VISVESVARAYA TECHNOLOGICAL UNIVERSITY,
BELGAUM, KARNATAKA

PROJECT REPORT

ON

"Traffic Signs Recognition"

Submitted in partial fulfillment of the requirement for the award of the degree of

BACHELOR OF ENGINEERING
IN
COMPUTER SCIENCE AND ENGINEERING

Submitted by

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CERTIFICATE

Certified that the project work and presentation entitled **"Traffic Signs Recognition"** *is a bonafide work carried out by* **ANIRUDH GUDISAGAR (2SD20CS016)**, **BHARATESH NAGARAJ LABHAGOND (2SD20CS031)**, **RAJESH PAWAR (2SD20CS083)**, and **SHARANABASAVA (2SD20CS098),** *students of S. D. M. College of Engineering & Technology, Dharwad, in partial fulfillment for the award of* **Bachelor of Engineering in Computer Science and Engineering of** ***Visvesvaraya Technological University, Belgaum****, during the year 2023-2024. It is certified that all corrections/suggestions indicated for internal assessment have been incorporated in the report deposited in the department library. The Project has been approved, as it satisfies the academic requirements in respect of project report prescribed for the said degree.*

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1. ______________________

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ABSTRACT

Traffic Signs Recognition (TSR) is used to regulate traffic signs, warn a driver, and command or prohibit certain actions. A fast real-time and robust automatic traffic sign detection and recognition can support and disburden the driver and significantly increase driving safety and comfort. Automatic recognition of traffic signs is also important for automated intelligent driving vehicle or driver assistance systems. This paper presents a study to recognize traffic sign patterns using Neural Networks technique.

The images are pre-processed with several image processing techniques, such as, threshold techniques, Gaussian filter, Canny edge detection, Contour and Fit Ellipse. Then, the Neural Networks stages are performed to recognize the traffic sign patterns. The system is trained and validated to find the best network architecture. The experimental results show the highly accurate classifications of traffic sign patterns with complex background images and the computational cost of the proposed method.

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PROBLEM STATEMENT

To study and implement a fast real-time and robust automatic traffic sign detection and recognition system that can support and disburden the driver and significantly increase driving safety and comfort and which can also be used by automated intelligent driving vehicle or driver assistance systems. This project proposes a study to recognize traffic sign patterns using Neural Networks technique.

CHAPTER 1: INTRODUCTION

The automotive industry is one of the largest industries in the world. In 2019, ninety-two million motor vehicles were produced in the world, with the United States itself producing over 2.5 million automobiles.With the world moving towards self-driving vehicles, more than 80 companies are testing over 1400 of them in the United States alone. It was forecasted that there would be more than 10 million self-driving cars on road by 2020. This prediction was quite exciting but quite clearly, did not happen. There are numerous reasons behind it.

In today’s world as the number of vehicles is increasing so are the road accidents and according to reports, India is on 1st spot in the greatest number of accidents in a country. This is caused due to many reasons such as poor enforcement of laws, carelessness, etc. One of the reasons is that people don’t recognize or follow traffic signboards. So, we have made a traffic sign recognizer which can inform the driver of the vehicle about the traffic sign coming ahead and to follow it. but the main issue is safety.

Self-driving cars need to identify all the details on the road with extreme precision and accuracy including traffic signs not just for the passenger, but fellow pedestrians as well. We began by studying the dataset (source:German Traffic Sign Recognition Benchmark (GTSRB)) at hand. Data pre-processing was done to make the data ready to be used.convolutional neural networks are a part of deep learning and are extensively used in image recognition. These convolutional neural networks consist of several layers. First, a Conv2D layer is used for feature extraction with the help of filters. A number of filters are generally in the power of 2 like 32, 64, or 128. An activation function is used in this layer. Generally ReLU(Rectified Linear Unit) activation function is used.

Road and traffic signs considered in this thesis are those that use a visual/symbolic language about the road(s) ahead that can be interpreted by drivers. The terms are used interchangeably in this thesis, and elsewhere might also appear in combination, as “road traffic signs”. They provide the driver with pieces of information that make driving safe and convenient. A type of sign that is not considered in this thesis is the direction sign, in which the upcoming directions for getting to named towns or on numbered routes are shown not symbolically but essentially by text.

Road and traffic signs must be properly installed in the necessary locations and an inventory of them is ideally needed to help ensure adequate updating and maintenance.

An automatic means of detecting and recognising traffic signs can make a significant contribution to this goal by providing a fast method of detecting, classifying and logging signs. This method helps to develop the inventory accurately and consistently. Once this is done, the detection of disfigured or obscured signs becomes easier for human operator. Road and traffic sign recognition is the field of study that can be used to aid the development of an inventory system (for which real-time recognition is not required) or aid the development of an in-car advisory system (when real-time recognition is necessary).

Both road sign inventory and road sign recognition are concerned with traffic signs, face similar challenges and use automatic detection and recognition. A road and traffic sign recognition system could in principle be developed as part of an Intelligent Transport Systems that continuously monitors the driver, the vehicle, and the road in order, for example, to inform the driver in time about upcoming decision points regarding navigation and potentially risky traffic situations.

CHAPTER 2: LITERATURE SURVEY

Extensive research has been done in the area of recognition and classification of traffic and road signs. The authors proposed a Convolutional Neural Network and Support Vector Machines (CNN-SVM) method for traffic signs recognition and classification. The coloring used in this method is YCbCr color space which is input to the convolutional neural network to divide the color channels and extracting some special characteristics.

