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TRAFFIC SIGN RECOGNITION SYSTEM USING AI

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ABSTRACT

Traffic Sign Recognition System (TSRS) is a significant part of Intelligent Transport System (ITS) as traffic signs help the drivers to drive all the more securely and proficiently.TSRS(Traffic Sign Recognition System) may plays a significant role in self driving car, artificial driver assistance, traffic surveillance as well as traffic safety. Traffic sign recognition is necessary to overcome the traffic related difficulties. This report speaks to another approach for Traffic Sign Recognition System. The traffic sign recognition system has two parts Detection and Recognition. In this intention, we have built a deep learning model using Classification algorithm and Convolutional Neural Network (CNN) individually to detect and recognize the traffic. signs. In detection part, we have used computer vision techniques to find out where traffic sign region is located and identified by creating a rectangular In this report, we have described an approach towards traffic signs recognition system. Here, we worked on 43 selected sign from the German traffic signs from the dataset provided by the German Traffic Sign Benchmark (GTSB) to train our deep learning model and eventually to get traffic sign detection and recognition purpose. We obtained 98.33test data ratio. On the other hand, the test result was 96.40

Keywords: *Driver Assistant System, Artificial Intelligence, Traffic Signs, Python.*

1. INTRODUCTION

With the rapid growth of technological development, vehicles have become an essential portion of in our routine lives. Because driving vehicles without follow traffic rules, it creates more and more intricate traffic on the road. As a result, it is one of the major reasons behind accidents every year. In recent times road accidents are happening regularly in increasing manner across the world. Leading reason of most road accidents is the ignorance or unawareness of the traffic sign. The meaning of traffic sign is any entity, device, or board on the road that entity carries the rules, indicates the warning or provides other explanation regarding driving. Therefore, it also provides necessary information through traffic signals and traffic control devices to continue smooth car driving. Traffic sign detection and recognition system is an crucial issue to reduce traffic and increase the sustainability of self driving car without any incidence.

Problem Definition

To build a vision-based traffic sign recognition system using CNN and other image processing techniques which which can recognize different type of traffic signs and help in manner of Driver Assistant System (DAS) or Automatic Driving Vehicle Systems

2. SCOPE

Intelligent Transportation System (ITS) integrates various technologies with traditional transportation infrastructure and vehicles, which is able to improve transportation safety and efficiency. Traffic signs on roads offer basic source of information for Intelligent Transportation System. Automatic road and traffic sign detection and recognition, as important subtasks of Intelligent Transportation System, collect the real-time traffic data for processing at a central facility, which have been of substantial interest for many years in the Intelligent Transportation System research field. TSRS plays a crucial role in autonomous vehicle, smart driving and smart traffic system

Analysis

Requirement Collection

After researching and analyzing we got to find following requirement from the model.

- Recognize sign with different colors
- Determine the exact notation from the sign.

- Must recognize and predict the sign in a mean time.
- Should give the probability of correctness of the output.

PRODUCT FEATURE

- **Prediction of traffic sign**: - This model uses more than one factor for prediction of traffic sign so that accuracy of the model is better than any normal prediction model. Users of this model can make good use of its efficiency and make the best decision by using this model.
- **Bar Representation for accuracy of each prediction**: - With each prediction the output screen will contains the accuracy representation in bar format (out of 100 according to that.
- **43 type of signs prediction** :- Here, we worked on 43 selected sign from the German traffic signs from the dataset provided by the German Traffic Sign Benchmark (GTSB) to train our deep learning model and eventually to get traffic sign detection and recognition purpose. The model wills different kind of signs.
- **Time efficiency of model**: - Driving vehicle is all bout timing and accuracy. Our model will predict the sign within just few fractions of seconds which will help the user in mean time, and he will take proper move according to the predicted sign.
- **Accuracy of model**: - the accuracy of our deep learning model will be more than 95to be accurate enough that users can trust its prediction

