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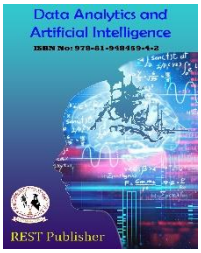

Ambulance Blocking Vehicles Identification By Artificial Intelligence

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Abstract: *In the emerging world, traffic violations havebecome a central problem in most developing countries. The number of vehicles is increasing rapidly, just as the number of traffic violations is increasing exponentially. Although the traffic management process has become automated, it is a very challenging problem due to the variety of plate formats, different scales, rotations and non-uniform lighting conditions during image acquisition. Increased vehicular traffic has also increase in traffic and road accidents often occur, causing loss of lifeand property due to poor emergency equipment. Due to heavy traffic, emergency vehicles such as ambulances are unable to reach their destination on time, resulting in loss of life. This project will provide an optimal solution to this drawback. If any other vehicles are blocking the ambulance, the vehicle is first identified for its type using the Yolo v4 algorithm, whether it is a car, truck or any other vehicle. The license plate of the blocking vehicle is then detected using the OCR algorithm. Once the vehicle number is recognized from the license plate,it is stored so that the driver can be charged fine.*

Keywords: *Ambulance, Yolo v4 architecture, Segmentation, OCR algorithm.*

1. INTRODUCTION

Emergency vehicles play an important role in any life-threatening situation. Traffic congestion claims more than 20% of patients' lives in an ambulance, but if the patient's condition is very serious, the percentage of patient deaths increases. This is a situation where a patient in the emergency room needs to go to the hospitalimmediately and the ambulance is stuck in a traffic jam. This scenario is dangerous in the case of heart patients who had to be taken to the hospital in time. In traffic jams, many people do not bother to give way to an emergency vehicle, and the traffic police also do not see which lane should be vacated by the ambulance. We can reduce these problems by introducing an OCR algorithmthat will detect the offending vehicle number plate and fine the drivers, thus reducing the number of offences. It is therefore proposed to reduce traffic violence. In this study, a multimodal function fusion approach was adopted to complete vehicle detection through multimodal fusion of camera and millimeter wave radar functions. The sensors were calibrated together to achieve spatial and temporal alignment and reduce sampling errors, and a statistical filtering algorithm was added to remove point cloud outliers and interference. After preprocessing, the fused elements were transferred to the vehicle detection module. Then, the collected features were fused and extracted using a multimodal feature fusion module combined with a feature pyramid to improve the accuracy of multi-scale vehicle detection.

2. OBJECTIVE

- The main objective of this project is to easily detect ambulances blocking vehicles easily without the need of anytraffic police.
- The number plates of the violating vehicles are easily saves in the database to assign the penalty for the violation.
- Helping in reducing the violation of traffic rules.
- Thus, ambulance blocking would be reduced resulting in saving many critical patients life.

3. LITERATURE REVIEW

The presence of emergency vehicles on the road is one of the critical pieces of information for city management to clear the way for these vehicles as soon as possible. However, this avalanche of vehicle density leads to delays in the response of emergency vehicles to accident scenes. Studies show that when an ambulance comes to the emergency room, it can help reduce pre-hospital mortality by a reasonable number. [1]

As the reaction time relates to the 6% difference, it is important to get to the hospitals as quickly as possible and provide quick treatment to the victims. Various improvements in this area have been researched and experimentally deployed in urban cities to overcome this problem and locate emergency vehicles as soon as possible. In Taiwan, ambulance siren detection is done using Longest Common Sequence (LCS) results to compare frequency positions within a frame. [2]

The detection of alarm sounds was investigated using two approaches, including a multi-layer neural network system and a sine model system, in which the first one relied on techniques borrowed from speech recognition and used the structure of alarm sounds and tried to separate the signal from the background to reduce the influence of interferenceby noise Both systems were tested on a small data set and both showed similarly imperfect error rates [3].

A siren is a special signal emitted by alarm systems or emergency vehicles such as fire engines, police cars and ambulances. When the emergency vehicle is performing its task, the siren will sound to alert other drivers or pedestrians on the road. However, drivers of private cars sometimes do not need to listen to the sounds of sirens in the surroundings due to the interference of the sound signal in the car, the soundproofing of the modern car or even the distraction of the drivers themselves. This problem can lead to delays in the provision of emergency services or even trafficaccidents due to inappropriate communication and cooperation. Thus, this study proposes an acoustic method for detecting the presence of emergency vehicles on the road [4].