Their proposed method achieved a 98.6% accuracy for traffic signs recognition and classification. In another model the authors developed a new dataset consisting of 40,000 images and also proposed a traffic sign detection and classification method based on a robust end-to-end CNN. The method achieved 84% accuracy.

The authors analyzed the spatial transformers and stochastic optimization methods for deep neural network for traffic sign recognition. They finalized this with a proposed system that achieved maximum accuracy.

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There is a notable amount of research work done on traffic signs recognition/classification in history and still is going on. Different types of datasets have been used to solve different types of problems which includes detection, classification, tracking etc. After trying out and testing every object detection approach researcher got to the implementation with deep networks. In recent years with increasing technology and availability of standard datasets deep learning method is being more preferable. First CNN architecture ever used for traffic signs recognition was LeNet architecture.

- In the paper 'Novel Deep Learning Model for Traffic Sign Detection Using Capsule Networks' by Amara Dinesh Kumar they had stated the various approaches been tried fpr traffic signs recognition in early stages. Also they have stated how CNN method is effective and preferable over other methods. They have also briefly stated about the capsule techniques.

- In the paper 'Traffic Sign Classification Using Deep Inception Based Convolutional Networks' by Mrinal Haloi IIT Guwahati again they have explained the novel deep learning for traffic signs detection.

- In paper ‘A Novel Neural Network Model for Traffic Sign Detection and Recognition under Extreme Conditions' by Haifeng Wan they have mainly focused on the traffic signs detection by autonomous vehicles under extreme weather conditions.

- In the paper 'Traffic Sign Detection for Intelligent Transportation Systems' by Ayoub Ellahyani they have survey regarding TSR system being installed in transportation vehicles and this paper proposes that it is a step towards intelligent transportation system.

- In the paper ‘Traffic Sign Detection and Recognition using Image Processing' by Karthikeyan D they have proposed the image processing approach towards TSR.

- In the paper 'Two-stage traffic sign detection and recognition based on SVM and convolutional neural networks by Ahmed Hechri. In this study, a novel two-stage approach for real-time traffic sign detection.

CHAPTER 3: DETAILED DESIGN

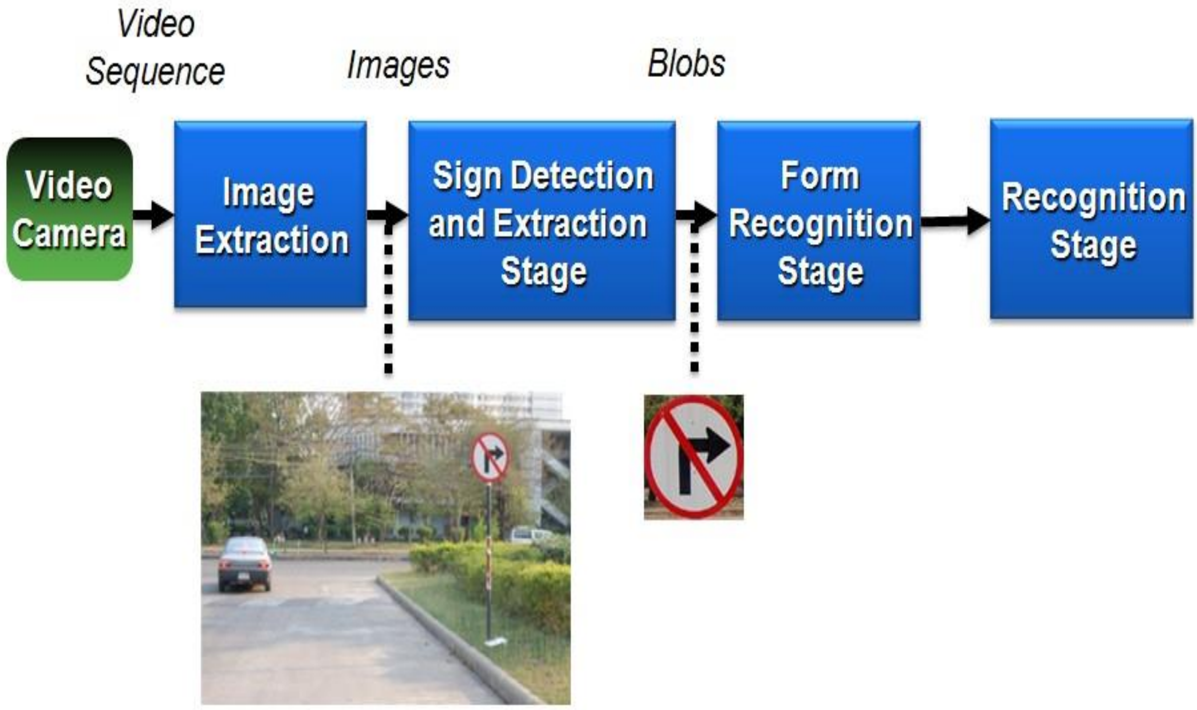


Fig. 3.1 System configuration

The first section is Image Extraction and Sign Detection and Extraction parts. The video images have been taken by a video camera, and Image Extraction block is the responsible for creating images. The Sign Detection and Extraction Stage extracts all the traffic signs contained in each image and generates the small images called blobs. Each blob will be performed by Form Recognition Stage to be valuable parameters input to Artificial Neural Networks in Recognition Stage which is the final part.

Fig.3.1 illustrates the system configuration. Then the output of traffic sign recognition will be presented. The system is based on previous works presented by The description of the traffic sign recognition system can be explained into Traffic Sign Pre-processing Stage and Recognition Core. For Traffic Sign Pre-processing Stage, it is divided in two parts: Sign Detection and Extraction and Recognition Stage.

