledge of road and traffic signs, it was found out that the second most heard reason was an individual not knowing what a particular traffic sign means. Our model focuses on detecting traffic signs and giving description about it, when provided an image to it through deep learning.

2. <u>Evaluation</u> -

Our Goal is to create a Machine learning model which will take images and gives prediction with confidence.

It needs major understanding of CNN(Convolutional Neural Network), Python.

So, Evaluation of Traffic Sign Classification starts from the study of Machine Learning.

First step of this project is to download a dataset (German traffic Sign Recognition Benchmark) from Kaggle. We have 43 different types of classes. Train the model using these images of 43 classes using CNN. Save the model as .h5 file

3. Limitations -

Although, there are many advantages of traffic sign classification, there are certain difficulties as well. It may happen that the traffic sign is hidden behind the trees or any board at the road side which may cause the inaccurate detection and classification of traffic sign. Sometimes it may happen that the vehicle went so fast, that it did not detect the traffic sign. This may be dangerous and can lead to accidents. There is a need for further research to deal with these issues.

4. Future Scope -

Traffic Signs are useful to all the individuals who are driving a vehicle on the road. Traffic Signs guide the drivers for following all the traffic rules and avoid any disruption to the pedestrians. The environmental constraints including lighting, shadow , distance (sign is quite far), air pollution, weather conditions in addition to motion blur, and vehicle vibration which are common in any real time system may affect the detection and thus the classification. Hence, there is a need for further research and advancements to deal with these issues. Also, there are certain traffic signs that may not be predicted accurately. For this, augmentation and one hot encoding techniques can be used. Augmentation involves shifting of the image, zoom in and rotate the images (if required).

This system helps the driver to observe the sign close to his / her eyes on the screen. This saves the time and efforts in manually checking whether any traffic sign board is there, identifying what type of sign it is and act accordingly. Traffic Sign Classification, thus, has a wide application in building smarter cars like automatic driving cars, where the system automatically detects, recognizes a traffic sign, and displays it.

5. Conclusion -

The proposed system is simple and does the classification quite accurately on the GTSRB dataset and finally the model can successfully capture images and predict them accurately even if the background of the image is not much clear. The proposed system uses Convolutional Neural Network (CNN) to train the model. The final accuracy on the test dataset is 94% .The benefits of "Traffic Sign classification and detection system" are generally focused on driver convenience. Despite the advantages of traffic sign classification, there are drawbacks. There can be times when the traffic signs are covered or not visible clearly. This can be dangerous as the driver will not be able to keep a check on his vehicle speed and can lead to accidents, endangering other motorists or pedestrians, demanding further research.