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Traffic Sign Detection and Recognition using CNN and Keras

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Abstract-*This paper presents an summary of traffic sign detection and recognition. It describes the characteristics and requirements and also difficulties between the road sign identification and recognition of the road signs. It shows the convolutional nueral network technique used for verification and classification of the road signs. The paper introduces a traffic sign detection and recognition system that accurately estimates the situation and exact boundary of traffic signs using convolutional neural network (CNN). during this Python project, we'll build a deep neural network model which will classify traffic signs present within the image into different categories. With this model, we are ready to read and understand traffic signs which are a really important task for all autonomous vehicles.*

***Key Words*: Traffic sign detection, traffic sign recognition, convolutional neural network, classifiers.**

1. INTRODUCTION

Traffic sign detection may be a major crisis in intelligent vehicles, traffic sign recognition provides critical information like directions and alerts in autonomous driving or driver assistance systems. you all have heard about the self-driving cars during which the passenger can fully depend upon the car for traveling. But to realize level 5 autonomous, it's necessary for vehicles to know and follow all traffic rules.
In the world of AI and advancement in technologies, many researchers and large companies like Tesla, Uber, Google, Mercedes-Benz, Toyota, Ford, Audi, etc are performing on autonomous vehicles and self-driving cars. So, for achieving accuracy during this technology, the vehicles should be ready to interpret traffic signs and make decisions accordingly.

There are several differing types of traffic signs like speed limits, no entry, traffic signals, turn left or right, children crossing, no passing of heavy vehicles, etc. Traffic signs classification is that the process of identifying which class a traffic sign belongs to.

2. PROPOSED SYSTEM

In this project, we make a CNN block where predictions are directly preformed across multiple feature levels. For this project, we are using the general public dataset available at Kaggle i.e GTSRB.

Our approach to putting together this traffic sign classification model is discussed in four steps:

Step 1: Explore the dataset

Our 'train' folders contain 43 folders each representing a special class. The range of the folder is from 0,1,2, upto 42. With the assistance of the OS module, we iterate over all the classes and append images and their respective labels within the data and labels list.

Step 2: Build a CNN model

To classify the pictures into their respective categories, we'll build a CNN model (Convolutional Neural Network). CNN is best for image classification purposes.

Steps 3: Train and validate the model

After building the model architecture, we then teach the model using model.fit().

Step 4: Test our model with test dataset

Our dataset contains a test folder and during a test.csv file, we've the small print associated with the image path and their respective class labels.

Now we are getting to build a graphical interface for our traffic signs classifier with Tkinter. Tkinter is nothing but a GUI toolkit within the standard python library. Here we upload the pictures and classify the image.

3. SYSTEM ARCHITECTURE

This project we'll develop using python. We are getting to develop a model which can detect the traffic sign. We build deep neural network model which will identify

which traffic sign is present therein image. We also used PIL library to open image content into array. Our dataset contain train folder which carries folder each represents different classes and in test folder we've the small print associated with the image path and their respective class labels.