- Following traffic signs are included in our project are listed below:

ClassId	Name
0	Speed limit (20km/h)
1	Speed limit (30km/h)
2	Speed limit (50km/h)
3	Speed limit (60km/h)
4	Speed limit (70km/h)
5	Speed limit (80km/h)
6	End of speed limit (80km/h)
7	Speed limit (100km/h)
8	Speed limit (120km/h)
9	No passing
10	No passing for vehicles over 3.5 metric tons
11	Right-of-way at the next intersection
12	Priority road
13	Yield
14	Stop
15	No vehicles
16	Vehicles over 3.5 metric tons prohibited
17	No entry
18	General caution
19	Dangerous curve to the left
20	Dangerous curve to the right
21	Double curve
22	Bumpy road
23	Slippery road
24	Road narrows on the right
25	Road work
26	Traffic signals
27	Pedestrians
28	Children crossing
29	Bicycles crossing
30	Beware of ice/snow
31	Wild animals crossing
32	End of all speed and passing limits
33	Turn right ahead
34	Turn left ahead
35	Ahead only
36	Go straight or right
37	Go straight or left
38	Keep right
39	Keep left
40	Roundabout mandatory
41	End of no passing
42	End of no passing by vehicles over 3.5 metric tons

CHAPTER 4: PROJECT SPECIFIC REQUIREMENTS

Hardware:

- A computer with ample processing capabilities to execute video analysis and motion prediction software.
- RAM: The system must have at least 4 GB of RAM, with the ability to upgrade to 8 GB or higher.
- Hard drive: The system must have a solid-state drive (SSD) or a hard-disk drive with a minimum capacity of 250 GB, with the ability to upgrade to a larger capacity.

Software:

- Operating System: The system must run on a supported operating system, such as Windows 10 or higher, or Ubuntu 18.04 or higher.
- Programming Language: The system must be developed using a high-level programming language, such as Python 3.7 or higher.
- Platforms: Jupyter Notebook (version 6.5.4 and above).
- Computer Vision Library: The system must use an open-source computer vision library, such as OpenCV, for frame extraction and video processing.

CHAPTER 5: IMPLEMENTATION

5.1. Software Development

In this section, the mathematical and scientific foundations of the subjects such as the used definition of the software development environment, the used programming language, the prepared database dataset classes, the used language libraries, and framework structures are explained. The development steps in general are very useful for developers to understand the logic and structure of this study.

5.2. Software Structure and Proposed System

In this study, the software is developed by installing the following packages on the phyton environment respectively; OpenCV, NumPy, Keras, Pandas, Scikit-learn, Scikit-image, TensorFlow for CPU and GPU. After the installation of these packages, the Python programming environment is created completely. GPU-based encodings accelerate the learning time and reduce the computational cost. The flowchart of the proposed study is illustrated in Figure 5.1. The collected dataset is used as an input to the CNN architecture for training, validation, testing, and classification.

5.3. Experimental Dataset

The dimension of the training range is an important aspect to take into account in DL learning models. The system becomes ambiguous without a sufficient number of training examples. In this study, public open-source datasets are used. Used TSR Benchmarks of the dataset. Traffic signs are manually created and tagged, in this way TSR data dataset is created. Dataset consists of 43 traffic sign classes and thousands of images. The low resolution and poor contrast of the images in the used dataset can reduce the success rate. In some cases, it can be difficult for the learning algorithm to recognize the traffic sign. Therefore, the better dataset is optimized and the higher the resolution images are used, the higher the success rate reaches of the TSR. The dataset used in this study is designed as multi-class, designed as a large and realistic database. The class distribution of the dataset is given in. The dataset is broken into sets for training, validation, and testing processes. This segmentation is used a statistical approach which is the Hold-out cross-validation method to measure and estimate the success rate of DL algorithms. This method is widely used because of its effectiveness and ease of application. As there are no set common instructions for the data set's percentage partitioning, commonly used partitioning percentages are used.

