Real-Time Vehicle Collision Detection Using Bounding Box Methodology with Alert System

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***Abstract*— Recent technological developments have sped up and simplified our lives. The risks associated with transportation have increased as a result of technological improvement. In order to decrease accidents and save lives, a GSM-based accident detection and prevention system is provided in this research. one of the most frequent issues that people try to solve while buying a vehicle. Accidents occur as a result of poor traffic management when the number of cars increases.**

Other than bad traffic management, a number of other factors can cause accidents, including bad weather, careless driving, faulty vehicles, and poor road conditions. The vehicle's performance has been periodically examined for safety reasons. The outcome of this project is that accident can be prevented by utilizing sensors and help can be sent immediately after accident has occurred

Keywords—ALEXNET, Image processing, Arduino, GSM module, artificial intelligence, machine learning Introduction

A. INTRODUCTION

Since the demand for automobiles is increasing every day, traffic is increasing. As a result, transportation has to be improved since, as demand grows, there will be more opportunities for automobile accidents. One of the most common causes of death is motor vehicle accidents. If individuals can't seek help when they need it, there will be serious consequences. Poor emergency response might be a key contributor to our country's high fatality rate. According to crash analysis research, road accidents may be avoided if this innovative life- saving technique was used. The design focuses on giving emergency contacts with basic information about the accident scene. A valuable life may be saved as a consequence of the prompt assistance.

During this project, a three-axis accelerometer was used. The approach identifies accidents faster and reports them to the appropriate authorities. Transportation development has been the generating force for citizens to possess the greatest civilization over all organisms on the planet.

The automobile is quite important into our way of life. It has the potential to cause us harm and even death through accidents. One of the most essential and fundamental risk factors in driving is speed. It has an impact not just on the severity of a collision, but also on the likelihood of being engaged in a severe collision. Despite the numerous efforts made by various governments and nongovernmental groups throughout the world via various manner initiatives to raise awareness about irresponsible driving, accidents continue to decrease on a regular basis. However, many lives may be spared if emergency personnel could receive the necessary information in a timely

II. RELATEDWORK

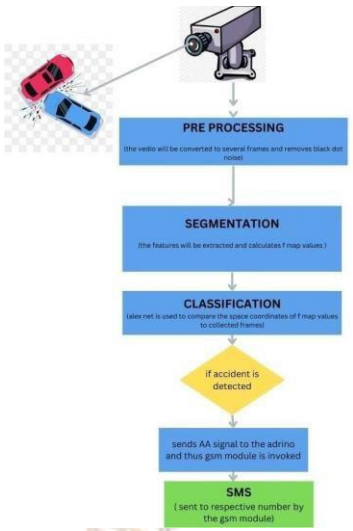
Accelerometers have been used in previous projects to detect changes in the car's axis, which then triggers a short message to the predetermined number with details of the accident. Various forms of technology have made our lives easier. Like every coin has two sides, technology is not without its downsides either. With technological advancements, road accidents are occurring at an increasingly rapid pace, which has resulted in a significant increase in fatalities.

III. PROPOSESYSTEM

In this paper, we have proposed and explained a deep learning approach to detect accidents taken place in real world using videos captured by surveillance cameras.

As real-world anomalies are such a rare event we train our model on more on the normal videos and normal data. But training only on normal data may not be optimal for detection of anomalies, hence we attempt to exploit both anomalous and non anomalous videos.

Proposed System Architecture:



We create positive and negative bags for anomalous and non-anomalous videos by training the model on the video segments using deep Machine Instance Learning framework with weakly labeled data. For validation of our approach, we introduce a new large scale anomaly dataset consisting of various accidents in real world. Resulting which we get a better accuracy of anomalies compared to the other baseline proposed systems. If the accident detected the admin will get the SMS via GSM Module.

INPUT:

Firstly, the accident will be captured via camera and the resulting footage will be saved in AVI format. AVI stands for Audio Video Interleave, which is a multimedia container format that can store both audio and video data.

Next, the AVI format footage will be converted into more frames. A frame is a single image in a video sequence, and videos are typically made up of many frames played in succession. By converting the footage into frames, the video can be broken down into individual images that can be analyzed and used for training purposes.It's important to note that the captured input should be in AVI format, or else it won't work. The previously recorded accident footage will be gathered. Whether this footage is from the same accident that was referenced in the preceding paragraph or if it is from a separate accident entirely is unclear from the paragraph. Nonetheless, this film will be used to create frames during the preprocessing stage will be the result of this phase.

