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Traffic Sign Detection

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Abstract: *Road signs are important to ensure smooth traffic flow without bottlenecks or mishaps. Road symbols are the pictorial representationshaving different necessary information required to be understood by driver. Road signs in front of the vehicle are ignored by the driversand this can lead to catastrophic accidents. This paper presents an overview of the traffic sign board detection and recognition and implements a procedure to extract the road sign from a natural complex image, processes it and alerts the driver using voice command It is implemented in such a way that it acts as a boon to drivers to make easy decisions. There are several major challenges that affectsthe detection and recognition process of traffic signs and makes it difficult for the driver to identify the signs in adverse weather conditions and darkness, these challenges and problems are highlightedin this study. Traffic signs are detected based on various features such as color, shape, and texture etc. Based on these features numerous methods exists for detection of traffic signs. We have describe a new, real-time traffic sign detection. This challenge get more difficult to meet in a city like environment where multiple traffic signs, ads,parking vehicles, pedestrians, and other moving or background objects make the recognition much more difficult.*

Keywords: Traffic Sign Detection, Recognition, Implementation, CNN Algorithm

I. INTRODUCTION

Road signs provide us number of information about the road and what you as a driver should do on road .They help to ease the flow of traffic by helping driver to reach the required location and knowing them entry, exit and turning point in advance. If the information is pre informed to the dirver can avoid mistakes wrong turns and help to prevent accidents and bottlenecks. Road signs, indicating turns, directions and landmarks, also help to save time and fuel by providing information on the route to be taken to reach a particular destination. Road signs are placed in specific areas to ensure the safety of drivers. These markers let drivers know how fast to drive. They also tell drivers when and where to turn or not to turn. In order to be a terrific driver, you need to have an understanding of what the sign mean. The ultimate goal is to create a system that can be used to catalogue traffic signs. This method can help local or national governments maintain and update their road and traffic signs by automatically recognising and categorising one or more traffic signs from a complicated image acquired by a vehicle's camera. The key approach is to identify the perfect colour combination in the scene so that one colour is inside the convex hull of another colour, and then combine that with the appropriate form. If a candidate is identified, the system attempts to categorise the item using the rim pictogram combination and returns the classification result.

II. LITERATURE SURVEY

A research paper is a document of a scientific article that contains relevant expertise, including substantive observations, and also references to a specific subject of philosophy and technique. Use-secondary references are reviewed in literature and no current or initial experimental work is published

Paper Name: A Traffic Sign Detection Algorithm Based on Deep Convolutional Neural Network
Author: Xiong Changzhen, Wang Cong, Ma Weixin, Shan Yanmei
Abstract: Traffic sign detection plays an important role in driving assistance sys- tems and traffic safety. But the existing detection methods are usually limited to a predefined set of traffic signs. Therefore we propose a traffic sign detection algo- rithm based on deep Convolutional Neural Network (CNN) using Region Proposal Network (RPN) to detect all Chinese traffic sign. Firstly, a Chinese traffic sign dataset is obtained by collecting seven main categories of traffic signs and their

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subclasses. Then a traffic sign detection CNN model is trained and evaluated by fine-tuning tech- nology using the collected dataset. Finally, the model is tested by 33 video sequences with the size of 640×480. The result shows that the proposed method has towards real-time detection speed and above 99detection precision. The trained model can be used to capture the traffic sign from videos by on-board camera or driving recorder and construct a complete traffic sign dataset.

Paper Name: A Traffic signs' Detection Method of Contour Approximation based on Concave Removal
Author: Xu Zhe, Ren Jingyi, Bao Chaoqian.
Abstract: In this paper, a simple and efficient algorithm for detecting deformed and occlusion triangular and circular traffic signs under complex natural scenes is pro- posed. Firstly, the image is segmented and binarized. Then the convex hull of every contour extracted from the binarized image is calculated. Some concave part of a contour is removed and is replaced by the corresponding convex edge of the convex hull. After that, the contour is approximated to a polygon. Finally, Those contours which can be succeed to approximated to a triangle is the triangular traffic signs, and other contours approximation which can be approximated to a ellipse with random least squares fitting is the circular traffic signs. The experimental results shows the detection rate reaches 86.79%, this algorithm can handle the adverse influence of traffic signs' deformation, occlusion better than tough method. It has better real- time performance and lower error detection rate than template method.