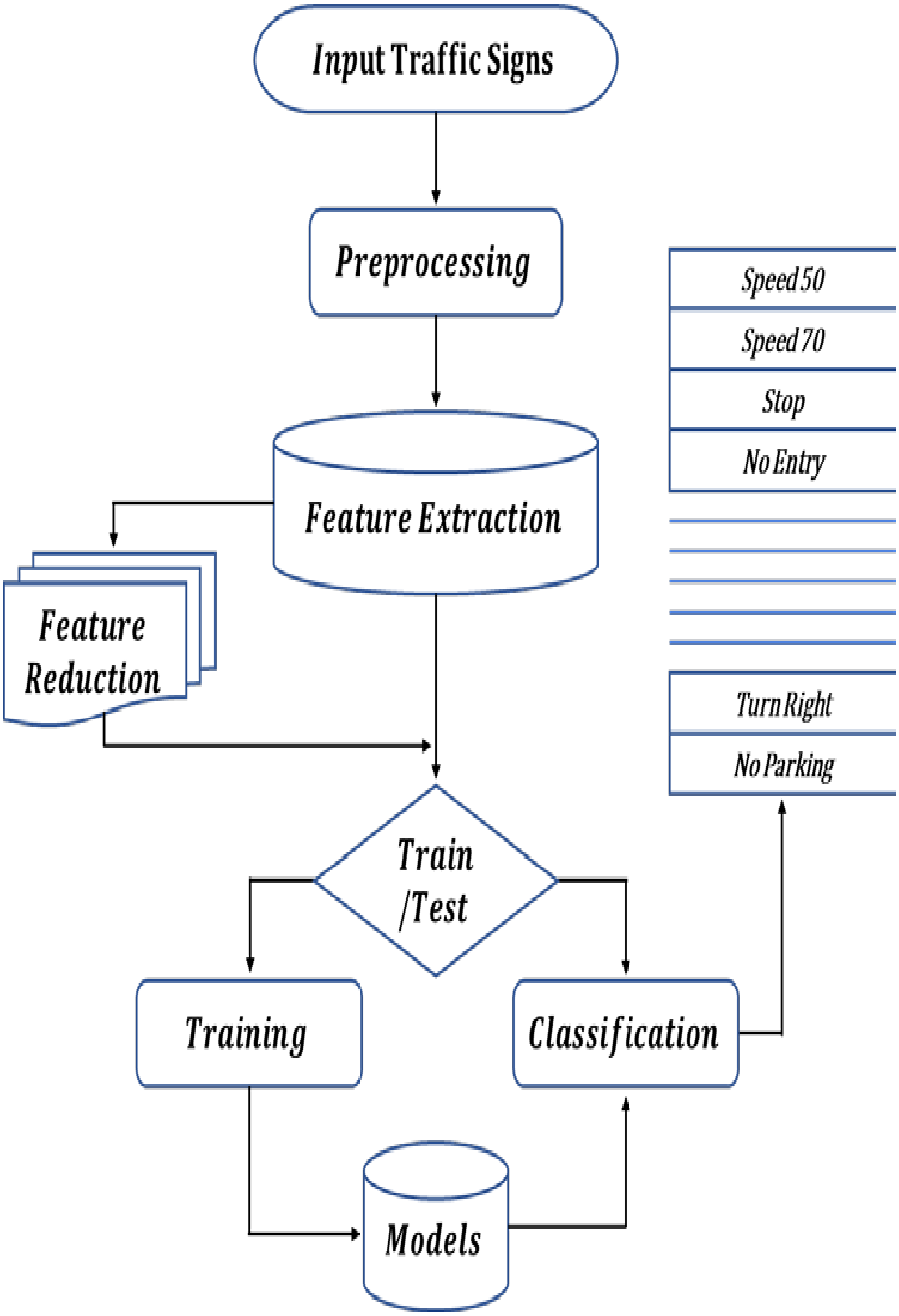


Fig 5.1 Flowchart of the proposed system

In this Project we create Traffic sign Detection Model. Using Traffic sign Detection Model, we can inform the driver of the vehicle about the traffic sign coming ahead.

Project Setup:

The dataset is plot into training, test and validation sets, with the following characteristics:

- Images are 32 (width) x 32 (height) x 3 (RGB color channels)
- Training set is composed of 34799 images
- Validation set is composed of 4410 images
- Test set is composed of 12630 images
- There are 43 classes (e.g., Speed Limit 20km/h, No entry, bumpy road, etc.)

Images And Distribution:

The below a sample of the images from the dataset, with labels displayed above the row of corresponding images.

Fig 5.2 Training Dataset

It is a significant imbalance across classes in the training set, as shown in the histogram below. Some classes have less than 200 images, while others have over 2000. This means that our model could be biased towards overrepresented classes, especially when it is unsure in its predictions.

```
[134, 1461, 1475, 908, 1259, 1191, 266, 937, 946, 943, 1273, 828, 1336, 1396, 499, 376, 261, 734, 765, 123, 215, 208, 223,
20, 169, 976, 393, 150, 334, 167, 300, 491, 154, 426, 243, 766, 247, 132, 1326, 190, 203, 156, 155]
```

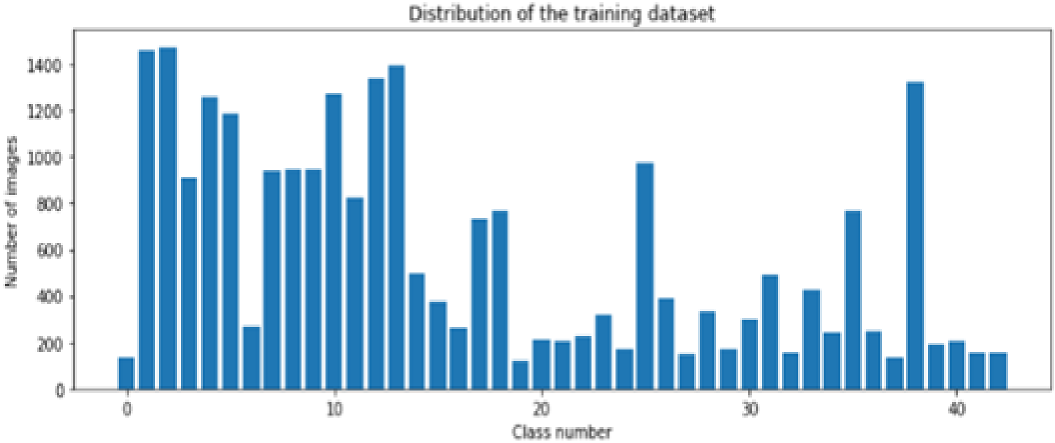


Fig 5.3 Histogram of Training Dataset

Pre-Processing:

1) Input the image.
2) Image Resizing: One of the limitations of the CNN model is that they cannot be trained on a different dimension of images. So, it is mandatory to have same dimension images in the dataset. We'll check the dimension of all the images of the dataset so that we can process the images into having similar dimensions (32*32*3).
3) Image Grayscale: We convert our 3 Channel images into a single grayscale image.
4) Image Equalization: - It standardize the lighting in a image.
5) Image Normalization: - To Normalized Value between 0 and 1 instead of 0 to 255**.**

