

Accident Detection and Reporting Using Deep Learning

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Abstract: *With population growth, the demand for vehicles has increased tremendously, which has created an alarming situation in terms of traffic hazards and road accidents. The road accidents percentage is growing exponentially and so are the fatalities caused due to accidents. However, the primary cause of the increased rate of fatalities is due to the delay in emergency services. Many lives could be saved with efficient rescue services. The delay happens due to traffic congestion or unstable communication to the medical units. The implementation of automatic road accident detection systems to provide timely aid is crucial.*

Keywords: Machine Learning, Deep Learning, Data-flow diagram (DFD), Convolutional neural network (CNN)

I. INTRODUCTION

Due to rapid growth of world population, the demand for vehicles has increased tremendously, resultantly problems of traffic congestion and road accidents has also increased. The general population's life is under high risk, if any accident occurs there's a long reaction time which increments the number of deaths, therefore an automatic accident detection system must exist to overcome this situation. There can be multiple causes of road accidents, some of them are, driver negligence due to drowsiness, driving while intoxicated over speeding etc. Some studies show that weather conditions can also contribute towards the severity of an accident such as fog, rain, high winds. High winds can directly influence the vehicle which may deviate the vehicle from road, or indirectly due to obstruction dangers present on the roads such as trees, walls etc. Accident detection is one of the key problems in computer vision that has been studied for more than 15 years. It is important because of the sheer number of applications which can benefit from Accident detection.

II. MOTIVATION

The consequences of road accidents are not just constrained to the loss of human lives yet, also incorporate the destruction of property, traffic blockages, and immense economic loss. Thus automatic accident detection systems are the need of time, which can speed up the rescue operations and limit the casualties after the mishap and numerous lives can be saved. This paper features existing mechanisms to detect accidents, its working, and limitations. Furthermore, accident prevention methodologies, accident contributing factors are highlighted as well. This study critically reviews existing literature on accident detection and prevention techniques, with the objective that smart systems can be developed with improved accuracy and better strategies to control accident causing factors while watching out for the existing challenges in the current systems.

III. PROBLEM STATEMENT AND OBJECTIVE

To implement an automated-system for detection and reporting of unexpected accidents using deep learning.

1. To detect an accident on highways.
2. Provide an alert message to the most proximate control room immediately.
3. Design a low resource consuming accident detection system that can compute on cheap hardware.

IV. RELATED WORK

Many systems have been proposed for accident detection by researchers. The accident detection methods were first based on real time traffic analysis to forecast traffic flow which deals with the change in the traffic before the occurrence of the accident. This detection technique is known as Traffic-incident detection-algorithm based on nonparametric regression which was proposed by Shuming Tang and Haijiun Gao. Similar model for traffic accident automatic detection, recording and reporting at intersection using metadata registry which was proposed by Yong-Kul Ki, Jin-Woo Kim and Doo-Kwon Baik. An accident detection system on highway, proposed by In Jung Lee makes use of CCTV which view flow of vehicle trace is like as level spacing distribution as Wigner distribution. But this method monitors the whole traffic flow which have many loop holes in its implementation as it depends on many factors such as traffic flow analysis, sensors to monitor this condition.

The android based smartphones are also used for detecting accident which monitors the vehicle through an On Board Diagnostics (OBD-II) interface, being able to detect accidents is proposed by Zaldivar, I. Calafate, e.T., Cano, J.e., Manzonei, P. A system proposed by Bin Basheer, F. Alias, J.J., Favas, C.M., Navas, Y., Farhan, N.K. and Raghu, C.Y. [10] put forward a Design for accident detection and alert system for motor cycles considering three parameters: acceleration! deceleration, tilt of the vehicle and the pressure change on the body of the vehicle. This systems lacks because two wheelers accidents may have a number of scenarios which are not completely covered by this system.

