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Ambulance Detection using Image Processing

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Abstract: *Ambulance Detection Using Image Processing is ambulance detection in traffic. Because the number of vehicles using the road is increasing every day over the past couple of years, resulting in traffic congestion. Traffic congestion is increasing at a rapid rate in nations such as India, Japan, etc. where the breadth and length of the highways make it difficult to create a separate lane for ambulance; therefore making it difficult for the vehicle to pass through the road. As soon as possible, there will be no traffic. At the designated intersections, and the software detects the ambulance approaching and switches the traffic signal green for the following 30 seconds and sending the message to traffic controller. They want to embed this software in ambulances to make it simple to convert addresses into a programmable format for review and retrieval. This information is fed into a computer system. Displays all of the crossings it must pass through to reach the destination. In this project using two techniques CNN and YOLO.*

Keywords: Ambulance Detection, Image processing, Convolutional Neural Network, YOLO

I. INTRODUCTION

A significant number of automobiles on the road has rapidly increased the amount of vehicle traffic in cities. Due to the heavy traffic, there are frequently traffic delays on the roadways, which can result in human lives being lost when emergency medical vehicles like ambulances and fire engines become stopped in the gridlock. Current traffic control systems are static, requiring cars to wait until the microcontroller turns on the green light for that lane after a predetermined length of time. The traffic police can provide precedence to the ambulance if it is stuck close to a traffic light by displaying the appropriate symbols or signals to the passing vehicles, allowing the ambulance to exit the traffic as swiftly as feasible. Additionally, if the emergency vehicles are blocked in a lane distance from the traffic signal, the ambulance's siren won't be able to reach the traffic police, forcing us to wait until the traffic is cleared or rely on other cars to move aside, which is not always possible in traffic. The use of Image Processing technology has been implemented in the proposed system. This system uses a CNN (Convolutional neural network) and YOLOv5 (You Only Look Once) modules. Following the predetermined stage, the features are taken from the provided input picture using different layers of the CNN. And YOLOv5 also same work but accuracy is more than and used to express the view that one should make the most of the present moment without worrying about the future. The detection outcome's projected bounding boxes are used. The ambulances seen in the traffic data are the product of the process. The CNN network is the basis for the proposals. We will do an image detection following the image capture in order to further define the detection process and focus it on the ambulance. The next phase of the procedure is bilateral filtering, where the intensity value of each pixel is saved using the weighted intensity of the nearby pixels that was collected in the previous step. In this stage, the edges' pixel values are saved. The data from this dataset file is sent on to the following CNN layer for additional filtering. This line contains the target. The ambulance is detection next stage signals is controlled then main target is to send the message into the traffic controller.

II. LITERATURE SURVEY

Daniel Keefer et.al [1] has proposed Visualizing Conical Intersection Passages via Vibrionic Coherence Maps Generated by Stimulated Ultrafast X-Ray Raman Signals this paper explain the ultrafast X-Ray subject in detail. Curved intersections affect the rates and outcomes of almost all photophysical and photocatalytic processes. On the nuclear landscape of molecules, there are areas of moral decay between electronic states where electrons and nuclei develop on comparable timeframes and become closely connected, enabling due to electron relaxation pathways upon visual activation. Experimentally monitoring conical junctions is a difficult task because of their extreme speed and immense complexity. Based on a quantum description of the nucleus, to provide a simulation study on the ultrafast photorelaxation