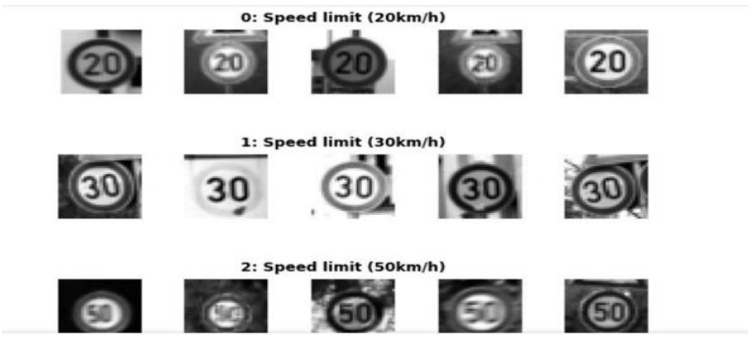


Fig 5.4 Pre-Processing of Training Dataset

In this section, the libraries, frameworks, algorithms, techniques, background, and fundamentals used in this study are explained and their contributions to the study are presented.

5.4. Computer Vision (CV) and OpenCV

OpenCV is a CV and DL application library that is open source, and it is designed to provide applications with common infrastructure and to accelerate the use of DL. CV libraries that contain algorithms such as image processing, pattern recognition, and histogram extraction are needed in the design and development of Real-Time systems. OpenCV includes open-source versions of these algorithms and OpenCV is preferred to be used in this study due to its open-source and no copyright issues.

5.5. TensorFlow Ecosystem

TensorFlow is not just a computational engine and a deep learning library for training neural networks. It is a complete ecosystem used (TensorFlow Lite for mobile and embedded devices) for the development of production machine learning pipelines and deploying-quantization production models. It includes sessions and willing execution, automatic differentiation, model and layer subclassification, and better multi-GPU/distributed training support functions. We can train, optimize, and quantify models designed to work on resource-constrained devices such as TensorFlow Lite, smartphones, and other embedded devices. Raspberry Pi and TensorFlow Lite were used in this study.

5.6. Keras DL Framework

Keras is a high-developed deep learning framework for the phyton environment and Keras framework is used to create a deep CNN in this study. By using Keras libraries, a CNN is created and trained in the following steps: Loading data from disk, creating the training and the test sections, defining Keras model architecture, compiling Keras model, training the model with training data, evaluating the model over test data, and making predictions using the trained Keras model.

5.7. Convolutional Neural Networks (CNN)

We have used the LeNet architecture for the model here with few modifications. The model originally consists of total 7 layers. The layers consists of 3 convolutional layers ,2 subsampling layers and 2 fully connected layers. First layer is the input layer then there are 2 subsampling layers also known as maxpooling layer thereafter it has the fully connected layer and then lastly the output layer. So basically, CNN has layer division as 3 types namely convolutional layers (Conv2D), pooling layers (Maxpooling2D) and fully connected layers. (fig.5.5)

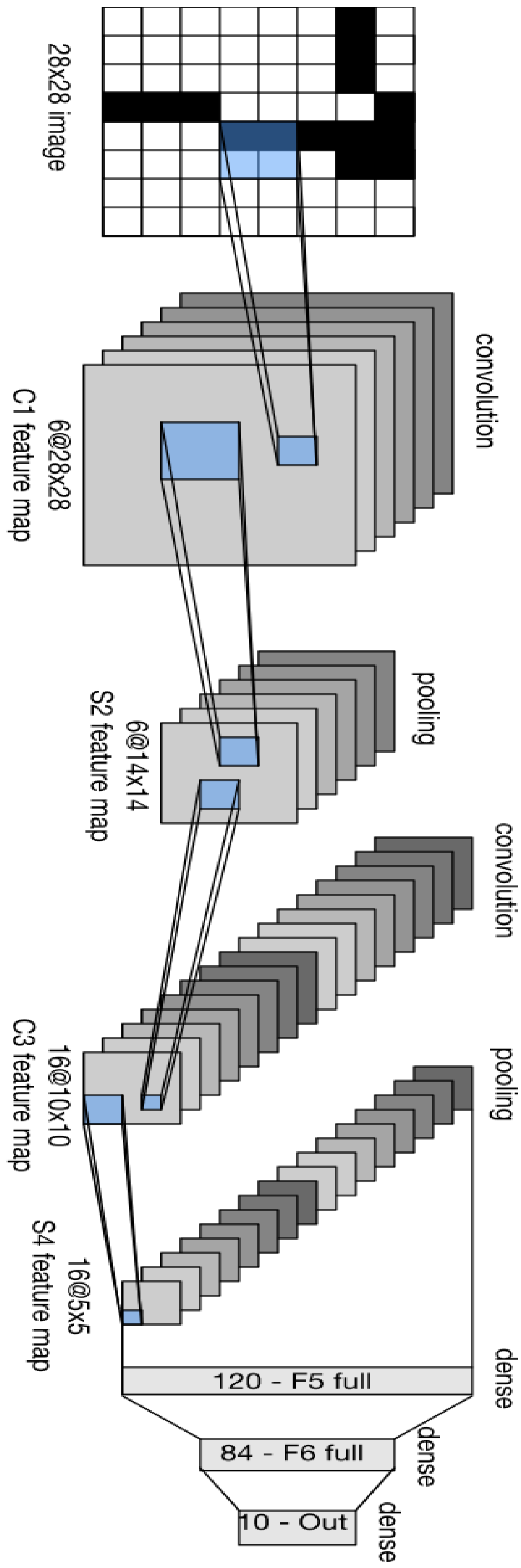


Fig 5.5 Standard LeNet Architecture

In fig.5.6 denotes the layers in a particular convolutional model. it takes the images as input then breaks down the images in small packets using the convolutional and pooling layers and then finally with the help of fully connected layers classification takes place and then we see the particular output.