The segmented image or video is cleaned and improved during the second step, which is called preprocessing. To increase the accuracy of the analysis, this can entail removing noise or distortion, modifying the contrast or brightness, or applying other sorts of image alteration.

The third step is the detection phase, in which it is determined whether an accident has occurred by utilizing a machine learning system called AlexNet. Convolutional neural networks like AlexNet are frequently employed for image identification tasks. It can recognize patterns and features in new photos to generate predictions after being trained on a sizable collection of labelled images.

A notification outlining the results of the detection phase will indicate whether or not an accident has been discovered. A graphical user interface (GUI), a form of software that enables users to graphically interact with the system, will get this message. Depending on the situation, the GUI can show the user the message, sound an alert, or do something else particular application.

PREPROCESSING AND SEGMENTATION:

The preprocessing stage, which was discussed in the paragraph before, is followed by the segmentation procedure. The output from the input phase, which could be the previously recorded video that was turned into frames in the preprocessing phase, will be examined in this stage.In the segmentation process, analysis entails determining a feature map (F-map) value for specific frames. A feature map is a 2D array of numbers that illustrates a certain aspect or quality of a picture. What precise trait or quality is being examined in this example is not immediately evident from the passage, but it might be something like colour, texture, or shape.

Finding the spatial coordination for a set of frames comes next once the F-map value is identified. The physical positioning of the frames within the movie is referred to as spatial coordination. To establish a feeling of motion and

spatial awareness, this could entail locating specific persons or objects inside the frames or following their movements between frames.

The paragraph doesn't make it apparent what the segmentation process's final objective is or what particular application it is utilised for. A range of applications, including object recognition and motion tracking, may benefit from the process of examining frames for feature map values and spatial coordination. By dissecting the video into its individual frames and doing an analysis on each one, it is feasible to develop a more thorough and complex knowledge of the entire video.

CLASSIFICATION:

The segmentation phase, which entails removing the irrelevant portions of the picture or video from the background, is the first stage. Often, an algorithm that can recognise edges or other elements that set the foreground apart from the backdrop is used for this. An image or video that has been segmented to highlight the area of interest will be the result of this phase.The segmented image or video is cleaned and improved during the second step, which is called preprocessing. To increase the accuracy of the analysis, this can entail removing noise or distortion, modifying the contrast or brightness, or applying other sorts of image alteration.The third step is the detection phase, in which it is determined whether an accident has occurred by utilising a machine learning system called AlexNet. Convolutional neural networks like AlexNet are frequently employed for image identification tasks. It can recognise patterns and features in new photos to generate predictions after being trained on a sizable collection of labelled images.

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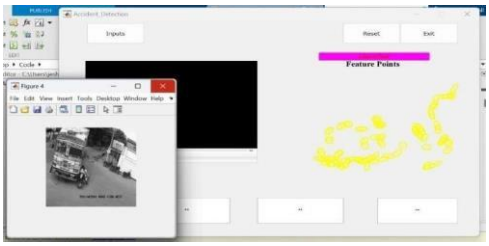
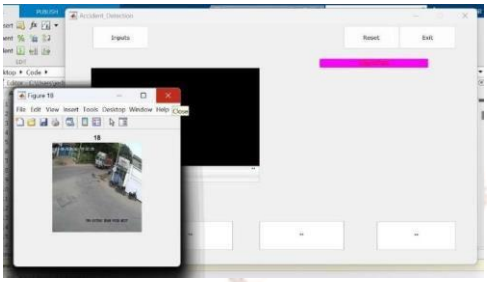
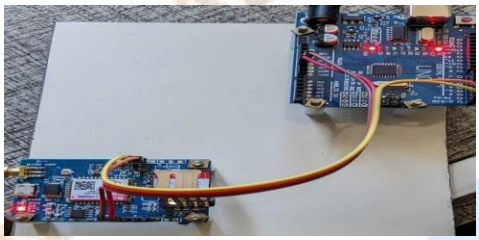
IV. EXPERIMENTAL RESULTS







V. CONCLUSION

This thesis presents a crash detection system for traffic intersections that operates in real-time. The focus is on vehicle detection and tracking, using a low-level feature tracking algorithm with a detection rate of 90-93% and tracking rate of 88-92%, but affected by shadows and occlusion. Using low-level features and vehicle velocity, the system detects crashes with a precision of 87.5% and a 100% detection rate for experimental test crashes. The system performs well in real-time, using low-level features instead of complex learning algorithms. Further analysis of traffic crashes data and training of the collision detection algorithm could enable real-time traffic scenario monitoring.

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