The primary method used in this work is audio recognition based on the OCR algorithm. In terms of data processing, we can roughly divide the techniques used in audio recognition into two broad categories: the first generally uses audio feature engineering techniques to extract useful features in the time and/or frequency domain before performing the recognition task, the second takesfull advantage of deep neural networks to build a complex recognition system that learns features directly from raw curves instead of extracting manually created features. Each approach has its advantages and success when appliedto different works; however, for the acoustic EVD problem,almost all works rely only on the first approach using neural networks or shallow learning algorithms such as support vector machine (SVM), Gaussian mixture models (GMM) and k-nearest neighbors (k-NN). In this work, our idea is to use both approaches and investigate whether it is possible to increase the accuracy of the system byaggregating the models of both approaches; in other words, we also investigate whether the features extracted by the deep neural network itself can complement the hand-crafted features in solving the recognition task or not [5].

4. EXISTING SYSTEM

An ambulance rushes to the scene of the accident to take the patient to the hospital while monitoring vital parameters like temperature and heart rate and transports them to the appropriate hospital. Along with this, the light signals in the ambulance path would be controlled via RF communication to ensure a clear path for the ambulance. This will reduce the time it takes for the ambulance to reach the hospital. But the transport system is not good enough to give way to an ambulance. There is no proposed system to detect the number plate identification of vehicles blocking an ambulance.

Disadvantages:

- The existing system does not identify the blockingvehicles.
- A traffic policeman will be needed to clear the way for the ambulance.
- Although the ambulance is fast, it could not reach the destination in time, which endangers the life of the patient.

5. PROPOSED SYSTEM

In our work, the only hardware we propose to use is the surveillance camera itself. The system will detect the vehicle through images instead of using electronic sensors. The input video is converted into a single frame, which is used for image preprocessing, and segmentation separates the desired part and the unwanted part, which is the image of the vehicle and the background.RGB color image converted to grayscale image to extract the desired part of the image. Gaussian filter is used to remove the noise present in the image and blurred edge detection is used to mark the outline of the license plate. A camera will be installed in front of the ambulance that will record the vehicle's license plate number. The captured footage is then converted into images and the YOLO algorithm is used to extract the vehicles. The extracted image is then processed by an OCR algorithm to detect and store vehicle details. A counter will be started once the algorithm starts detecting the vehicle. When the counter reaches the threshold and if the vehicle does not give way to the

ambulance which means getting away from the camera frame, then those vehicles will be detected for the number plate and the recognized number plate will be stored in a database.

Advantages

- Prevents unwanted vehicles from blocking the ambulance in emergency situations.
- It also saves human life and time.
- Less equipment is needed.
- Fully automated system.
- Highly scalable.

6. ARCHITECTURE DESIGN

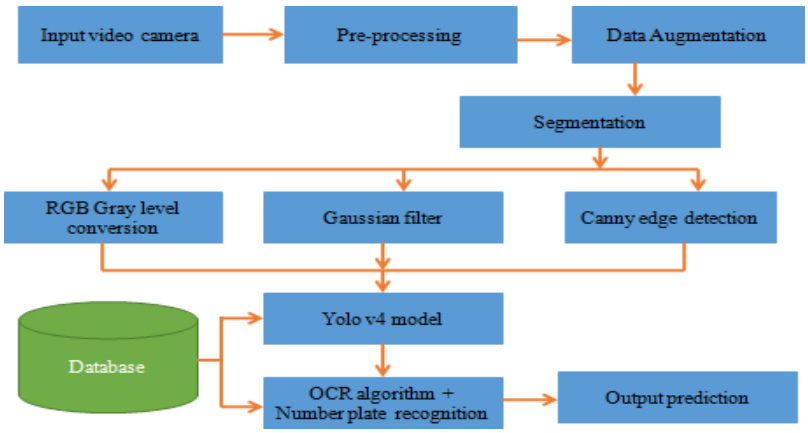

Fig. No: 1. Architecture design

7. MODULES

There are 5 modules used in this project:

- Videos processing module
- Image conversion module
- Vehicle detection module
- Number plate recognition
- Database module

8. MODULE DESCRIPTION

- Video Processing module

In this module, the real time camera is used to get input image which is installed in front of the ambulance, the camera will capture live video streaming and convert the video into image frames by extracting the image from video. This video processing module receives the vidoe data provided by the camera and the video are augmented into a standardized format which is provided by cameras. If the camera captures a video and played back in 25 FPS (frame per second), by converting it to 1FPS, it gives the accurate output image**.**

- Image conversion module

Image conversion is the conversion of the true color image RGB to the grayscale image. The image frame that is extracted from the video input will be in the RBG image. These RGB images will be converted to grayscale by eliminating the background images and saturation information by white and black color conversion. Gaussian filter is used to remove the unwanted noise in the image. Blurred edge detection is used to mark the outline of the license plate.