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of purine. By capturing the transient wavepacket coherence during this passage using an X-ray free-electron laser pulse, they are able to show an extra window into conical junctions. It reports two significant discoveries. First, we discover that it is possible to quantify the vibronic coherence at the conical junction for several hundred femtoseconds. Second, Wigner spectrograms of the signal are directly used to derive the time-dependent energy-splitting landscape of the participating vibrational and electronic states. The proposed experiment directly maps the course of a nuclear wavepacket at the conical junction.Liang et.al [2] has put forward Vision-based vehicle detection and counting system using deep learning in highway scenes, this paper explain the vehicle detection in detail In the realm of highway management, intelligent vehicle recognition and counting are becoming more and more crucial. However, because cars come in a variety of sizes, it might be difficult to identify them, which has an impact on how accurately counts of vehicles are made. The suggested dataset, which offers the entire data foundation for vehicle recognition based on deep learning. The newly suggested segmentation approach, which is essential for enhancing vehicle recognition, first extracts the highway road surface from the picture and divides it into a distant region and a proximal area in the proposed vehicle verification and counting system. The YOLOv3 network is then used to determine the kind and position of the vehicle using the previously mentioned two zones. The ORB algorithm finally produces the vehicle trajectories, which may be used to determine the direction in which each vehicle is moving and the total number of cars. The experimental findings support the claim that applying the suggested sedimentation strategy can increase detection accuracy, particularly when looking for little vehicle objects. V. Machacha et.al [3] has proposed intelligence Fast car Crash Detection in Video, this reference pager the main work is, in this study, our goal is to identify auto accidents in video. They provide a structure with three stages: The first one is a car detection method using convolutional neural networks, in this case, they used the net You Only Look Once (YOLO); the second stage is a tracker in order to focus each car; then the final stage for each car we use the Violent Flow (ViF) descriptor with a Support Vector Machine (SVM) in order to detect the car crashes. They idea is virtually in real time with just 0.5 seconds of latency and additionally they acquired an 89 percent accuracy identifying automobile collisions. Florian Damerow et.al [4] has proposed Intersection Warning System for Occlusion Risks Using Relational Local Dynamic Maps. In the main aim is the challenge of risk assessment in traffic situations with constrained observability due to constrained sensory coverage is addressed in this study. Here, they focus on junction situations that are challenging to see visually. They use ray casting to locate the field of sight on a local dynamic map that includes road infrastructure and geometrical data. They initially construct scene items that might represent a risk but are not yet visually perceptible based on the area with decreased visibility. Then, using the survival analysis to estimate collision risk, we project a worst-case trajectory. The resulting risk indicators are then used to assess the driver's conduct at that moment, to alert the driver in emergency circumstances, to offer advice on how to behave properly, or to plot safe routes. By using the resultant intersection warning system in real-world circumstances, we validate our methodology. The suggested system's behaviour appears to be an imitation of a properly performing human driver's conduct in general. K Malarvizhi et.al [5] has submit to Use of High-Resolution Google Earth Satellite Imagery in Landuse Map Applications, K Malarvizhi, et.,al[5] in 2016. In this reference the main aim is Accurate data on present land use patterns in a city or town and how they have changed over time are essential for urban planners and policy makers to conduct different urban planning and management tasks. There are certain restrictions on the free satellite imagery offered by the Global Land cover Facility (GLCF), which may be utilised to create land use maps as tried in numerous research. The photographs are of a low or medium resolution, and it may not always be feasible to get the most recent version. To solve this, one must acquire the most recent, high-resolution satellite picture, which is more expensive and occasionally unavailable owing to security concerns. Utilizing Google Earth imagery, which is free source and offers a good perspective of buildings, roads, etc., is an alternate method that is best suited for urban-related applications. Girish H R et.al [6] has moved to explain the IJERT-A Review: Smart Ambulance and Traffic Controlling System India is a thriving nation, and its population is rapidly expanding. In terms of population, India is ranked second worldwide. As the population progressively grows, so will the number of cars, which will result in more traffic and a greater need for emergency vehicles like ambulances and fire engines. The suggested framework is represented using an experimental set-up that replicates real-time traffic using Arduino and LED displays. The simulation's findings show the terms of detection as they relate to allowing the emergency vehicle to pass without causing a holdup during rush hour. R Roopalakshmi et.al [7] proposed to the population is rising quickly in emerging nations like India. The number of cars on the road is exponentially growing along with the population, which leads to a rise in traffic congestion and accidents. Saving a

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human life is particularly challenging when an emergency vehicle like an ambulance or fire truck is caught in a traffic bottleneck. Under these conditions, a promising system that can relieve traffic congestion, particularly during peak hours, and so create a clear way for emergency vehicles is very necessary. The suggested framework is modelled using an experimental setup that replicates real-time traffic using Arduino and LED displays. The simulation results show how the suggested framework performs better at managing and detecting emergency vehicles by allowing them to avoid traffic jams during peak hours. Amrutha Madhusan et.al [8] has put forward to on-road accidents are a serious problem. Accidents still happen despite all the contemporary advancements in lane management, car design, and road design. Any type of mishap is automatically reported as an alert to the necessary location. Each of these approaches has its own limits and a distinct accuracy %. This review article outlines numerous methods for spotting traffic. Accidents on a road that is being watched by security cameras. Harshitha D et.al [9] has proposed current state of affairs A major issue in our faster-paced society is traffic congestion. Large delays or the time allocated for the red light in the signal are two of the primary causes of congestion. The traffic system has already set the turnover time for the relevant signal, and it is not depending on the volume of traffic in a specific direction. The suggested concept is built around Arduino. The suggested device includes an infrared transmitter and receiver that are installed at various points along the highways with traffic signals. The Arduino decides and regulates the traffic signal time length as a consequence of the vehicle count. The number of vehicles generated by the Arduino data will be noted. By advising Arduino to the computer system, the record details can be stored to the controller for accurate categorization, and it will then transmit the proper delay of signal to the LED lights. Jayathi Routh et.al [10] has proposed lives are now easier thanks to the infrastructure's rapid rise. Due to inadequate emergency services, the development of technology has also increased traffic risks and the frequency of road accidents, which result in significant loss of life and property. Micro electro mechanical system (MEMS) sensors detect signals when a car is involved in an accident, and Arduino analyses these signals. The Arduino notifies the police control room or a rescue team of the emergency through the GSM Module, along with the location. The objective of this research is to automatically identify accidents and notify the closest hospital or emergency services of their precise location.

