

Ai Enabled Blind Spot Detection Using Rcnm Based Image Processing

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Abstract: Due to the rapid increase in the rate of road accidents and traffic density, modern automobiles are equipped with intelligent systems like Adaptive cruise control and Lane Departure Warning System. Therear-view mirror can be effective to observe a limited range only and there are zones that cannot be viewed. This region is referred to as the blind spot. Therefore, we present a method to detect the vehicles from the side and the rear for Blind Spot Detection with vision system incorporating RCNN. Blind spot detection is a key technology among driver aids that provides 360 degrees of electronic coverage around the car during motion. The methodology presented in this paper uses two stereo cameras as input devices which constantly capture the images at the blind spot area and the information is passed to the main controlling unit. Potholes are also detected and the alert is sent to the nearby vehicle. The incorporation of Artificial Intelligence would help in enhancing the picture quality and blur or cancel the background images probable of misreading the target image. RCNN is used for the vehicle detection and for evaluating the relative distance between the vehicles. This technology allows us to provide a realistic environment for commercial vehicle drivers as they can't monitor the side and rear-view mirrors all the time, making the whole driving experience more comfortable.

Keywords-Blind spot, RCNN, Potholes, Artificial Intelligence

I. INTRODUCTION

ADAS

Advanced driver-assistance systems (ADAS) are systems designed to assist the user in the driving process. It provides an intelligent human-machine interface, thereby increasing car safety. This system will contribute in reducing human errors. ADAS technology can help in detecting and classifying objects, alerting the driver of risky road conditions and, in some cases, slow down or stop the vehicle. ADAS is useful for applications like blind spot monitoring, lane-keep assistance and forward collision warning.

ADAS systems range on the spectrum of active or passive. A passive system alerts the driver of a potentially dangerous situation such that he corrects it. For example, Lane Departure Warning (LDW) alerts the driver of unintended lane departure. Forward Collision Warning (FCW) detects the collision underexisting circumstance and alerts the driver to apply brakes in order to avoid the collision. On the other hand, active safety systems take

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action automatically. Automatic Emergency Braking (AEB) detects collision and brakes without any driver intervention.

II. BLIND SPOT DETECTION

A blindspot in a vehicle can be defined as an area around the vehicle that cannot be directly observed by the driver while under control. Blind spot detection system consists of two cameras mounted on either aspect of side-view mirrors which is kept at an angle that the side mirrors cannot cover. If the driver under control doesn't notice the presence of these vehicles, it may lead to abrupt lane changing resulting in accidents. Therefore, we employ Region based Convolutional Neural Network (RCNN), a deep learning algorithm to detect and classify the vehicles by comparing with the image database.

III. POTHOLE DETECTION

Potholes are hollows in a road surface caused by wear or subsidence. These potholes are detected and the information is conveyed to the slave device via UART serial communication using ZigBee module.

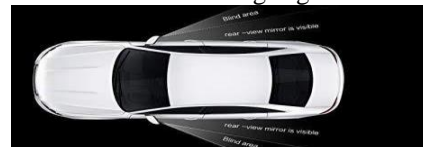


Fig 1 BLIND SPOT IN VEHICLES

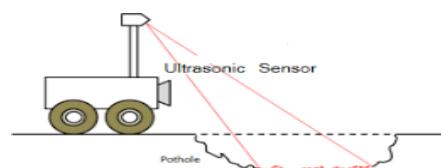


Fig 2 : POTHOLE DETECTION

IV. EXISTING METHOD

A typical blind spot observance system needs an electronic detection device mounted on the perimeters of the automotive (often within the neighborhood of the external rear read mirrors or close to the rear bumpers) that generates electronic magnetism waves. Optical sensors analyze the particular flow of traffic to spot any

objects within the blind spot of the vehicle.

Software based Blind spot detection systems include multiple target capability, open road testing, video integration, BSD warning, free analysis software and multiple contact points.

A special convexo-concave mirror can be placed at the corner of the available car mirror. But the disadvantage of this method is that the driver has to keep looking at the mirrors and have frequent distractions from the road.

Through this process we are able to stop the accident before it occurs. The ultrasonic sensor is used to detect the pothole and indicate it to the user on LCD and the information is shared to the nearby vehicles.

V. PROPOSED SYSTEM

In the proposed system, cameras are placed on both sides of the mirror to capture images of the vehicles which are not under the range of side view mirrors. This is transferred to

RCNN ALGORITHM

Fig 3: RCNN

MATLAB for image processing. In MATLAB, the captured image will be pre-processed, and it will identify the vehicle and its position using RCNN. All the processing done by the MATLAB will be updated on the microcontroller (Arduino). This will ensure the user to identify the side from which the vehicle is approaching. The real time video feed of the blind spot area with the necessary information about the vehicle is displayed on an LCD display.

Another aspect is to check for potholes and an alert message is given to the nearby vehicle through the ZigBee module.

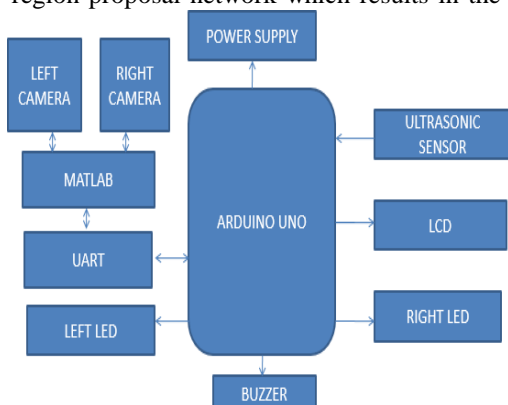
Instead of analyzing a large number of regions, the RCNN algorithm proposes a bunch of boxes in the image and checks if any of these boxes contain the objects to be detected via selective search.

The regions that form an object are varying scales, colors, textures, and enclosure. Selective search identifies the patterns in the image and proposes various regions.

It will then combine the similar regions to form a larger region. Finally, these regions then produce the final object locations consisting of the Region of Interest.

As this is slow, we employ fast RCNN which uses a single model to extract the features from the different regions, divides them into appropriate classes, and returns the boundary boxes for the identified classes simultaneously.

Fast RCNN replaces the selective search method with region proposal network which results in the much faster



algorithm. The input image resolutions are high when compared to other algorithms. The time cost of generating region proposals or prediction is very low. Data augmentation is an added advantage to enhance the training of convolutional neural networks.

VI. CONCLUSION

This paper has given an idea for vehicle detection and classification at the blind spot region using a deep learning algorithm (RCNN). It also provides the distance details between the host vehicle and object detected such that the user can take appropriate decisions such as lane departure warning, rear and front parking sonar, the rear traffic alert and parking. Blind spot detection depends on the angle at which we set the camera at the side mirror. The angle should be such that it covers the area not covered by the side mirrors. We've taken an implemented when a video is given as input and when a real time object is placed. It is one of mitigate possible road accidents in the near future which may result in loss of life and property.

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