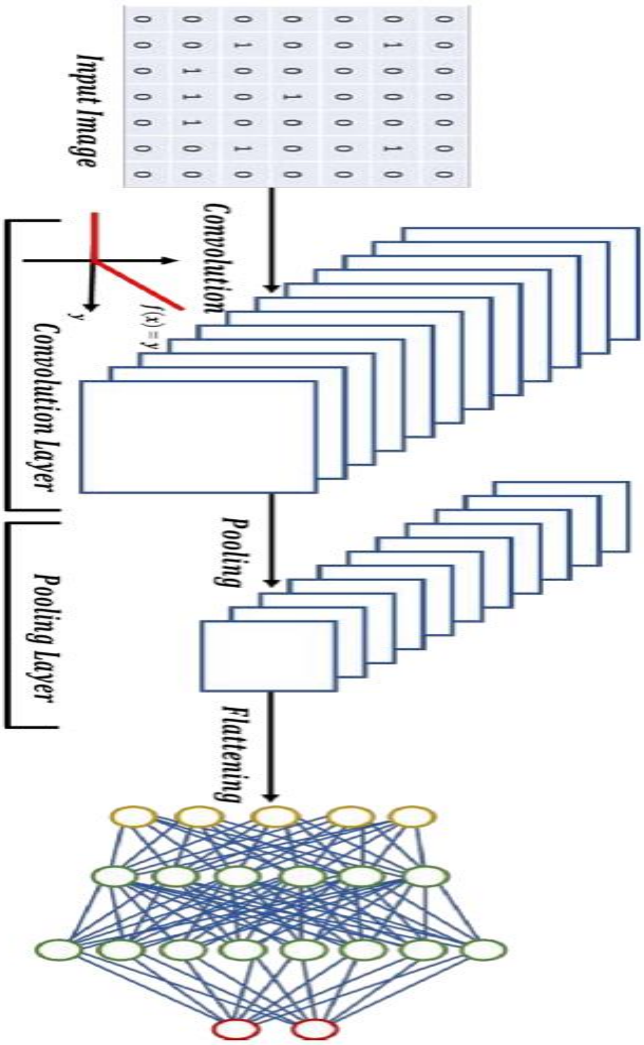


Fig 5.6 Entire process of creating and optimizing a CNN

In this particular project we have used LeNet architecture as mentioned before. In this model we have few convolutional layers, few pooling layers then we have few dropout layers and at the end we have a dense layer which is nothing but our output layer.

CHAPTER 6: RESULTS

The Traffic Sign Detection Model is detecting and recognizing at maximum accuracy.

- <u>Earlier results</u>

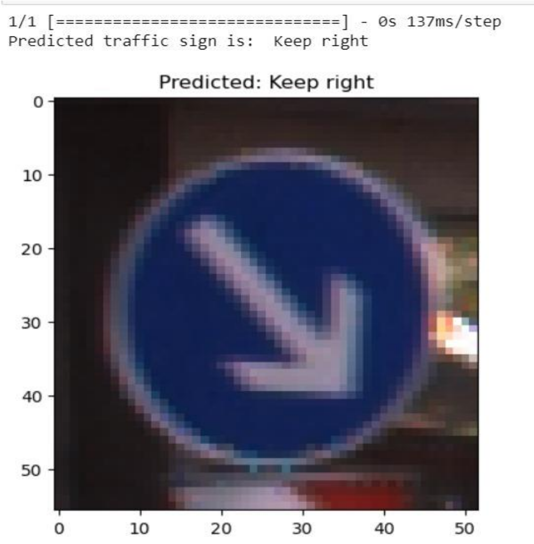


Fig 6.1 Keep right Sign Recognition

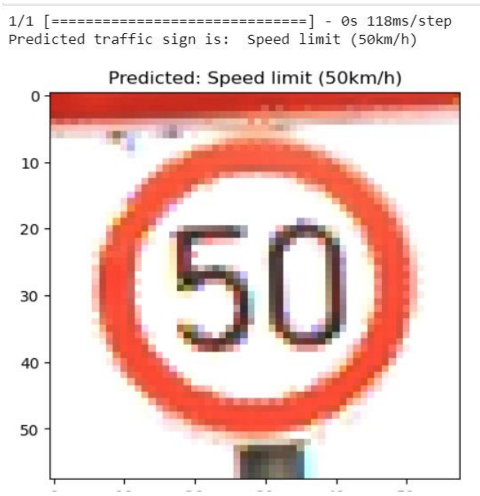


Fig 6.2 Speed limit (50km/h) Sign Recognition

Current Results

Fig 6.3 General Caution sign recognition

Fig 6.4 Go straight or right sign recognition

Fig 6.5 Speed Limit 120 km/h sign recognition

The main.py script initiates a process to train a model using a dataset that comprises multiple classes of images. Initially, the script detects the number of classes present within the dataset, identifying a total of 43 distinct classes. Subsequently, it iterates through each class folder within the dataset, importing the images contained there and

```
Total Classes Detected: 43
Importing Classes.....
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
```

```
Data Shapes
Train(25055, 32, 32, 3) (25055,)
Validation(6264, 32, 32, 3) (6264,)
Test(3480, 32, 32, 3) (3480,)
```

Fig 6.6 Splitting of dataset

aggregating them into a unified matrix representation. Each image is associated with its respective class label during this process.
Following the data aggregation step, the script proceeds to partition the dataset into distinct subsets for training, testing, and validation purposes. This partitioning involves allocating a predetermined number of images to each subset, ensuring that the dataset is sufficiently representative for training, evaluation, and performance assessment.