III. PROPOSED METHOD

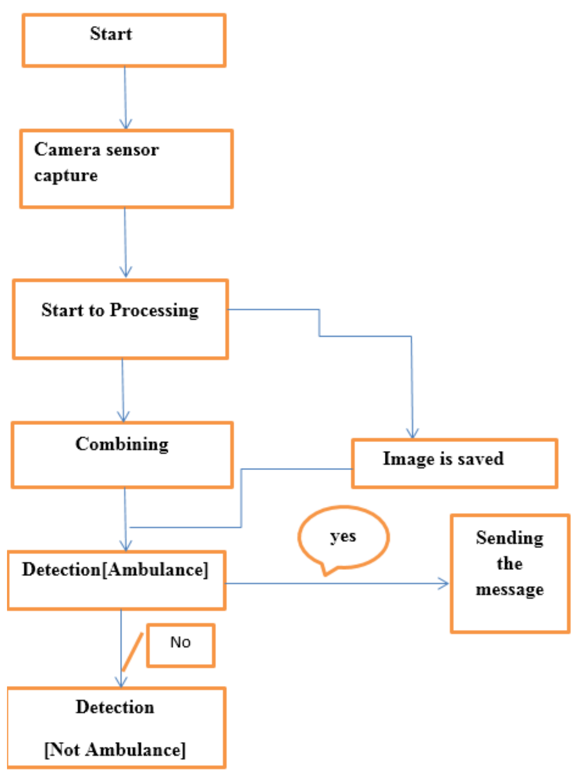


Fig 1 System Block Diagram

The surveillance camera is the sole piece of technology we suggest using in our task. However, employing CNN and YOLOv5 makes the method much more suitable with nations like India and Thailand, where road width does not matter for distinct ambulances. Because of the following reasons, using CNN and YOLOv5 in combination with security cameras is beneficial: The amount of hardware required is reduced to a single WIFI module attached to a camera-connected microcontroller. Because the same microcontroller may link cameras per connection, costs are dramatically lowered. The range of this security camera is quite long, allowing us to scan a big volume of traffic in a single scan.
In Fig 1. System Block Diagram--- Because we're using CNN and YOLOv5, it supports us in creating the dataset, which includes the filtered data from the programme as input. Using the dataset, will use CNN and YOLOv5 to determine if the detected object is an ambulance or not and whether it is ambulance sending the message into traffic controller.

Algorithm Flow

Step 1: Load the ambudataset.
Step 2: Split the dataset into test and training data set.
Step 3: Fit the CNN and YOLOv5 model on training dataset.
Step 4: Select the image from testing dataset.
Step 5: Predict whether the image is of ambulance is or not.

IV. IMPLEMENTATION

There are three primary phases to this project—

- Capture
- Training
- Detection

The images collected by the camera sensor are which are then analysed using an algorithm before the computer determines whether or not the recognized vehicle is an ambulance then the message is sending into the traffic controller then traffic controller take next action.

4.1 Capture

Picture taking obtaining a digital picture from a visual sensor, including a camera. Every image captures those half a second and saves them in perpetuity. When generating the final image, the development method changes that sensitivity into brightness. To use a camera to photograph. The entire incident was recorded on specialised computing. The majority of picture capturing devices fall into one of two categories. An optical imaging unit consists an optical module for taking an image, at minimum one sensor module for providing image signals for the captured image, and a data processing module for processing the created image signals to yield image data for the confirms.

4.2 Training

Even before system can identify the vehicle and give an output depending on the outcome, it must be educated how to detect an ambulance. For this, we produced a fortune teller dataset of more than five hundred photos, and a model that will be called in the confirmation segment must be trained. After training, validation and trained photographs are saved in their respective folders in Google Photos, which is linked to the training algorithm. To boost the model's effectiveness, the entire set of data is pooled after coaching, streamlined using the Adam optimizer, and penalties are reported. The framework was built using the Fit generator, and it is then retained in the folder. The statistics accuracy and loss serve as a starting point for the whole strategy, and figures for these measures are also presented.