- Vehicle detection module

The module is used to detect the vehicle and the type of the vehicle. Here Yolo V4 algorithm is used for the detection of vehicle. This module will identify the car or truck that captured in the camera.

FIGURE 2. Vehicle Detection

- Number plate recognition

In this module, the detected vehicle using Yolo algorithm is segmented and recognize the number plate using OCR (Optical Character Recognition) algorithm and the recognized number plate will be stored in a file for the further use.

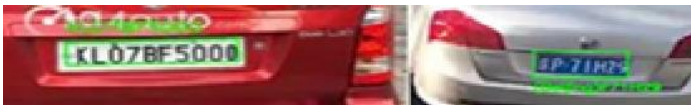

FIGURE 3. Number plate recognition

- Database module

A database is an organized collection of image and train dataset information, or data, typically stored computer system. Here the database contains the data that needed to train the vehicle detection models and number plate recognition models.

9. SYSTEM FUNCTION

Segmentation: Segmentatio0n divides the image into different regions containing each pixel with similar attributes**.** To be meaningful and useful for image analysis and interpretation, regions should be strongly related to the depicted objects or features of interest**.** Meaningful segmentation is the first step from low-level image processing, which transforms a grayscale or color image into one or more other images, to a high-level image description in terms of features, objects, and scenes**.** The success of image analysis depends on the reliability of segmentation, but accurate image segmentation is generally a very challenging problem**.** Segmentation techniques are either contextual or non-contextual**.** The latter do not take into account the spatial relationships between elements in the image and the group pixels together based on some global attribute. Image segmentation is a technique to determine the shape and size of an edge**.** It separates an object from its background based on various features extracted from the image**.** After removing noise and hair from the lesion area, the lesion needs to be separated from the skin, and therefore the analysis for diagnosis is performed using only the necessary area**.** There are many possible segmentation methods for this study.

FIGURE 4. Segmentation Processing

RGB To Grayscale Level Conversion:

The RGB color model is an additive color model in which the red, green, and blue primary colors of light are added in different ways to reproduce a wide range of colors. The name of model comes from the initials of the three colors, red, green and blue. The main purpose ofthe RGB color model is to capture, represent and display images in electronic systems such as televisions and computers, although it is also used in conventional photography. Before the electronic age, the RGB

color model had behind it a solid theory based on human colorperception.RGB is a device-dependent color model: different devices detect or reproduce a given RGB value differently because the color elements (such as phosphors or dyes) and their response to individual levels of red, green, and blue differ between manufacturers, or even within the same device over time. So, an RGB value does not define the same color between devices without some kind of color management.

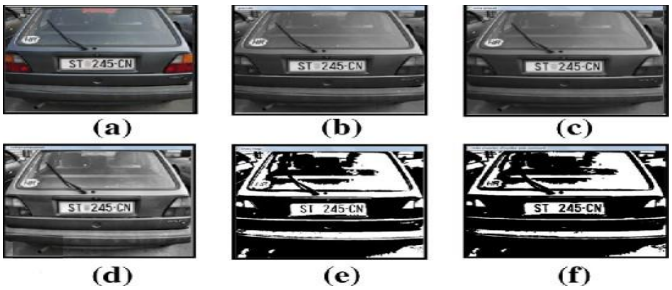

FIGURE 5. Grayscale image

Gaussian Filtering: A Gaussian Filter is a filter image used for reducing noise to high rice components and blurring image. It is used to remove Gaussian noise and is a realistic model of a defocused lens. Sigma defines the amount of blur. The radius slider is used to control the size of the template. Large values for sigma will cause large blurring only for larger template sizes. Noise canbe added using the sliders.

FIGURE 6. Gaussian filter

Canny Edge Detection: Edge detection is the process of locating edgesin an image, which is a very important step in understanding image properties. Edges are assumed to consist of meaningful elements and contain significant information. It significantly reduces the size of the imageto be processed and filters out information that may be considered less relevant, while preserving and focusing only on the important structural features of the image forthe business problem. Edge-based segmentation algorithms work to detect edges in an image based on various discontinuities in gray level, color, texture, brightness, saturation, contrast, etc. To further improve the results, additional processing steps must follow to merge all edges into an edge.

