**REPORT ON TRAFFIC RECONITION SYSTEM**

As a project work for Course

**ARTIFICIAL INTELLIGENCE (INT 404)**

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**Traffic Recognition System**

***Abstract: -***

You must have heard about the self-driving cars in which the passenger can fully depend on the car for traveling. But to achieve level 5 autonomous, it is necessary for vehicles to understand and follow all traffic rules.

In the world of Artificial Intelligence and advancement in technologies, many researchers and big companies like Tesla, Uber, Google, Mercedes-Benz, Toyota, Ford, Audi, etc are working on autonomous vehicles and self-driving cars. So, for achieving accuracy in this technology, the vehicles should be able to interpret traffic signs and make decisions accordingly.

***Acknowledgement: -***

I have taken efforts in this project. However, it would not have been possible without the kind support and help of many individuals and organizations. I would like to extend my sincere thanks to all of them.

I am highly indebted to Sagar Pandey Sir for their guidance and constant supervision as well as for providing necessary information regarding the project & also for their support in completing the project.

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***Introduction: -***

There are several different 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 the process of identifying which class a traffic sign belongs to.

In this Python project example, we will build a deep neural network model that can classify traffic signs present in the image into different categories. With this model, we are able to read and understand traffic signs which are a very important task for all autonomous vehicles.

***Team Members with their role: -***

**Ankit Yadav**: - I am doing this project solo so all the work is done by me.

**Proposed Approach: -**

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***Libraries: -***

**The Dataset of Python Project: -**

For this project, we are using the public dataset available at

**Kaggle**:

[Traffic Signs Dataset](https://www.kaggle.com/meowmeowmeowmeowmeow/gtsrb-german-traffic-sign)

The dataset contains more than 50,000 images of different traffic signs. It is further classified into 43 different classes. The dataset is quite varying, some of the classes have many images while some classes have few images. The size of the dataset is around 300 MB. The dataset has a train folder which contains images inside each class and a test folder which we will use for testing our model.

OpenCv:-

**OpenCV-Python** is a library of Python bindings designed to solve computer vision problems.

cv2.imread() method loads an image from the specified file

**MatplotLib: -**

Matplotlib is a plotting library for the Python programming language and its numerical mathematics extension NumPy. It provides an object-oriented API for embedding plots into applications using general-purpose GUI toolkits like Tkinter.

**numpy:-**

NumPy is the fundamental package for scientific computing with Python. It contains among other things:

* a powerful N-dimensional array object
* sophisticated (broadcasting) functions
* tools for integrating C/C++ and Fortran code
* useful linear algebra, Fourier transform, and random number capabilities

**pandas:-**

**pandas** is a [software library](https://en.wikipedia.org/wiki/Software_library) written for the [Python programming language](https://en.wikipedia.org/wiki/Python_(programming_language)) for data manipulation and analysis. In particular, it offers data structures and operations for manipulating numerical tables and [time series](https://en.wikipedia.org/wiki/Time_series).

* DataFrame object for data manipulation with integrated indexing.
* Tools for reading and writing data between in-memory data structures and different file formats.
* Data alignment and integrated handling of missing data.
* Reshaping and pivoting of data sets.

***Sample Database Images: -***

A database comprising of 200 images is created for evaluation of the proposed algorithm. The dataset consists of all variety of traffic signs like warning sign, prohibitory sign, information sign and mandatory sign. The images are captured under varying scale and illumination conditions. . Some of the traffic sign images are shown in figure

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Description automatically generated

***Accuracy Of the System: -***

The accuracy of the system as in the graph it is shown this has the accuracy of approx 95%.

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***Conclusion: -***

This paper proposes a new and effective method for both detection and recognition of traffic signs. The proposed system uses a very simple and accurate detection procedure and classifies the detected image with a accurate feature extraction algorithm along with a classifier. The proposed strategy comprises three main sections. At first the road sign image must be detected from road scene image. The RGB-based colour thresholding was used for detection. Then for extraction of features using HOG. Finally the feature vector of road sign is classified using k-NN classifier. Experimental results indicate that the proposed system is strong against non-uniform illuminations, scale and rotations. But it has some defects. For instance if there is more than one red road sign in the image, the response will not be unique. So some improvements remain as tasks for the future. Hence the proposed recognition procedure could be used also for recognition of the blue road signs and as the future task we'll improve our system to detect and recognize the road signs in complex background scenario and we will increase the number of road sign classes.

***References: -***

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