A SMART DRIVER ALERT SYSTEM

[1]Divya B, [2] Bhagyavathi V, [3] Theertha D, [4] Vidhya K, [5]
[1,2,3,4] Undergraduate student, Computer Science Engineering, K S Institute of Technology,
[5]Deepa S R,
[5]Associate Professor, Department of CSE, K S Institute of Technology

Abstract: - Road traffic constitutes a major part in the problem of society. As the road traffic is increasing day by day there is a necessity of following the traffic rules with proper discipline. Traffic rules consists of traffic sign boards and traffic signals which are meant to be followed by everyone in the society. To provide a comprehensive assistance to the driver for following the traffic signs, we are representing Traffic sign detection and driver alert system .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. The camera used is installed on the vehicle. Traffic signs are detected by examining the colour using the colour space. Our methodology of implementation used for segmentation and recognition of the red object sign boards obtained as a live video image as per algorithm.

Indexed Terms -MATLAB R2018a, Image processing..

I. INTRODUCTION

In traffic environments, India records a huge number of accidents in the world. In this situation, an automatic system used to detect and recognize traffic signs, mounted on vehicles, would help a lot. Many of them are avoidable, especially those which are caused by missing the traffic sign boards. Automatic traffic sign detection and recognition plays a crucial role in building an autonomous system .A fast real-time and automatic traffic sign detection and recognition can support and disburden the driver, and thus, significantly increase driving safety and comfort. 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. 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.

II. RELATED WORK

In Existing work this approach is used in many fields like counting the number of objects and counting the vehicles and observing the traffic and detecting particular objects using blob analysis. But the proposed system going to detect and classify sign boards which will not done before. So this can extend various other poses. At present, there are lots of applications in the system of traffic surveillance and video monitoring Optimization for surveillance system generally aims at improving system efficiency and seeks for good performance with less resource. Live video process in surveillance systems leads to study on image processing methods. Researchers improve algorithms to achieve good performance. However, most of them aim at video processing and separating from concrete surveillance application. When working, video based traffic surveillance system will get live video data, transmit data, and conduct processing and return result. We will mainly concentrate on the steps involving in data processing and complex computing which will affect system performance immensely, consisting of greying, banalization, demonising and moving object

detection. Foreground object detection is the main thing of most video surveillance systems. Foreground object detection is mainly used for detecting objects of meaningful information in a video sequence not everything we want to be detected as foreground.