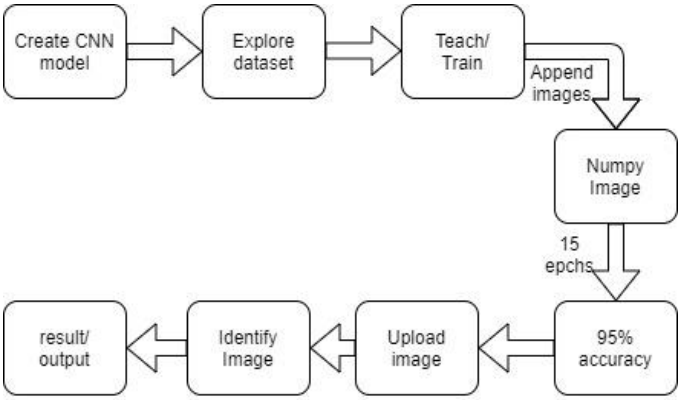


FIGURE 3.1 SYSTEM ARCHITECTURE

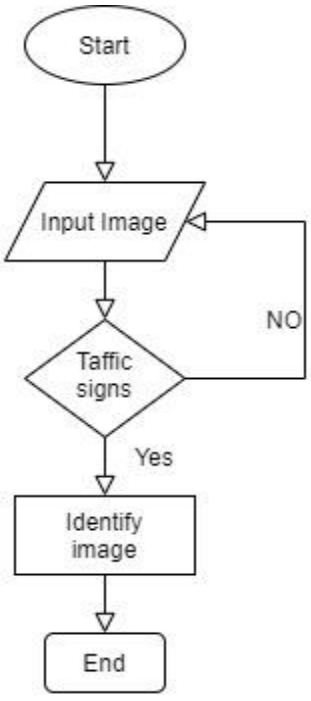
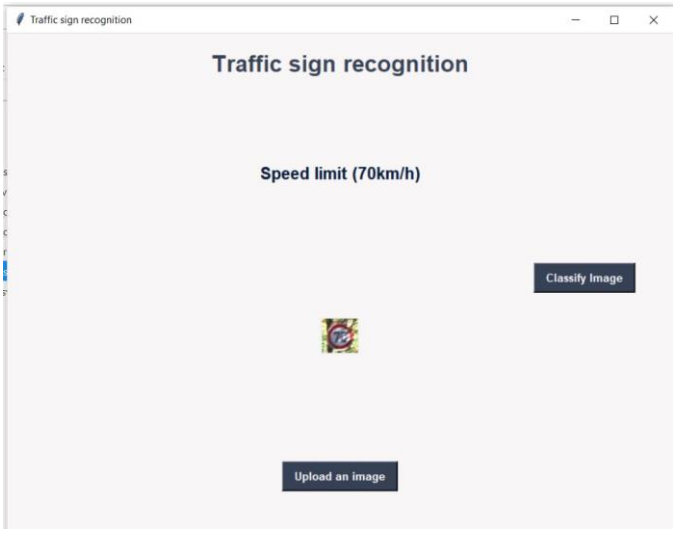


FIGURE 3.2 FLOWCHART

Convolution neural network algorithm may be a multilayer perceptron that's the special design for identification of two-dimensional image information.

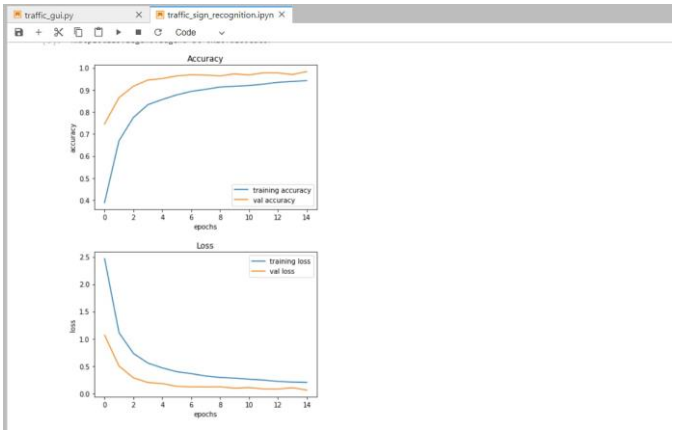
4. RESULTS

In this Python project we've successfully classified the traffic signs classifier with 95% accuracy and also visualized how our accuracy and loss changes with time, which is pretty good from an easy CNN model.



As we can see that there is speed limit sign, as soon as car detects and recognise the traffic sign, and accordingly Informs the driver about seep limit if driver is over speeding.

And above traffic sign shows that there is some work is going on road so car cannot move from that road



These are some graphical represntation of trainig accuracy and val accuracy

5. CONCLUSION

In this paper, we proposed an efficient traffic sign detection and recognition method. to the present end, we generalized the traffic sign templates with precise boundaries and high accuracy .To achieve practical detection speed, we explored the best-performing convolutional nueral network for both detection & recognition considering the characteristics of traffic signs. By using the images of traffic signs, our method effectively utilizes strong information of target shapes to the drivers.

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