DESIGN

System Architecture

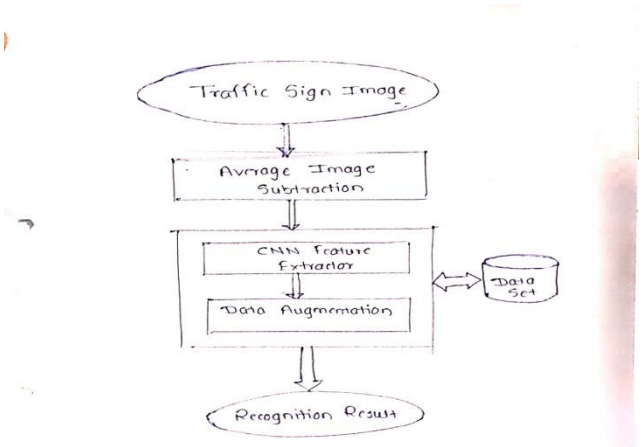
The architecture design part of traffic sign recognition and classification using Convolutional Neural Networks consists of creating a data set for the application, training the application using CNN, and then classifying and recognizing the traffic signs accurately. The various tools and applications used to design this system are depicted.

Data Set

The images that have used in this paper are downloaded from the standard test data set provided by the German Traffic Sign Detection Benchmark which acts as a supportive mile to the researchers in the field of computer image processing with respect to research in traffic sign detection. The training images provided by this dataset are of size 2.6 GB which can be downloaded online there are about 2700 training images in PPM format (i.e., 1360 x 800 pixels). The images are clear in every perspective with no distortion or bad lighting effects.

Data Flow Diagram

A data flow diagram (DFD) is a graphical representation of the 'flow' of data through an information system, modelling its process aspects. A DFD is often used as a preliminary step to create an overview of the system, which can later be elaborated. DFDs can also be used for the visualization of data processing (structured design). A DFD shows what kind of information will be input to and output from the system, where the data will come from and go to, and where the data will be stored.



3. RESULT

The following table gives the Accuracy, Precision, Recall and F1 score metrics on the test set. The test set was obtained by splitting the whole dataset into 80% train data and 20 % validation and test data. Out of the 20% validation, 10% was the test data. The followings results take into consideration the traffic sign that is perfectly cropped from the image. This may not be true when we are extracting traffic signs from the image without the prior knowledge of their position. Metric Score Accuracy 86.9 % Precision 0.8638 Recall 0.8694 F1 Score 0.8633 Below Images are the final input of the system. The output window can be seen to have successfully predicted the given traffic signs. The output window consist of 2 additional feature named Sign and Probability. Sign represent the class of the traffic sign which according to the training data consist of 43 different kind of traffic sign, which means that the sign field represent the name of the predicted traffic sign. The second feature is Probability, consist of a decimal numeric format which represent the measure of accuracy of the predicted sign in percentage format (i.e. from 100%) . In below examples we can see that the probability field represent a numerical number for example 99.99 & 99.79 which means that the probability of the predicted sign being accurate is 99% which is a highly reliable probability.

4. CONCLUSION

In this thesis a road and traffic sign recognition system which can help in creating a road safety mechanism was developed, implemented and evaluated. This system, which involves a mixture of computer vision and pattern recognition problems, was able to extract road signs from still images of complex scenes subject to uncontrollable illumination. In the computer vision part, algorithms were developed to segment the image by using colours and to recognise the sign by colour-shape combinations as a priori knowledge. In the pattern recognition part, neural network put the unknown sign in one of the traffic sign categories depending on the sign rim and interior. This goal has now been reached and the system shows high robustness . Under trial and error method various models were fit to the dataset to find a best model for cotton price prediction. It is found that the Convolution Neural Network (CNN) and Deep Learning model is the best fit with 80. Thus, performance of a particular model totally depends on the problem and data at hand and it is not necessary for deeper neural networks to always surpass the rest. Additionally, our proposed model gives the best response time while providing reasonable accuracy. Final Remarks The problem of traffic sign recognition for the purpose of road safety has been approached by using colour and shape information of the traffic signs. A new set of algorithms, which has been developed and evaluated in a wide range of conditions, is exhibiting a good and robust performance. The success of the proposed system opens new frontiers for further research in the future. Automation of road safety is becoming a necessity for road authorities and such a system will be in use in the very near future.

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