III. SYSTEM DESIGN

The following block diagram of the system is given below

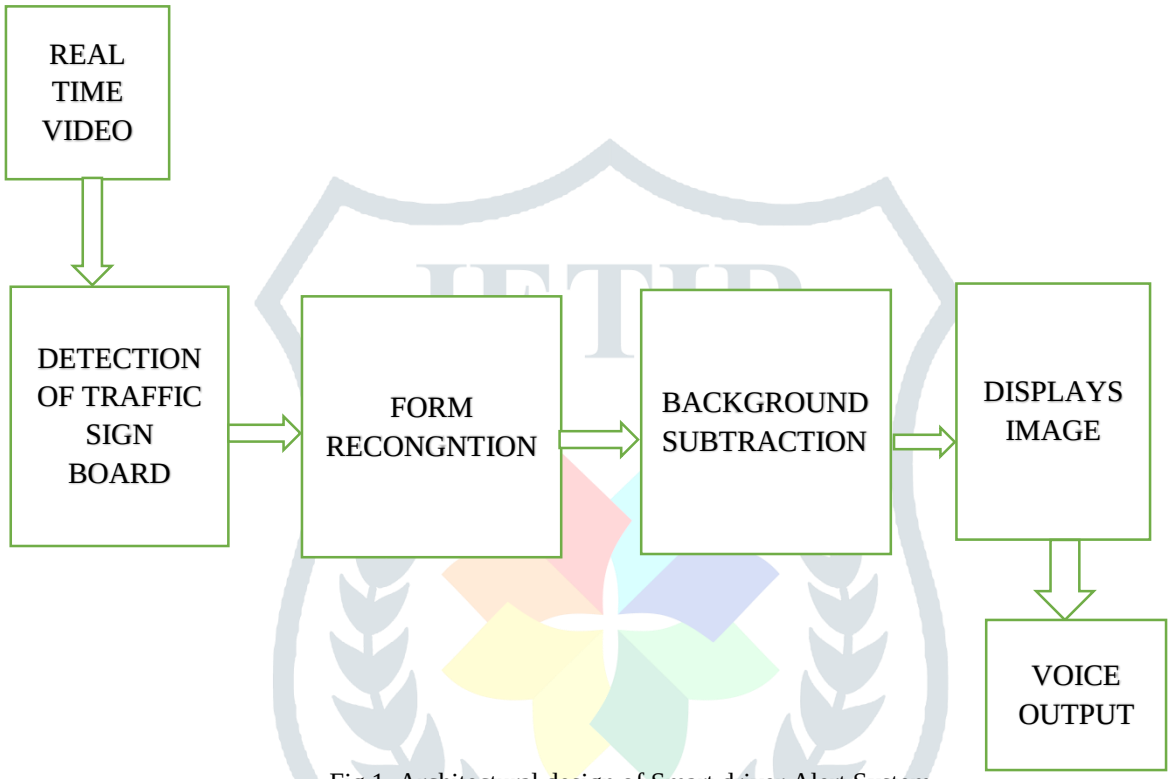

Fig 1. Architectural design of Smart driver Alert System.

Here we give live video as an input to the system, which is processed by image processing technique to detect and recognize the signboard. The Sign Detection Stage extracts all the traffic signs contained in each image and generates the small images called blobs. Each blob will be performed by Form Recognition Stage to be valuable parameters. Background subtraction is a widely used approach for detecting moving objects in a video. The frame considered is converted to binary image with color threshold (R, G, B) =(255, 0, 0) hence the red objects are highlighted and the frame considered is differentiated into foreground and background image by Adaptive background subtraction technique**.** The recognized signboard is displayed along with the predefined voice output.

