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TRAFFIC SIGN RECOGNITION SYSTEM

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Abstract: Traffic Sign plays a crucial role in our every day life. during this epoch every and each one amongst USA own vehicles, that results in the appearance of serious traffic. because of serious traffic and improper traffic observation, there's a high chance of road accidents. in keeping with a recent survey taken everywhere the planet, majority of deaths area unit caused because of road accidents. Also, the prevalence of accidents is also because of many reasons like carelessness of drivers in noticing the traffic signs, is also because of the varied lightning conditions or weather calamities there by resulting in hazy vision of traffic signs within the edge. So, we tend to area unit in would like of a Traffic Sign Recognition System (TSRS) that may warn the drivers regarding the coming traffic hurdles in their approach. The projected methodology makes use of a camera placed before of the vehicles. The camera captures the traffic signs on the edge and when analyzing the category to that the given traffic sign belongs to, it'll warn the drivers regarding the coming hurdles. Existing work are enforced with CNN, call Tree and SVM. so as to point out the novelty and improve the general accuracy, we tend to enforced the projected system with CNN and SVM combination and additionally with CNN with Adam Optimizer. The accuracy obtained with SVM is sort of seventy nine. Then the CNN with Adam optimizer provides Associate in Nursing accuracy of nearly ninety two.9%. The CNN with SVM provides the general accuracy of nearly ninety nine. This accuracy may vary relying upon the epoch worth and batch size. The output is envisioned mistreatment the program that may tell USA the particular sign expected as output.

Introduction

Traffic Sign plays a very important role in our daily life. during this era every and each one has vehicles, that ends up in the arrival of significant traffic. because of significant traffic and improper traffic observance, there's a likelihood of road accidents. per a recent survey taken everywhere the globe, majority of deaths area unit caused because of road accidents. Also, the occurrences of accidents is also because of many reasons like carelessness of drivers in noticing the traffic signs, is also because of the varied lightning conditions or weather calamities there by resulting in blurred vision of traffic signs within the wayside. So, there's a necessity of a Traffic Sign Recognition System (TSRS) that may warn the drivers regarding the approaching traffic hurdles in their manner.

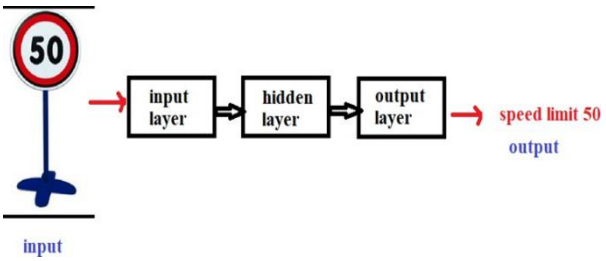
I. RELATED SYSTEM

In [1],authors have developed the traffic sign recognition system using Convolutional Neural Network. The system has three workings: image segmentation, traffic sign recognition and traffic sign classification. First the given input image is partitioned into several segments. Then after segmentation the features will be extracted by using convolutional layers. Finally after feature extraction, the traffic sign will be detected and classified into its respective class. In [2], the authors developed the system which will first detect and then classify what type of traffic sign it is. Authors have used SVM as algorithm. The support vector machine has a concept of hyper lane.

SVM can be used for both classification and regression purpose. The number of features extracts decides the hyperplane dimensionality. In [3], the authors have deep thin CNN architecture with four layers include the convolutional layer, pooling layer, fully connected layer and drop out layer. Here various computer vision tasks is being performed. TensorFlow is utilized for this purpose. In [4], the authors have made use of recurrent attentive neural networks. It focuses on particular parts of image features and stresses the importance of those features and strengthens its learning parameters. Here based on automatic perception, the decision is made. Considerable results are obtained in both speed and accuracy and improves small object detection. In [5], the author has made use of low-computation neural assistance system for traffic sign recognition, shaped-based detection algorithms to detect the regions, which are with circle and triangular traffic signs in designated regions of interest. For classification to those detected regions, a convolutional neural network is used.

