Road Sign Boards Detection & Recognition with Distance Calculation Alert system

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Abstract

Road Traffic and over speeding is a major problem which is increasing day by day which causes accidents. It occurs due to the negligence of traffic rules and sign boards located on the roads and highways. There are some traffic rules that must be followed. The highest death rate is caused by road accidents each year in Pakistan. This paper proposed highway sign board detection and alert system for following traffic rules and for safety. This system works though image processing and computer vision techniques i.e. SURF algorithm using MATLAB which detects sign boards on roads having different properties like color, shape, size etc. but one more thing which the uniqueness of our system is ultrasonic sensors which are attached to the system for measurement distances that at on how much distance the sign board is located. This system tells us what the sign is saying in both English and Urdu Language what the driver should do through LCD and speaker.

Key words:

Image processing, Computer Vision, SURF Algorithm MATLAB, Ultrasonic Sensors, LCD

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1. Introductions

Accidents are mostly caused by road traffic nowadays. According to World Health Organization report 1.25 million deaths caused every year by road traffic. Asia has the large number of accidents per year because of avoiding traffic rules and signals. Millions of people lose their lives each year due to road accidents.

Road sign board detection and alert system with distance calculation alert system ca detect and recognize sign boards located on highways and roads.it instruct driver according to the given sign boards and at specific distance. This system is complete independent system which can sense, know and suppose the traffic signs would be an extraordinary assistance to the driver. Then it will decrease the driver's work of learning and considerate the traffic signs, this will also decrease the number of accidents happening on the road. Hereafter, all the traffic signs will be observed. There is also a chance that items of alike color mixture seems in the image alike to a traffic sign. Though noticing the traffic signs, the scheme come across many circumstances. Then it meets numerous difficulties due to weather conditions while noticing the traffic signs. The different weather conditions which affects the discovery of traffic signs badly are: Rain, Low intensity of light, Fog, Smog. Scratched traffic sign boards also create a problem in the finding and acknowledgement of traffic signs. Our goal is to put onward a method which can be used to notice and identify traffic signs in actual time.

Automatic traffic sign detection and recognition plays an important role. A method is adopted to detect the traffic panels and to recognize the information contained in the panels. Ones the information is recognize it is announced through speakers to warn the driver about the sign board. It will reduce the driver work of recognizing and detecting the traffic sign boards and hence reduce the number of road accidents that are mainly caused by missing the sign boards. In this manner all the sign boards will be noticed.

2. Materials and methods

1)   In this paper Michael Shneier, Road sign detection and recognition method for autonomous vehicle on the roads for obeying the rules as other vehicle does. In this paper the process is only for two types of sign on roads, one is warning signs and other are regulatory signs. Different techniques were used for detecting signs, different filters were applied. In this image processing techniques are applied. But this method does not work accurate for white signs with black background. This method is tested on number of warning signs. In this recognition is attained by template matching. This method used is performed on real time video. In this method some sign can be detect and recognize. Camera is mounted on top of vehicle to detect and recognize sign easily. So, at normal speed they get number of frames and different type of warning sign located on roads. In this few signs were missed. This method is tested in different seasons as in spring they tested this method on sign board which have color flowers in background related to the sign board color but in recognition step all these false recognitions were rejected. The consequence for the additional detections is that the recognition method must be run separately. This decelerates down the whole processing, while the algorithm still goes at over 20 frames/second on Intel Pentium mobile.

2)   Karla Brkic, Department of Electronics, Microelectronics, Computer and Intelligent Systems In paper, they have shown traffic sign detection methods mostly used as building blocks of detection

systems detection systems. Different methods were used which were divided into color based, shape based and learning based techniques. They have presented that in what way the sketched methods are used in two traffic sign detection systems. They contemplate that the complication of the sign detections system will weaken in the future because of rapidly growing of technology, due to quality sensors will be available in market on cheap prices and will be available in huge amount. However, the innovation will perhaps continue gradually, because of the tenacious need to minimalize manufacture expenses.

3)   (Aparna A. Dalve) and (Sankirti S.Shiravale), department of computer science, Pune, India: Their research work is also being conducted on this issue, because of its enormous potential in practical traffic control system applications. They did it through OCR technology in which images from scanned page to camera captured, focusing on basic preprocessing and detection. In their project computer vision technology is also used. The reason is to integrate the detection and recognition tasks into an end-to-end text recognition system because most of the research exists on the detection and recognition of text in natural scenes. According to their view approaches to this problem can be broadly divided into two Parts:

a.   Region-based methods
b.   Connected component (CC) - based methods

Region-based text detection methods use local features, such as texture, to locate text regions whereas CC-based methods attempt to segment text characters individually by using information such as intensity, color distribution, and edges.