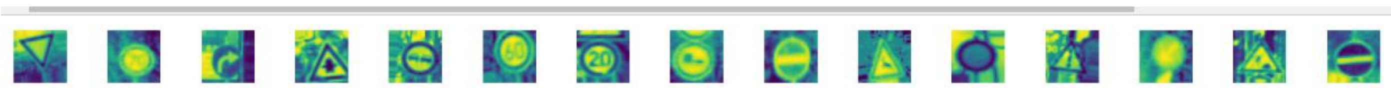
Fig 6.7 Training distribution

Specifically, a portion of the images is assigned to the training subset to facilitate the model learning process, while separate subsets are reserved for testing the model's generalization capabilities and validating its performance on unseen data.
as shown in the fig.9 it has around 25000 images for training,6000 images for validation and 4000 images for testing.

Once the splitting is done it will show the distribution of the training dataset in graphical form. Studying this training distribution it is important to know that we do not have same no of images for each class. So, as we can see in fig.10, we have about 100 images for first class and similarly we have about 1300 images for another class it clearly implies that the distribution is not even so this may result in good classification for one class and bad classification for another class because the dataset is not evenly distributed for each class.

Once this is done the pre-processing of the images will take place that is the images will get converted to grayscale and it

will show us example augmented image so that to Check that the preprocessing is done properly.



After compiling the model the training will start for the 10 epochs as parameter declared before and 2000 steps per epochs. So, 2000 images will train for 10 iterations to give accuracy and loss of the model(fig.6.8)

```
Model: "sequential"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 conv2d (Conv2D)             (None, 28, 28, 60)        1560

 conv2d_1 (Conv2D)           (None, 24, 24, 60)        90060

 max_pooling2d (MaxPooling2D  (None, 12, 12, 60)       0
 )

 conv2d_2 (Conv2D)           (None, 10, 10, 30)        16230

 conv2d_3 (Conv2D)           (None, 8, 8, 30)          8130

 max_pooling2d_1 (MaxPooling  (None, 4, 4, 30)         0
 2D)

 dropout (Dropout)           (None, 4, 4, 30)          0

 flatten (Flatten)           (None, 480)               0

 dense (Dense)               (None, 500)               240500

 dropout_1 (Dropout)         (None, 500)               0

 dense_1 (Dense)             (None, 43)                21543

=================================================================
Total params: 378,023
Trainable params: 378,023
Non-trainable params: 0
_________________________________________________________________
```

Fig 6.8 CNN Model

```
_________________________________________________________________
None
Epoch 1/10
502/502 [==============================] - 157s 303ms/step - loss: 2.6209 - accuracy: 0.2719 - val_loss: 0.9285 - val_accuracy:
0.7634
Epoch 2/10
502/502 [==============================] - 134s 266ms/step - loss: 1.2113 - accuracy: 0.6308 - val_loss: 0.3295 - val_accuracy:
0.9125
Epoch 3/10
502/502 [==============================] - 161s 321ms/step - loss: 0.8381 - accuracy: 0.7403 - val_loss: 0.1799 - val_accuracy:
0.9561
Epoch 4/10
502/502 [==============================] - 178s 354ms/step - loss: 0.6265 - accuracy: 0.8037 - val_loss: 0.1216 - val_accuracy:
0.9625
Epoch 5/10
502/502 [==============================] - 172s 343ms/step - loss: 0.5109 - accuracy: 0.8402 - val_loss: 0.0957 - val_accuracy:
0.9740
Epoch 6/10
502/502 [==============================] - 147s 292ms/step - loss: 0.4443 - accuracy: 0.8604 - val_loss: 0.0880 - val_accuracy:
0.9746
Epoch 7/10
502/502 [==============================] - 134s 266ms/step - loss: 0.4001 - accuracy: 0.8752 - val_loss: 0.1601 - val_accuracy:
0.9454
Epoch 8/10
502/502 [==============================] - 134s 267ms/step - loss: 0.3563 - accuracy: 0.8886 - val_loss: 0.0737 - val_accuracy:
0.9757
Epoch 9/10
502/502 [==============================] - 136s 271ms/step - loss: 0.3285 - accuracy: 0.8974 - val_loss: 0.0674 - val_accuracy:
0.9823
Epoch 10/10
502/502 [==============================] - 133s 265ms/step - loss: 0.3002 - accuracy: 0.9056 - val_loss: 0.0556 - val_accuracy:
0.9866
```

Fig 6.9 Training per epoch

In fig.8 accuracy, loss, validation accuracy is seen. So, the accuracy it gets is around 0.95 which is fair enough to classify the images i.e. it might get good results.
After that it plots the graph for accuracy and loss of the model it is getting fairly good results. For 10 epochs it is giving good results. After 4 epochs it is going at the same level. (fig.6.10) (fig.6.11)