II. PROPOSED SYSTEM

The projected methodology makes use of a camera placed Infront of the vehicles. The camera captures the photographs on the road aspect and picked up input is given as coaching knowledge for CNN. The Convolutional Neural Network has 3 main parts: Input layer, Hidden layer and Output layer. The input image is passed via the input layer. Then the fed input is processed by the hidden layers within CNN. because the variety of hidden layers will increase, the accuracy and performance are accumulated. Then finally output is given out via output layer. Here CNN with SVM offers smart performance than CNN with VGG16 & Adam optimizer. the varied benefits of this method square measure traffic might be regulated, supernumerary accidents might be prevented, and therefore the accuracy is a lot of when put next to different existing ones.



III. METHODOLOGY

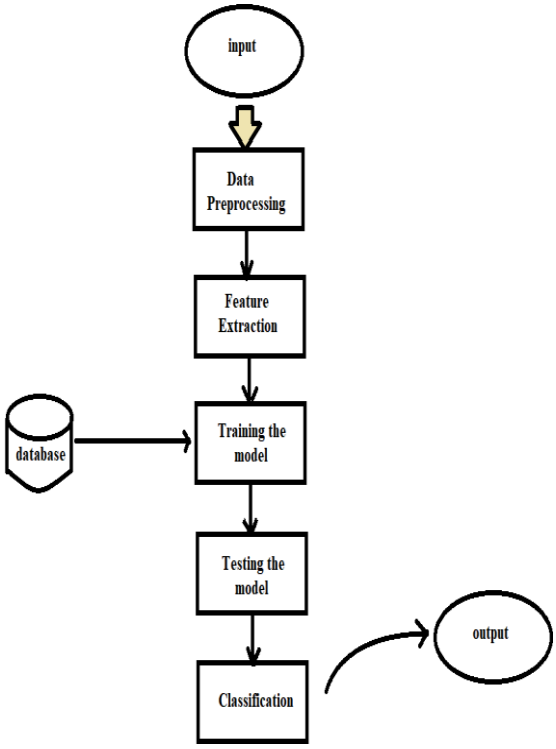
THE OVERALL STEPS INVOLVED IN DESIGNING TRAFFIC SIGN RECOGNITION SYSTEM ARE:

1. DATASET COLLECTION AND DATA PREPROCESSING
2. 2.TRAINING , TESTING AND SPLIT DATA
3. 3.CODING PHASE
4. 4.ALGORITHM IMPLEMENTATION

1.DATASET PREPROCESSING AND COLLECTION

The data set that we've used is German Traffic Sign Recognition Benchmark(GTSRB). it's nearly forty three categories of traffic signs.It has each the coaching and testing folder. The coaching folder has quite thirty four,799 images. The tesing folder has quite twelve,630 images. The validation half has 4410 pictures. The dataset that we've collected several contain null values , inappropriate values or maybe missing values. therefore we tend to square measure in have to be compelled to clean those dataset and build it appropriate for predicting functions.

This method of cleanup the dataset is termed information Preprocessing. All the pictures square measure within the kind of thirty two x thirty two x three format(width x height x RGB). If the dataset is unbalanced, we've to create it as balanced by employing a technique known as image augmentation. once this grey scaling and image standardization takes place .



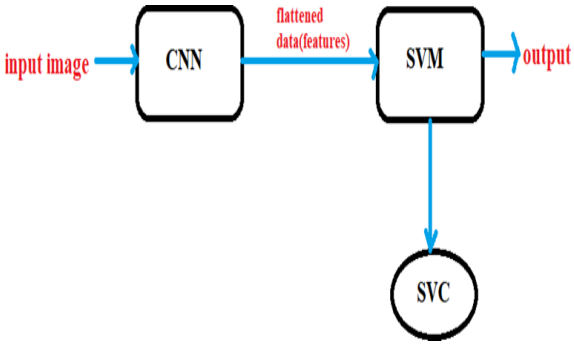
Overall working of the traffic sign recognition system

2.TRAINING , TESTING AND SPLIT

After preprocessing the dataset, split the given dataset into testing, training and validation set. The training dataset is used for training the model. The learning rate, epochs and batch size are the main factors to be considered in training part. Epoch is nothing but how many times the dataset is read by the model. The batch size depicts how our dataset is splitter into different batches for loading purpose. Then the dataset is also allocated for testing purpose too. The training data occupies 75% and testing data occupies 25%. The testing data is utilized for testing the accuracy and output verification. If the expected result and obtained result is matched, then the model is successful.

