# **Traffic Sign Classification using Convolutional Neural Network**

**Mohsinali Vijapura\*(AU2040080) , Manan Vadaliya\*(AU2040264) ,**

**Pruthviraj Dodiya\*(AU2040175) , Harshrajsinh Vaghrola\* (AU2040195)**

**School of Engineering and Applied Science, Ahmedabad University**

**\*All Authors have contributed equally**

***Abstract*— We present a computer vision-based method for accurate traffic sign tracking and recognition. In an autonomous car, such a technology offers crucial support for driver assistance. Convolutional Neural Networks (CNNs) for object identification tasks, including traffic sign recognition. While preprocessing the data set images we have converted them into grayscale, standardize the lighting in images and normalize the image from 0 to 1 instead of 0 to 255 . The article presents the development of a traffic sign recognition system using a CNN and compares various CNN architectures. The model was trained using Tensorflow and Keras and achieved an accuracy of 93.58%.**

***Keywords***— **traffic signs recognition, computer vision, CNN, soft-max layer.**

1. Introduction

Since a driver assistance system controls both the flow of traffic and the driver, its ability to recognise traffic signs is a major problem. Severe accidents occur when distracted or mentally unbalanced drivers misread road signs. Consequently, automated traffic sign identification is a key area of research for autonomous navigation systems. To accurately identify traffic signs in a real-time environment, such a system must be quick and effective. Also, they must deal with various issues that may reduce the effectiveness of detection and recognition. Variations in illumination (fog, rain, and shadow), motion blur, and sign occlusion are some of these issues. Being effective is important since one incorrectly identified or unnoticed indicator could interfere with the navigation system.

Indeed, there is no 100% accuracy guarantee offered by the current technologies. This has inspired numerous academics to find ways to enhance the effectiveness of traffic sign detection, tracking, and recognition in challenging environments, which is the goal of the method we've just described. As a result, we developed a new technique for quickly detecting, monitoring, and classifying traffic signs from moving vehicles under challenging circumstances.Designing a system that can recognise traffic signs is the main objective. This technology can help local or national authorities in the upkeep and modernization of their road and traffic signs by automatically identifying and classifying one or more traffic signs from a complex image captured by a vehicle's camera.

The TensorFlow library, a massively parallel architecture for multithreaded programming, is used to train the neural network. To read traffic signs, follow these three steps. Traffic signals are first divided into subregions based on the color of the supplemental signs and the main sign using a region proposal based on segmentation. Second, increasing the amount of data accessible for deep neural network learning by including images in the training dataset.

The purpose of this effort is to find a solution to the small data problem. It is used to enhance deep learning's capabilities. Eventually, a deep neural network is used to combine the original and suggested images in a dataset of photographs.

1. Literature Survey

Using the visual key of traffic sign properties like color and form, the picture is split in the detection stage. As traffic signs are made of primary colors that contrast sharply with their surroundings, they really serve to express fundamental information. As a result, many techniques start with a segmentation stage within a particular color space. An RGB picture is often the result of a mounted camera. Nevertheless, due to its sensitivity to changes in lighting, the RGB color space is not suited for detecting the colors of signs.

In order to identify the sign colors in the image, some writers employed a color ratio between the RGB intensity components, while others used just one RGB component as a reference. The Hue Saturation Intensity (HSI) method and HSV have been widely utilized to lessen the reliance on light variance.

Contrarily, there are techniques built on the TS shape that completely disregard color information in favor of shape data from grayscale photos. To find the spots of interest in the TS picture, for instance, the local radial symmetry method was used. This method uses a center point vote for circular signs and a line vote for regular polygons on the gradient of a grayscale picture.

1. Implementation

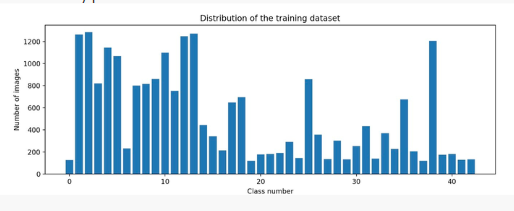
Use TensorFlow, a deep learning toolkit, to solve the identification of traffic sign puzzles. Both training and testing were carried out using the dataset. The algorithm that was developed can categorize the 16 most prevalent forms of traffic indicators. When building network architecture, there are several rules.

Despite this, heuristic methods are mainly used in the design of network architecture. The network depth should be inversely correlated with the data volume. A model that is overfit is more likely when there is a big network and little data. A shallow network with a lot of data, on the other hand, wouldn't provide any advantages.

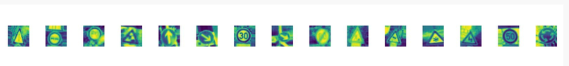
So, it's crucial to strike the correct balance between network depth and data volume. One soft-max layer and multiple convolutional layers make up the architecture. The soft-max function is necessary as the activation function in the output layer of neural network models that forecast a multinomial probability distribution. In other words, soft-max is used as the activation function for multi-class classification problems. Tools for visualizing models at various levels of abstraction, from high-level mathematical processes to simple mathematical operations, are available in TensorFlow. The dataset is split into 80:20 training and testing datasets.

Each round of training involves processing a batch of 50 images from the train dataset. Every 100 iterations, the intermediate accuracy was computed using a batch of 50 images from the test dataset. After receiving adequate instruction, accuracy was determined.

1. Results



The above picture describes the frequency distribution of each class(i.e type of road sign) from the dataset.





The above two images denotes the pre-processing of the dataset images by converting them to :

* Grayscale
* Standardizing the lighting in image
* Normalizing the image from 0 to 1 instead of 0 to 255

1. Acknowledgement

The solution to the challenge of classifying traffic indicators is examined in the suggested study. When used in conjunction with preceding work's pre-processing and localization steps, the proposed approach for traffic sign classification yields 93.58 percent of accurately classified images. The suggested categorization approach is put into practice using the Tensor Flow framework.

1. References

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