1. **Results and discussion**

The main purpose for developing this project is to avoid accidents and to follow rules. The accidents are mostly caused by road traffic and over speeding. This project will help in avoiding these types of disasters by detect and recognize sign, alarming the driver at specific distance to do what sign is saying sign like pedestrian walk, left turn etc. This project will provide great assistance to drivers. Many systems related to these problems were created but innovation in our project is measurement of distance of sign board according to vehicle through which driver will know about sign. Traffic rules will be obeyed and then there will be lesser accidents.
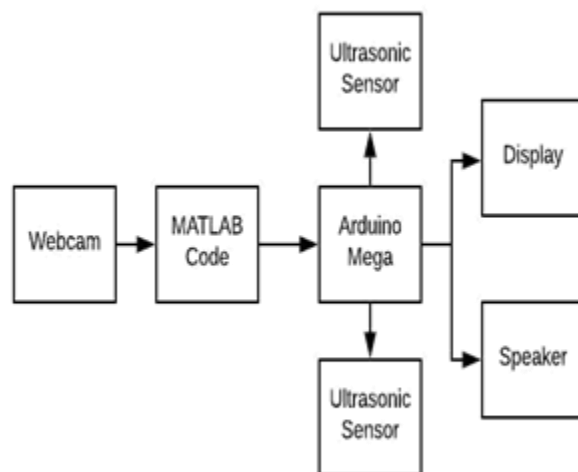
This system is proposed for avoiding accidents and to obey rules. Webcam is placed in front of motor car for capturing real time image and helps in detecting image of sign boards on roads

through MATLAB Code by using image processing and computer vision technique which is known as SURF algorithm (Speeded Up Robust Features) and different filters because SURF algorithm shows most accurate result of object detection and recognition. Surf algorithm is collected of feature extraction, feature description and feature matching. Surf uses square shape filters as a calculation of Gaussian smoothing for reducing image noise and details.

The sum of the original image inside a rectangle can be calculated quickly using the integral image.

$$S(x,y) = \sum_{i=0}^{x} \sum_{j=0}^{y} I(i,j)$$

Surf also customs the blob detector centered on Hessian matrix.

$$H(p,\sigma) = \begin{pmatrix} L_{xx}(p,\sigma) & L_{xy}(p,\sigma) \\ L_{yx}(p,\sigma) & L_{yy}(p,\sigma) \end{pmatrix}$$

Then Arduino mega is connected through USB TTL Serial cable for connectivity with interface in MATLAB. Ultrasonic sensors are connected to Arduino which calculate the distance between vehicle and sign board and then with Text to speech command it tell us what sign is saying through speaker and through LCD it show us that at what distance the sign board is located and show what the sign board is saying and what should do to follow it in both English and Urdu language to understand for users in Pakistan.
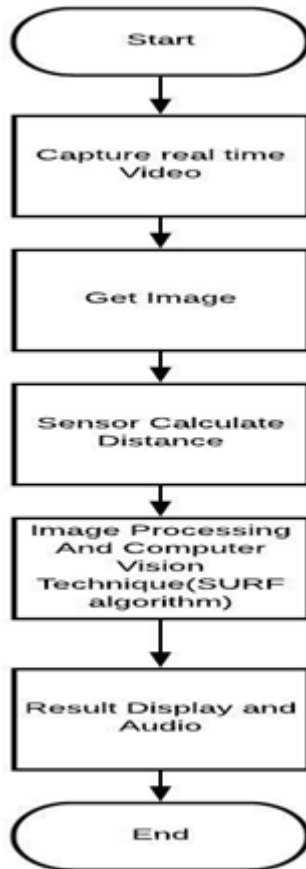
Figure: 2 Flowchart of the system

Through MATLAB code the system detects the whole object through applying different filters

2. Conclusion

Many people died due to not following traffic rules. This system is committed to save lives of people and to help in obeying traffic rules because if traffic rules are obeyed then there will be less chances of road accidents and traffic rule violation. This system is easy to understand. Beside this people will get knowledge about the sign boards on roads and highways. And through following them they will be safe and rule obeying people of society.

5. Acknowledgements

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