IV. DATAFLOW DIAGRAM

Fig 2.Dataflow Diagram

V. PROPOSED PARADIGM

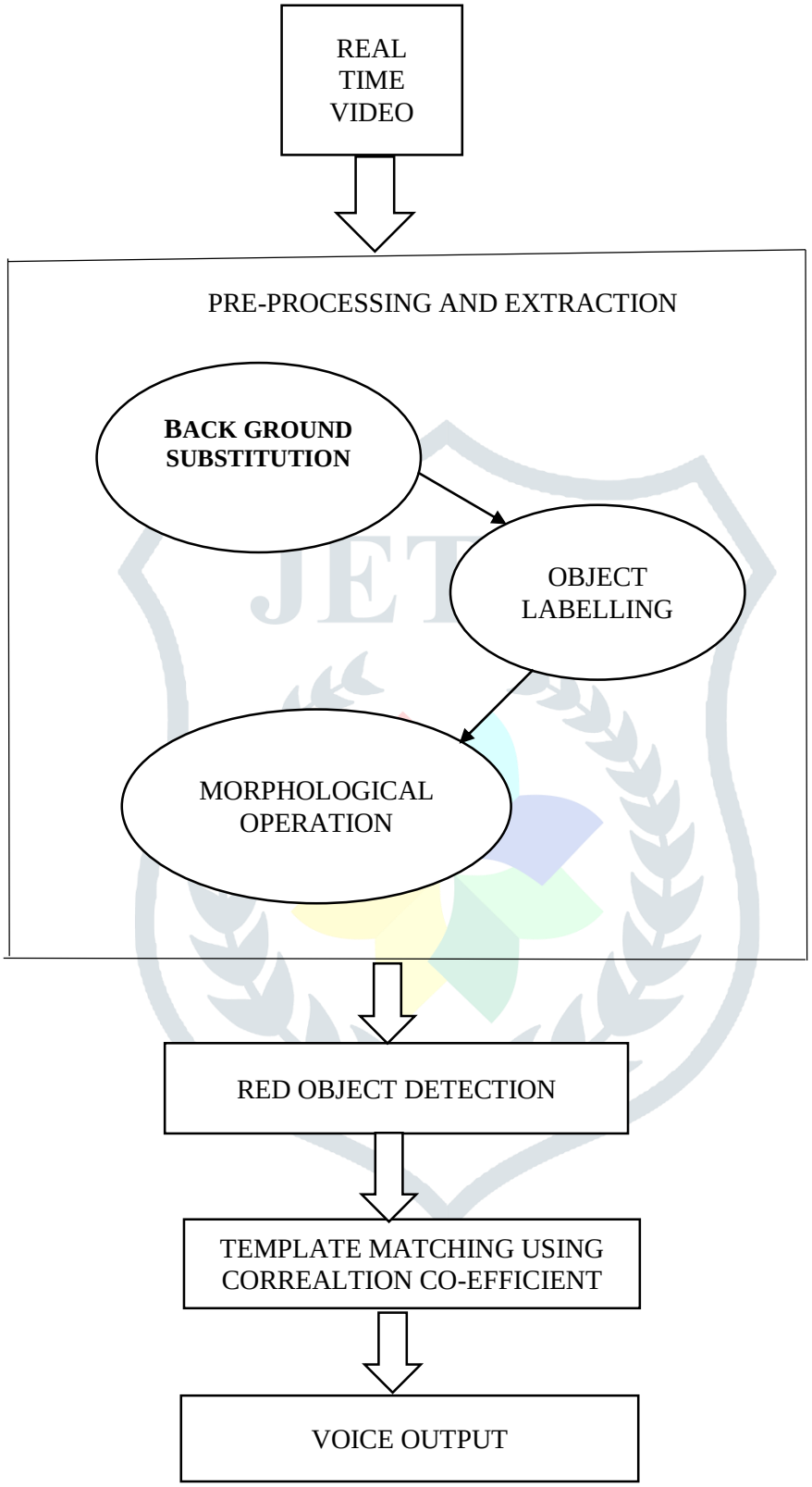

Fig 3. Architecture of the system

Here we propose a system in which the road sign board is detected and recognized, the input video consists of frames and each frame is analysed and background subtraction technique is applied wherein an images' foreground is extracted for further processing. Objects in foreground are identified and the object with the

red pixels are considered as red objects. The red objects are classified based on shape using Hough Transform and using correlation co-efficient technique the recognition of the sign board is done by template matching with standard images of dataset present in the database. After recognition of sign board, the driver is alerted with the voice message.

VI IMPLEMENTATION

The implementation of the proposed system consists of following modules:

Module I – Real time video Acquisition and Data Collection

In this module, we collect different sign board images and define it as a standard dataset. On the other hand, we give real time video consists of sign boards as an input to the system.

Module II – Division of Frames

The real time video is made of sequence of frames and the input live video given to the system is divided into number of frames and each frame is considered for detection.

Module III –Background Subtraction

Background subtraction is a widely used approach for detecting moving objects in live video. The frame considered is converted to binary image with color threshold (R, G, B) = (255, 0, 0) hence the red objects are highlighted and the frame considered is differentiated into foreground and background image by Adaptive background subtraction technique[6].

Module IV – Morphological operations

The different morphological operations are applied on the objects that are present in the frame considered. Common image processing tasks namely noise removal, thinning, contrast enhancement are applied. To improve the quality of the image we apply the following operations such as, Dilation, Erosion, Opening and Closing. The background is subtracted and the imperfections present in the image are removed [7].

Module V – Red Object Extraction

Once the background image is subtracted, different objects are identified. Objects with pixel which has the value (255, 0, 0) are considered to be the red objects and using the Hough transform algorithm, the objects are differentiated based on the shape. The objects with hexagonal, triangular and circular in shape are considered and resized for template matching [8].

Module VI – Template Matching

In template matching the comparison of the resized image with standard dataset available in the database. The
comparison of two images is done based on correlation coefficient algorithm. The quantitative measure of degree of association of two distinct variables is often coined as correlation coefficient which ranges from -1 to 1. The Correlation coefficient = $\rho_{A,B} = \frac{conAB}{StdA * StdB}$

Procedural steps
a. Convert the images A and B into matrices.
b. Find average or mean of the matrix A and B i.e meanA
and meanB.
c. Subtract mean value from the matrix A and B respectively
which gives Asub and Bsub.
d. Find covariance of A and B by using the below formula
covAB = average of (Asub*Bsub).
e. Find standard deviation of A and B, stdA and stdB.

f. Find the correlation coefficient.
If the correlation coefficient of A and B is closer to 1, then they are highly correlated [9].

Module VII –Voice Alert
The recognized signboard is displayed along with the predefined voice output.

VII RESULT

The frame which consists of the traffic sign board is detected and processed whereas other frames without the traffic sign boards are discarded.

The sample frame which consists of traffic sign board is as shown in the above figure 3. And the frame is converted to binary image and morphological operations are performed as shown in the below figure.Using Background subtraction foreground is extracted from the frame, the frame consists of objects, the object with red pixels is detected as red objects. Using Hough Transform the objects are classified based on shape and compared with the standard data set in the database using template matching.