Paper Name: Using Mobile Lidar Point Clouds for Traffic Sign Detection And Sign Visibility Estimation
Author: Shuang Wu, Chenglu Wen, Huan Luo
Description: This paper presents a novel method for traffic sign detection and visibility evaluation from mobile Light Detection and Ranging (LiDAR) point clouds and the corresponding images. Our algorithm involves two steps. Firstly, a detection algorithm based on high retro-reflectivity of the traffic sign from the MLS point clouds is designed for sign detection in complicated road scenes. To solve the spa- tial features of traffic signs, we also create geo-referenced relations between traffic signs and roads according to the normal of ground. Secondly, we propose a visibility estimation method to evaluate the visibility level of the traffic sign based on a com- bination of visual appearance and spatial-related features.

Paper Name: Automatic Detection and Classification Of Traf- Fic Signs
Author Name: Carlos Filipe Paulo, Paulo Lobato Correia
Description: This paper proposes algorithms for the automatic detection of traffic signs from photo or video images and their classification to provide a driver alert system. Several examples taken from Portuguese roads are used to demonstrate the effectiveness of the proposed system. Traffic signs are detected by analyzing color information, notably red and blue, contained on the images. The detected signs are then classified according to their shape characteristics, as triangular, squared and circular shapes. Combining color and shape information, traffic signs are classified into one of the following classes: danger, information, obligation or prohibition. Both the detection and classification algorithms include innovative components to improve the overall system performance

III. System Architecture

1. The DFD is also called as bubble chart. It is a simple graphical formalism that can be used to represent a system in terms of input data to the system, various processing carried out on this data, and the output data is generated by this system.
2. The data flow diagram (DFD) is one of the most important modeling tools. It is used to model the system components. These components are the system process, the data used by the process, an external entity that interacts with the system and the information flows in the system.
3. DFD shows how the information moves through the system and how it is modified by a series of transformations. It is a graphical technique that depicts information flow and the transformations that are applied as data moves from input to output.
4. DFD is also known as bubble chart. A DFD may be used to represent a system at any level of abstraction. DFD may be partitioned into levels that represent increasing information flow and functional detail.

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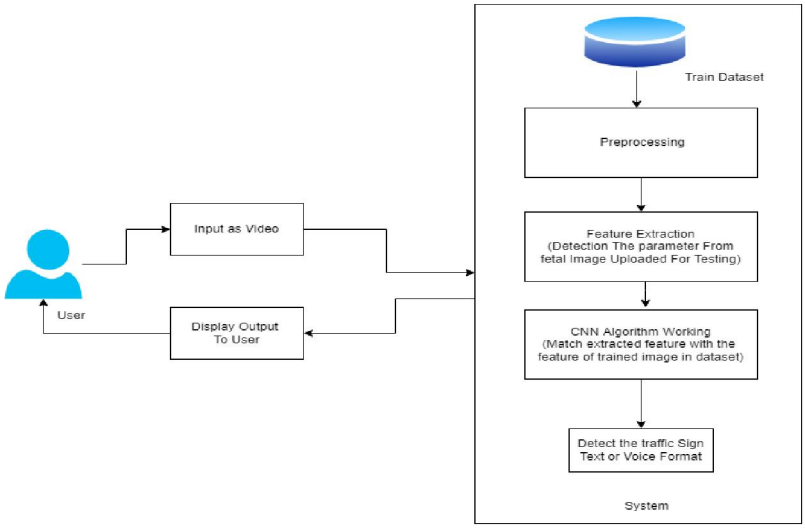
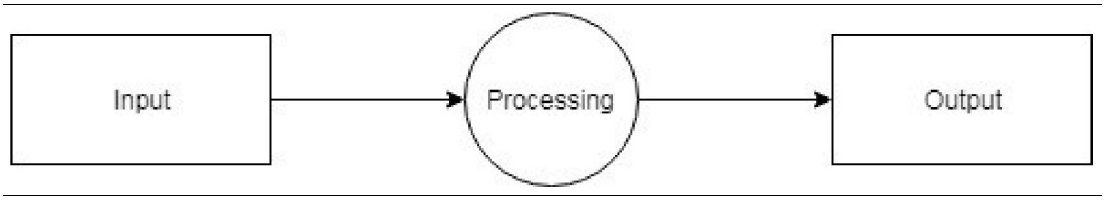
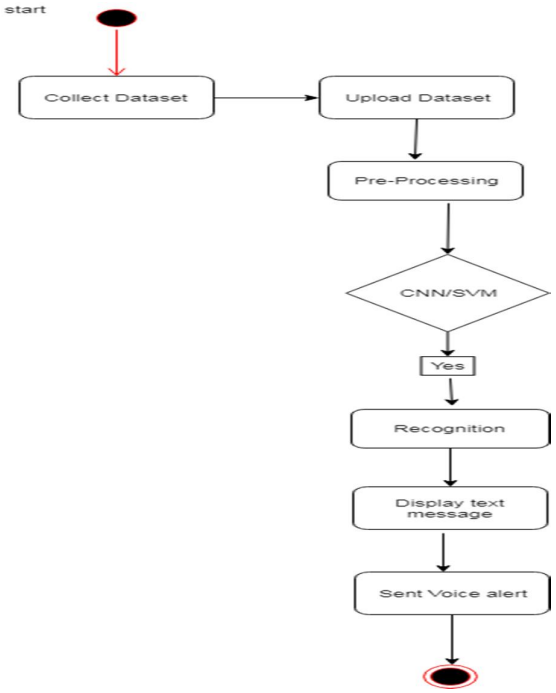


