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Abstract
The traffic sign recognition system (TSRS) is an important component of an intelligent transportation system (ITS). Being able to interpret traffic signs properly and efficiently can increase driving safety. This project proposes a traffic sign identification approach based on deep learning, which primarily targets at the detection and classification of traffic signs while being trained on a traffic sign benchmark dataset. A traffic sign recognition and identification approach based on image processing is proposed, which is integrated with a convolutional neural network (CNN) to classify traffic signs. TensorFlow is used to implement CNN. We have 99.4% accuracy in identifying.

Keywords - Traffic Sign Recognition System (TSRS), Detection & Classification, Image Processing, CNN, Tensorflow

1. Introduction
Autonomous car or Self Driving car is a driverless ground vehicle which has a capability of sensing its external and internal environment and runs on its own, with little or no human input. A car, be it manual or autonomous, when it runs on road, has to follow traffic rules to maintain road safety. The traffic sign recognition (TSR) system plays an important role in this situation which makes the autonomous car learn about various traffic rules. It involves a front facing camera with a wide field of view that can scan the entire road for traffic signs. The Convolutional Neural Network (CNN) model is used to train the TSR to recognise various traffic signs in this project. The German Traffic Sign Recognition Dataset (GTSRB) is an image classification dataset which is used to train TSR in this project. Many big companies like Tesla, Uber, Mercedes etc and other researchers are still working on autonomous driving systems for achieving more accuracy. The market size is still growing. The global market for self-driving cars is projected to grow from 20.3 million in 2021 to about 63 million in 2030. In this paper, we look at how to create an accurate and real-time TSR model using deep learning.

2. Literature Review
TSR has always been a popular study topic in recent years. TSR is researched to recognise traffic sign region and non-traffic sign area in complex scene of photos, TSR is to extract the specific features represented by traffic sign patterns [20]. Existing TSR approaches are divided into two categories: those based on classical methods and those based on deep learning methods.
TSR approaches based on colour and shape of a given image's major phases are to extract the visual information contained in the candidate region, collect and segment the traffic signs in the image, and accurately label the signs using pattern classification [21]. TSR, on the other hand, requires colour and shape information, which is used to increase recognition accuracy.
The challenges of traffic sign lighting changes or colour fading, as well as traffic sign distortion and occlusion, remain unsolved [14]. Conventional machine learning approaches often choose certain visual cues and utilise them to identify traffic sign classes. Specific aspects include Haar-like characteristics, HOG characteristics, SIFT characteristics, and so on [3]. Traditional TSR approaches are based on template matching, which requires extracting and using invariant and comparable visual elements of traffic signals before running matching algorithms for pattern classification. Because of the changes in traffic signs, describing the visual aspects properly is a difficult challenge for these approaches' feature representation [17,

24].
As classifiers, neural networks, Bayesian classifiers, random forests, and Support Vector Machines (SVM) are used. However, because the effectiveness of traditional machine learning algorithms is dependent on the features supplied, they are prone to omitting important characteristics. Furthermore, appropriate feature description information is necessary for different classifiers. As a result, standard machine learning approaches have limits, and their real-time performance is not comparable.
Deep learning is a technique that uses a multilayer neural network to automatically extract and learn the properties of visual objects, which has applications in image processing [29]. CNN models are among the most widely used deep learning algorithms for TSR. TSR algorithms are based on region proposals, sometimes known as two-stage detection algorithms; the main principle is selective search [10], and its advantages include excellent detection and positioning performance at the cost of a large number of calculations and high-speed computing hardware.
R-CNN, Fast R-CNN, and Faster R-CNN are all included in the CNN models. Faster R-CNN combines bounding box regression with object classification, employing end-to-end techniques to detect visual objects, which not only improves the accuracy of object detection but also increases the speed of object identification. Road signs are often identified from the driver's perspective; however, in this work, we examine the signs from the perspective of satellite photos. In [24], guided image filtering was used to eliminate visual artefacts such as hazy and haze from the input picture. For model training, the processed picture is input into the suggested networks.

3. Our Propositions
The task is divided into three primary sections:
* Pre-processing
* Model building and training
* Detection and classification of traffic signs

3.1 Data Collection
The data was taken from a benchmark dataset in traffic sign recognition - GTSRB, which is around 300MB in size. It has over 50,000 photos of various traffic signs and is divided into 43 distinct classes.
This database consists primarily of traffic incidents caught by cameras. The photographs in this collection are divided into several categories, including sign type, sign condition (such as obstructed, damaged, or faded), weather circumstances, light geometry, and other characteristics. It varies greatly; some courses have a large number of photos, while others have only a handful. The dataset already has a predefined train folder that contains photos inside each class and a predefined test folder that was used for blind testing the model.

3.2 Preprocessing
Once the data has been collected and displayed, the pictures must be preprocessed to improve the model's performance.The pre-processing was done in stages. They are as follows:
* Image Grayscale
* Image Equalising
* Normalise values of the Image
* Addition of depth of the Image
* Image Augmentation

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