Binary Image

The comparison of two images is done based on correlation coefficient technique. The alert message, as voice output to the driver is given to avoid the further fatalities or catastrophes.

In this paper, we propose a smart driver alert system which detects and recognizes traffic signboard from video stream input and gives voice message to the driver. We are using template matching for recognition of the sign board that uses correlation coefficient algorithm to compare two images and find a match. The proposed approach can be used in automatic vehicles, all kinds of vehicles to automate the process and to reduce road accidents.

VIII. ACKNOWLEDGEMENT

The successful project execution would have not been possible without the people who made it possible and whose constant guidance crowned our effort with success. We take this opportunity to express our sincere gratitude to Management K S Institute of Technology, Bengaluru. We would like to express our gratitude to Dr. K.V.A. Balaji C.E.O. K.S. Institute of Technology, Bengaluru, for facilitating us to build and present the project. We would like to extend our gratitude to Dr.T.V.Govindaraju, Principal/Director, K.S. Institute of Technology, Bengaluru, for providing opportunity to publish this paper.

We thank Dr. Rekha.B.Venkatapur, Professor and Head, Department of Computer Science and Engineering, K.S. Institute of Technology, Bengaluru, for her encouragement.

We would also like to thank, Mr. K. Venkata Rao, Associate Professor, Department of Computer Science and Engineering, K.S. Institute of Technology, Bengaluru, for his constant guidance and inputs.

We wholeheartedly thank our project mentor Mrs. Deepa S R, Associate Prof., Department of Computer Science and Engineering, K.S. Institute of Technology, Bengaluru, for her support and guidance.

Finally, we would like to thank all the teaching and non-teaching staff of the college for their cooperation.

Moreover, I thank all my family and friends for their invaluable support and cooperation.

IX. CONCLUSION

Detecting sign board through a machine is a good achievement in a modern era of computer world. This application is really working in many fields. So far object classification is done for vehicles and counting objects, humans only. It can extend to various other poses. In this system, we implement a fast and precise real-time blob detection algorithm for traffic surveillance. 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. The camera used is installed on the vehicle. Traffic signs are detected by examining the colour using the colour space. Our methodology of implementation used for segmentation and recognition of the red object sign boards obtained as a live video image as per algorithm

X. REFERENCES

[1] Garcia,Sotelo and Gorostiza,"Fast Traffic Sign Detection and Recognition Under Changing Lighting Conditions",2006.
[2] Sallah,Hussin and Yusoff ,"Road Sign Detection and Recognition System for Real-Time Embedded Applications" ,2011.
[3] Truong Quang Vinh, "Real-Time Traffic Sign Detection and Recognition System Based on FriendlyARM Tiny4412 Board", IEEE,2015.
[4] Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing", Third Edition, - Pearson Education, pp. 864-874.
[5] Andreas Møgelmose, Mohan M. Trivedi, and Thomas B. Moeslund: "Traffic Sign Detection and Analysis: Recent Studies and Emerging Trends", In 15th International IEEE Conference on Intelligent Transportation Systems Anchorage, Alaska, USA, September 16-19, 2012.
[6] Carlos Filipe Paulo, Paulo Lobato Correia: "Automatic Detection and Classification of Traffic Signs. In IEEE Image Analysis for Multimedia Interactive Services", 2007. WIAMIS '07. Eighth International Workshop on, 6-8 June 2007.
[7] Miguel A´ ngel Garc´ıa-Garrido, Miguel A´ ngel Sotelo and Ernesto Mart´ın-Gorostiza, "Fast Traffic Sign Detection and Recognition Under Changing Lighting Conditions", 2006 IEEE Intelligent Transportation Systems Conference, Toronto, Canada, September 17-20, 2006.
[8] Kiran C. G., Lekhesh V. Prabhu, Abdu Rahiman V. and Rajeev K.:"Traffic Sign Detection and Pattern Recognition Using Support Vector Machine", IEEE Seventh International Conference on Advances in Pattern Recognition, Dec 2009.
[9] Siti Sarah Md Sallah, Fawnizu Azmadi Hussin, and Mohd Zuki Yusoff, "Road Sign Detection and Recognition System for Real-Time Embedded Applications", International Conference on Electrical, Control.