3.CODING

In this study, we have chosen two different varieties of algorithm- CNN with SVM and CNN with VGG-16 & Adam Optimiser. Convolutional Neural Networks has input, hidden and output layer. The hidden layer contains multiple Convolutional layers and pooling layers inside it. CNN has neurons within them just like the neurons present inside the human brain. These neurons play an important role in passing and receiving stimuli. Support Vector Machine is a kind of supervised learning that is mostly used for classification purpose rather than Regression. Here we have developed a new hybrid combination algorithm by mixing CNN with SVM. Initially the input is fed to the CNN. After this the input image is processed, predicted and finally the output is obtained. The obtained output is fed as training data for the SVM. The SVM in turn process the solution again and finally produces the enhanced and more accurate results. This combination offers much more performance and accuracy.



Algorithm Name	Accuracy obtained
SVM	79%
CNN with Adam optimizer	92.9%
CNN with SVM	99%

4.ALGORITHM IMPLEMENTATION

Here forms of library packages like Numpy, Pandas, Matplotlib, Keras and Tensorflow. when putting in the specified libraries , we have a tendency to trained and tested the model. Then the prevailing resolution (i.e) CNN is enforced. when this new combination of CNN with SVM and CNN with VGG sixteen & Adam optimiser is enforced. CNN layers include:
Convolutional Layer:
This layer is liable for feature extraction with calculation of convolution (i.e) the inner product. Pooling Layer: This layer provides the utmost pool worth by reducing the size of the image and thereby reduces the overfitting downside.
Fully Connected (FC) Layer:
This layer ensures the property of neurons between 2 totally different layers.
Dropout Layer: This layer drops the unwanted neural property so as to avoid overfitting problems. Dense(output) Layer: Dense layer is that the final output layer wherever we have a tendency to get the processed result. it's wherever the classification activity takes place.

IV.SYSTEM SPECIFICATION

SOFTWARE USED:- boa Navigator (Jupyter Notebook)
LIBRARIES:- Numpy, Pandas, Tensor flow, Matplotlib
PROGRAMMING LANGUAGE:-Python
ALGORITHM:- CNN with VGG sixteen & Adam optimiser, CNN with SVM
DATASET:- German Traffic Sign Recognition Benchmark

V.RESULTS AND DISCUSSIONS

The Traffic Sign Recognition System can be implemented by using different algorithms like CNN, SVM, hybrid combination of CNN with SVM and also with CNN with Adam Optimizer. Here by increasing the epochs , the test accuracy can be increased. If the batch size is increased , the test accuracy is decreased.

i. **epochs↑ = accuracy ↑ batch size↑ = accuracy↓**

Here we designed the GUI by which the user can interact with the model and thereby visualize the output (i.e) the predicted traffic sign . The accuracy obtained with CNN and SVM is much more when compared to other algorithms. So the below table depicts the overall comparison of all the algorithms used:

Table 2: Comparison of accuracy of all algorithms

CONCLUSION

Traffic Sign Recognition System has been developed with GTSRB dataset by using CNN with Adam optimizer and also with CNN and SVM . The accuracy obtained by using CNN with VGG 16 & Adam optimizer is 92.9%.Then by using CNN with SVM combination nearly 99% accuracy is obtanied. With the development of this TSRS, unnecessary road accidents and traffic congestion can be reduced. In future, with the advent of heavy data , there is a need to train the model with the huge dataset and thereby increase the epoch value , so that the accuracy and performance could be enhanced. In future, we have planned to improve the overall working of the traffic sign recognition system in the most dreadful weather conditions too.

VI. REFERENCE

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