FIGURE 7. Canny Edge Detection

Database Management System:

A DBMS manages incoming data, organizes it, and provides ways for users or other programs to modify or extract the data. Some examples of DBMS includeMySQL, Posture SQL, Microsoft Access, SQL Server, FileMaker, Oracle, RDBMS, dBase, Clipper, and FoxPro. Oracle makes software, called database management systems (DBMS), for creating and managing databases.RDBMS is a relational database management system. An Oracle database (or Oracle RDBMS) is a collection of data organized by type, with relationships maintained between different types. Databases are used to store the information about working projects and properly maintain and access control the dataset because train dataset and data

store in DB. Database management the information will be collectedand stored in a dataset in one place so that it can be observed and analyzed. A database can be thought of as an image and videos collection it stores in a dataset. A database is an organized collection of image train model information and dataset, usually stored in a computer system. Together, the data and the DBMS, along with the applications associated with them, are referred to as a database system, often abbreviated to just database.

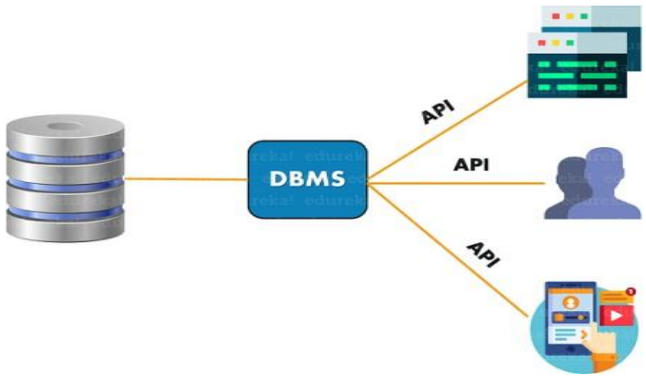

FIGURE 8. Data Base Management System.

10. RESULT

In this paper, the vehicles which block the way for the emergency vehicles like ambulance and fire fighting vehicles, those vehicle's number plate will be identified if the vehicle doesn't give way to the emergency vehicle for more than 60 seconds. The identified number plate will be stored in the database so that the corresponding vehicles will be charged fine. Hence, anyone blocking an ambulance with their vehicle will now have to think twice before doing it. Because our project detect number plate and it will be stored in excel file and fine will be collected from vehicle owner.

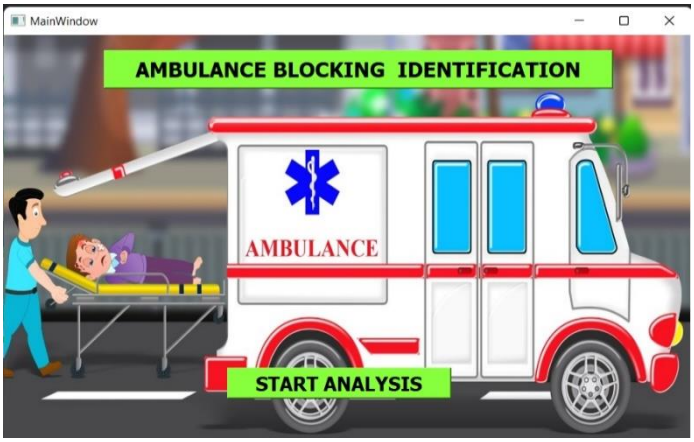

FIGURE 9. Front End Page.

FIGURE 10. Vehicle detection for car and truck**.**

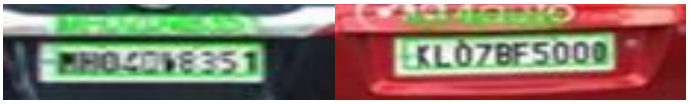

FIGURE 11. Number plate detection.

11. CONCLUSION

In this project, to prevent the violation of traffic rules of ambulance and to make way to the ambulance, we identify the ambulance blocking vehicles and store the number plate of the corresponding vehicle using the video captured by the camera. We used Yolo algorithm for the detection of type of vehicles and using OCR algorithm for segmenting the number plate of the vehicle. This project can be implemented by fixing a camera in front of the ambulance and processing the video captured by the camera. As it is a law to give way to the emergency vehicles, this project helps in making way to the ambulance and people will be aware of noting their vehicle number plate and charging fine for the violation. Because of this the violation will be reduced and lives can be saved.

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