4.2.1 Pre-processing

In order to build a trained dataset that can be deployed for detection, more than 500 photos were collected from various internet sources and used as training input. To improve the database, the "Traing" function is used to modify the current photos and provide more copies. The photos are resized and separated functions before being protected in the "Train" categories.

4.3 Detection

Traffic is captured in brief image clips by the image sensor, that are then for use as input by the Computer system. Pictures are formed from footage and then processed. They are first housed in the associated ambudata folder. The YOLO algorithm evaluates if the vehicle is a car from images first from overall folder. It is a predefined algorithm that makes use of Microsoft's COCO dataset. The YOLO approach is used to identify if the picture being processed contains trucks or not. A snapshot of these images is kept in the "ambudata" folder after a bounding box is appended if the car or truck or bus qualifies to be classified as a truck. The cropped images are saved in the "Train" folder after already being cropped thus according their embeddings. Afterward, the image has been sent to the main function, where our model is called and it is studied to identify if the image is an ambulance. The main function will return yes if it meets the criteria for an ambulance. If the answer is affirmative, "a message including the relevant mobile number is sent to indicate that an ambulance has been found", and the photographs are then saved in the final folder.

V. RESULTS

Ambulance Detection

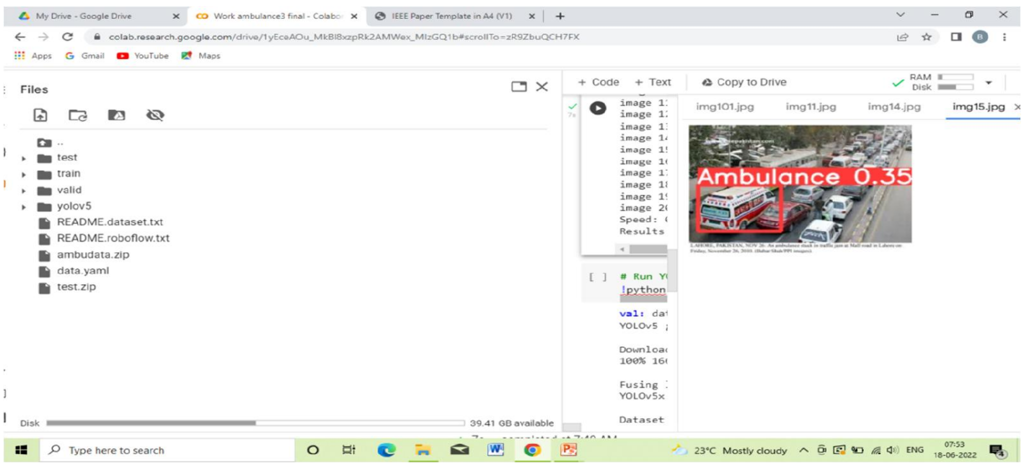
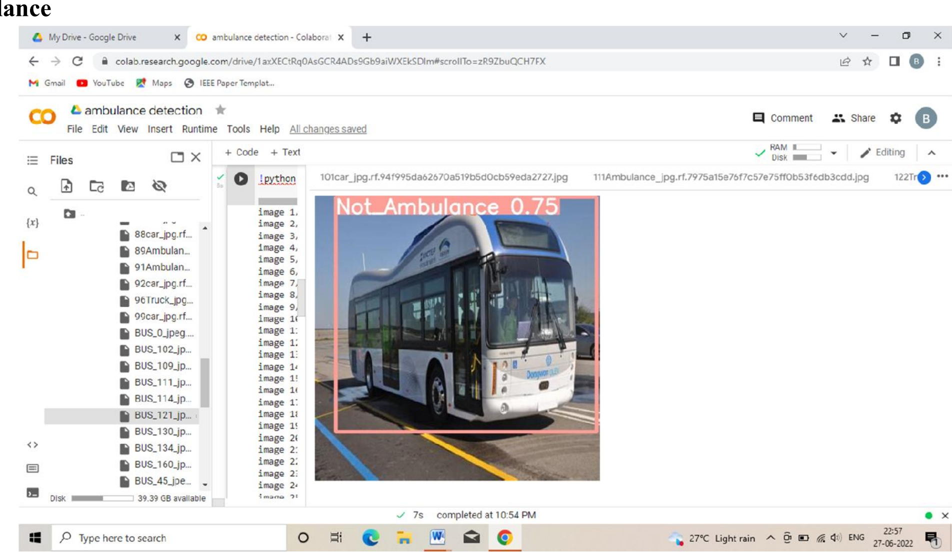


Figure 2: Camera detect the ambulance

Figure 2 shows that, as a consequence of object recognition via image processing, it’s system has identified the ambulance and has created a border box around it. In our project, it detects the Not Ambulance and says which one is detected. The only time a traffic signal changes is when an ambulance arrives and detects a red light, which then turns green.