The proposed method aims to overcome the above mentioned limitations and utilizes the capability of a GPS device and a proximity sensor to create an intelligent distributed system to detect accidents and alert the emergency services. G. Sasikala et al. proposed a system which is based RF transmitter and receiver that enhance the feature of helmet and provide extra protection while accidents. It may increases the cost of helmet and does not provide a solution that could mandate the use of helmet for every riders or non riders. Narong Boonsirisumpun et al. proposed a system which is based on convolutional neural network. System is able to classify the helmet and motorcycle using CNN, but CNN is limited with training samples that restricted if a person is using different kind of helmet or if girls cover her face may detected as helmet that may increases the false recognition rate. Liang-Bi Chen et al.] proposed a system which is based on IR sensors that proposes an intelligent helmet with heavy vehicle detection to aware the riders to not to be a part of any casualties. Here system uses camera on helmet's back side for recognizing heavy vehicles that approaches. Mario Andres Varon Forero et al. proposed a system which is based on convolutional neural network and background subtraction approach that may highlight the riders with helmets This study critically reviews existing literature on accident detection and prevention techniques, with the objective that smart systems can be developed with improved accuracy and better strategies to control accident causing factors while watching out for the existing challenges in the current systems.

V. SYSTEM ARCHITECTURE

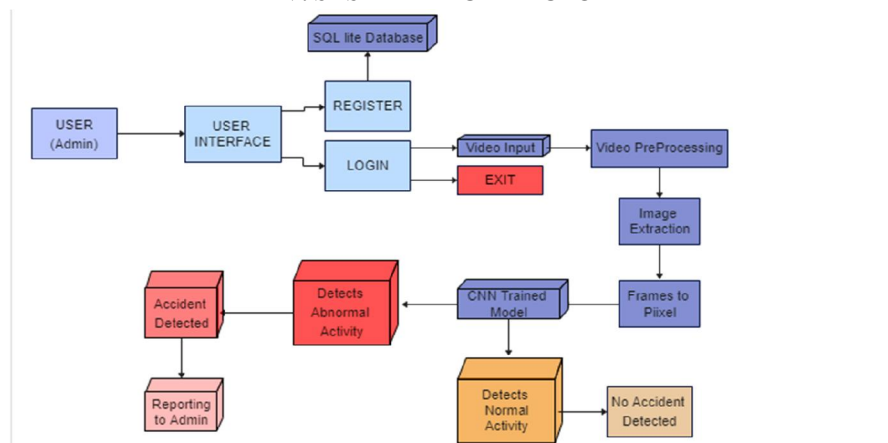


Fig. 1. System Architecture

System architecture is a conceptual model which specifies the overview of the whole process of the project. It describes each step in the project making with the help of a flow. It specifies each and every step descriptively. The system

architecture is as follows: SRS needed to be represented into pictorial form for better understanding. This chapter is about system design. The system design consists of architecture and the system implementation flow. It includes diagrams like system architecture, data flow diagram, use case diagram, activity diagram, class diagram. These diagrams help in understanding the functioning of the system. A data-flow diagram (DFD) is a way of representing the flow of a data of process or a system (usually an information system). The DFD also provides information about the outputs and inputs of each entity and the process itself.

VI. RESULTS



Fig. 2 Normal Activity (No-Accident Detected)

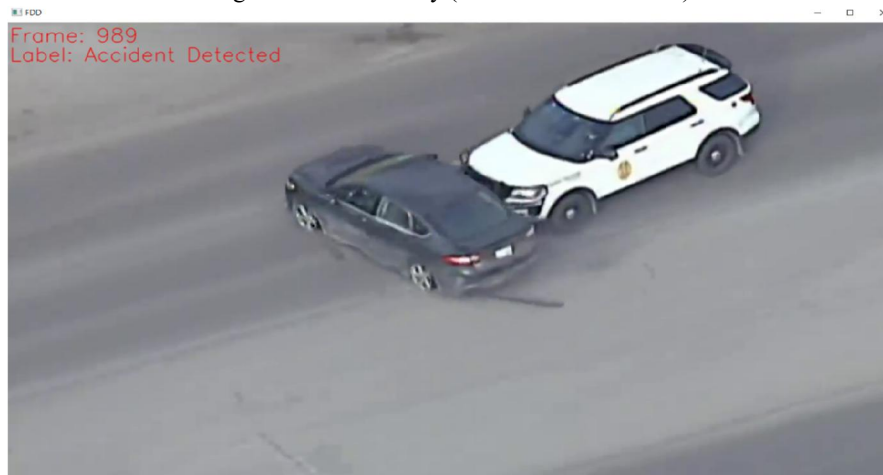


Fig. 3 Abnormal Activity (Accident Detected)

VII. CONCLUSION

We implemented a system to process CCTV footage to detect any abnormal activity which will help to create better security and less human intervention. Thus it was possible to design a low resource consuming accident detection system that can compute on cheap hardware which can detect accidents and provide an alert message to the most proximate control room immediately.

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