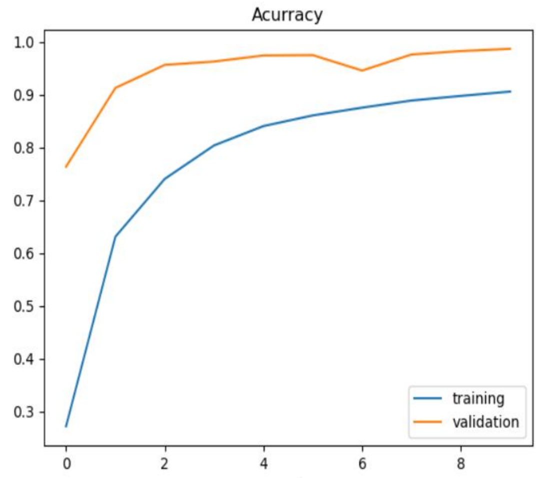


Fig 6.10 Accuracy plot

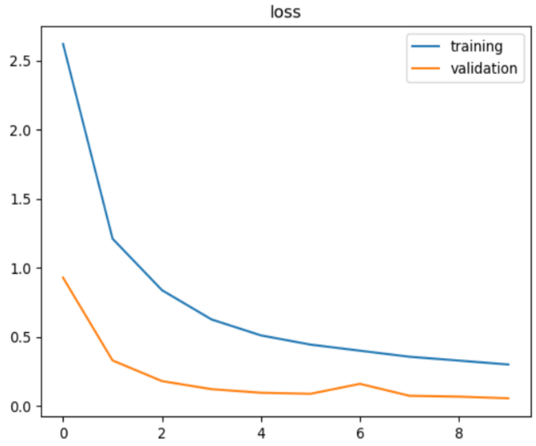


Figure 6.11 Loss plot

Once training is done when we give the path of an image it shows us the classification of the traffic signs using image processing techniques and will show the label and class of the particular traffic sign.

CHAPTER 7: CONCLUSION

The proposed automatic traffic sign detection and recognition system integrates advanced techniques, primarily convolutional neural networks (CNNs), to enhance driving safety and comfort. By leveraging CNNs, the system effectively extracts features from traffic sign images, enabling robust recognition.

The literature survey highlights the efficacy of similar approaches, with reported accuracies ranging from 84% to 98.6%. The detailed design outlines a systematic approach, involving image extraction, sign detection, and recognition stages. The system architecture ensures efficient processing of video images captured by a camera, ultimately presenting recognized traffic signs to the driver.

Through this project, the aim is to mitigate road accidents by alerting drivers about upcoming traffic signs, thereby promoting adherence to traffic regulations and enhancing overall driving experience and safety.

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ANNEXURE

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Traffic Signs Recognition

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Abstract: Traffic signs are mandatory features of road traffic regulations worldwide. Automatic detection and recognition of traffic signs by vehicles may increase the safety level of drivers and passengers. For this reason, Real Time-Traffic Sign Recognition system is one of the essential components for smart transportation systems and high-tech vehicles. Recently, very good performances have been achieved in public datasets, especially with advanced Computer Vision (CV) approaches like Deep Learning or more precisely CNN (neural networks) due to high recognition rate and fast execution.

CNN has largely influenced all the computer visionary tasks. So, in this project we propose a deep network traffic sign recognition/classification model with the help of python as the base language and followed by different python libraries for training the CNN model. This model will consist of different CNN layers which will precisely classify interclass samples from the dataset which will be provided. This system will be more efficient for recognizing the real time traffic sign and also tell from which class a particular sign belongs with name. Therefore, this study makes TSR software has been developed by using Convolutional Neural Networks (CNN) built on DL techniques along with CV techniques. Coding is accomplished under TensorFlow and OpenCV frameworks with the python programming language and CNN training is carried out by using parallel architecture. The experimental findings indicate that the developed CNN architecture achieves greater accuracy and confirms the high efficiency of the system.

Keywords: *Deep Learning, Convolutional Neural Networks, traffic signs.*

1.Introduction

Traffic signs are warning, and caution signs are put on roads to advise drivers of road conditions and constraints or the way to go. Problems with road safety are mostly due to driver-specific subjective factors such as carelessness, inappropriate use of the driver, and non-compliance with traffic laws. For these reasons, lately autonomous vehicles have been a center of attraction for research study and development. And when we speak about autonomous vehicles Traffic Signs Recognition system is the first and foremost concept to include in any autonomous vehicles. Sometimes drivers may tend to miss the traffic signs along the route this can be dangerous and very unsafe with concern to road safety. In such cases automatic process of classification of traffic signs and reduce the number of road accidents on very large scale and can ensure complete safety. Many big companies in automation used this system in their cars using computer vision and machine learning approach but this was soon replaced by deep learning approach based on classifiers. Recently deep convolutional techniques have been proved to be the most effective for object detection. It proves to be advantageous to look at the traffic signs recognition/classification with the deep learning the deep learning perspective. Classification of traffic signs is not a simple task it requires a huge dataset to go through various processes in deep learning. Initially the dataset gets divided into some ratio where those many images will go through one process and other no of images will go through other process and then will show the accuracy of the classes and then further it will get recognized. This concept has notable research work history and existing work going on still there are few areas/drawbacks that are yet to overcome. high-tech cars have recently become an efficient method for eliminating these human factors. TSR is the method of identifying traffic signs as automatic and it will provide the capability for smart cars and smart driving. Developing TSR systems that will enable state of the art vehicles to automatically recognize traffic signs such as speed limits, pedestrian crossings and inform the driver will provide extra security for drivers and passengers.

In summary, TSR is a 3-step process. The first one is that preprocessing is a process to reduce negative effects by arranging the pixels and dimensions in the images. The second one is the localization process that detects and localizes where a traffic sign is found in an image. Lastly, recognition is a process to recognize and classify the traffic sign by taking the localized traffic sign. In this study, software technology developed for detecting and recognizing traffic signs on a real-time based is explained.

2.Literature Review

Extensive study has been done in the area of recognition and classification of traffic and road signs. The authors proposed a Convolutional Neural Network and Support Vector Machines (CNN-SVM) method for traffic signs recognition and classification. The coloring used in this method is YCbCr color space which is input to the convolutional neural network to divide the color

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