Not Ambulance



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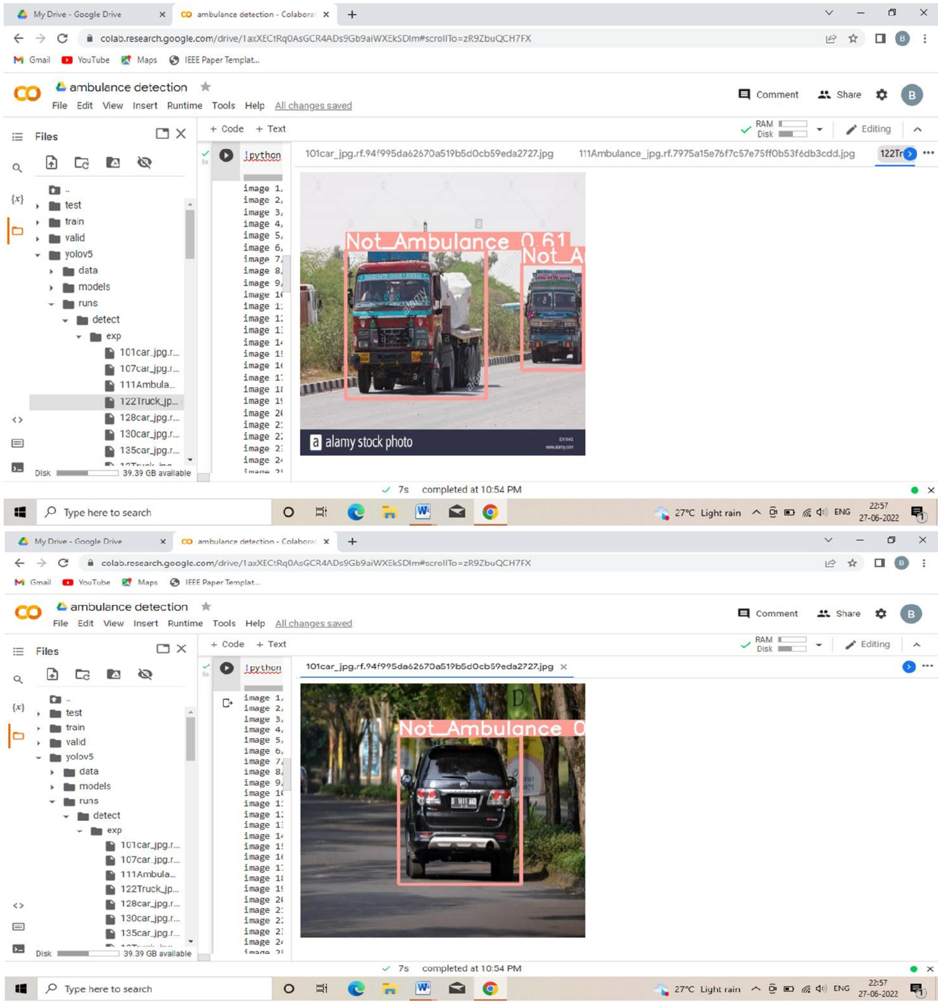

Fig 3 Camera detect Not Ambulance

Figure 3 shows the, as a consequence of object recognition via image processing, the system is identified the not ambulance and has created a border box around it.

Message Sending into the Traffic Controller

Fig 4 Sending into traffic controller

Figure 4 shows the, as a consequence of object recognition via image processing, the system is identified the not ambulance and has created a border box around it and then to sending the message into traffic controller.

VI. CONCLUSION

In the planned research, we were able to:

Build a dataset so the software may need it for training and evaluation. The application used the design that was created in order to separate the ambulance from most other vehicles. While other traffic lights were turned red and we successfully got the computer to change that traffic light to green when it realised the captured vehicle was an ambulance and "a notification was sent to the traffic controller". The ambulance, a vehicle used for emergencies, can travel rapidly and be at its destination in a matter of a few minutes thanks to the camera prediction and prevention. As once work activities of capture, training and detection have been accomplished, the simulation of the entire system may be completed successfully. The scope of research can be broadened to include all emergency vehicles in the coming.

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