3.1 Data Flow Diagram



3.2 Activity Diagram

Activity diagrams are graphical representations of workflows of stepwise activities and actions with support for choice, iteration and concurrency. In the Unified Modeling Language, activity diagrams can be used to describe the business and operational step- by-step workflows of components in a system. An activity diagram shows the overall flow of control.



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3.3 CNN Algorithm

A Convolutional Neural Network (ConvNet /CNN) is a Deep Learning system that can take in an image, assign importance (learnable weights and biases) to distinct aspects/objects in the image, and distinguish one from the other. When compared to other classification methods, the amount of pre-processing required by a ConvNet is significantly less. While filters in primitive approaches are hand-engineered, ConvNets can learn these filters/characteristics with adequate training. A ConvNet's design is similar to the connecting pattern of neurons in the human brain and was inspired by the arrangement of the Visual Cortex. Individual neurons only respond to stimuli in a narrow section of the visual field known as the Receptive Field. A group of similar fields will encompass the full visual region if they overlap.

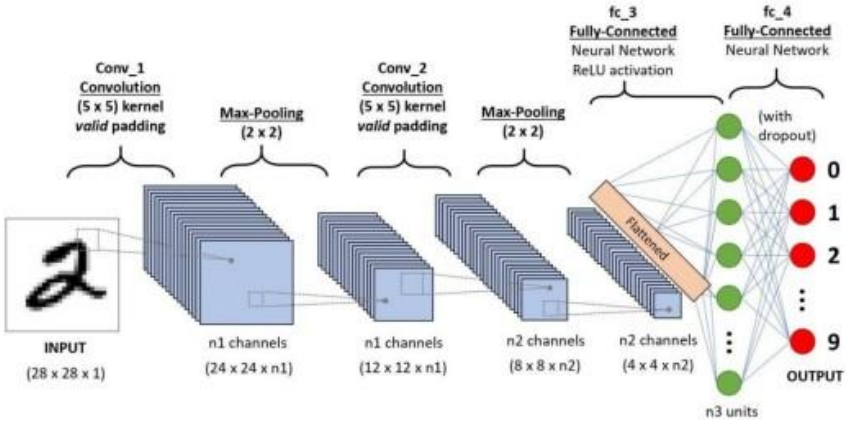
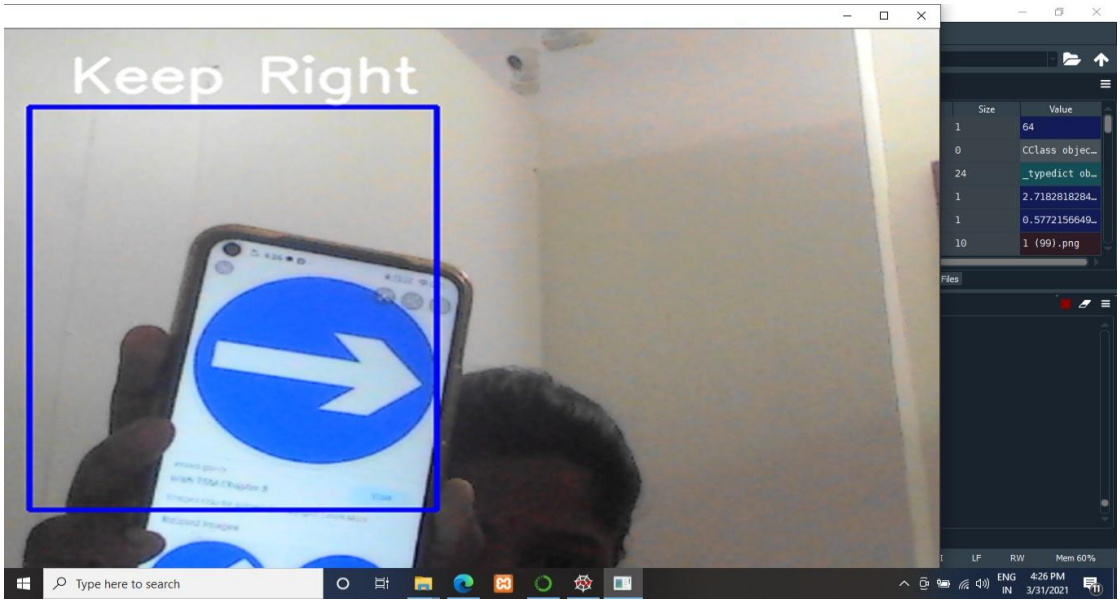


Figure: CNN Diagram

IV. RESULT

1 When we give the input image of TRAFFIC SYMBOL, it successfully detects the helmet and shows the confidence score and also it prints "Keep right!" on the console.



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2 When we give the input image of traffic symbol, it successfully detects the image and shows the result and also it prints- “50km” on the console.

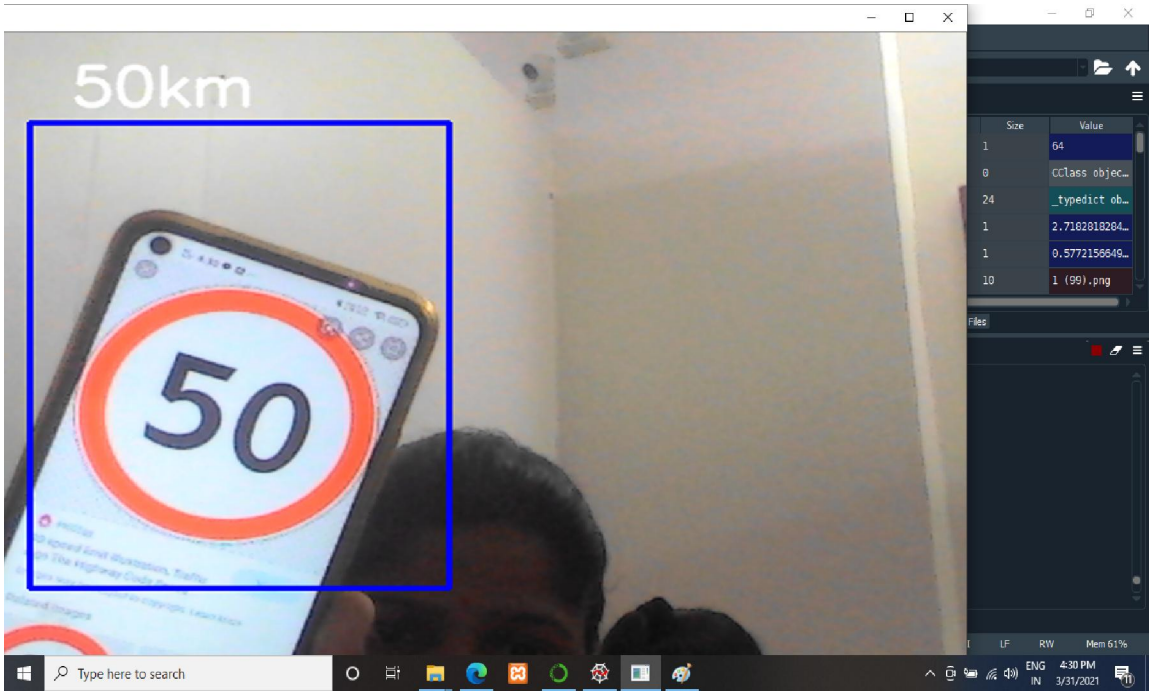

Figure 1: A sample line graph using colors which contrast well both on screen and on a black-and-white hardcopy

V. Conclusion

It conclude that a smart driver alert system which detects and recognizes traffic signboard from video stream input and gives voice message to the driver. By using this technology it can reduce the road accidents as well as regulate traffic safely. A system that is able to detect and classify a set of 28 traffic signs in different environments. The results are moderate and it can be improved by testing different neural network structures. As a neural network is often called a black box, there is no guarantee that it will perform best with the defined set. Real-time detection and recognition can also be implemented in the future

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