Automatic Traffic Accident Detection Using CNN

Shrinivas Nimbalkar[1], Sanket Chavare[2], Shrinivas Niley[3], Ayush Aryan[4], Prof. Priti Warungse[5]

Students, Department of Computer Engineering Faculty, Department of Computer Engineering

NBN Sinhgad School of Engineering, Pune, Maharashtra, India

Abstract: The implementation of automatic road accident detection systems to provide timely aid is crucial. Many solutions have been proposed in the literature for automatic accident detection. 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. With such high rates of deaths associated with road accidents, road safety is the most critical sector that demands significant exploration. In this paper, we present a critical analysis of various existing methodologies used for predicting and preventing road accidents, highlighting their strengths, limitations, and challenges that need to be addressed to ensure road safety and save valuable lives. The techniques include crash pre- diction using smartphones, vehicular ad-hoc networks, GPS/GSM based systems, and various machine learning techniques.

Keywords: CNN, Accident Detection, Traffic, Accidents

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. Our application can be used in surveillance at places like malls, airports, railway stations, etc. where there is a risk of robbery or a shooting attack.We will be using deep learning and neural networks to train our system. And prevent this type of accident in early stage.We plan to build an application for detection of accident of people in public places in real time. 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. The survival rate of victim is highly reliant on how long an ambulance takes to reach the site of the accident and then carry the patient to the hospital.Road crashes can be seen as a collision between any on road vehicles, obstacles or pedestrians.

II. LITERATURE REVIEW

Every year around 1.35 million people are cut off due to numerous crashes in case of road traffic accident. As per the statistics 20 to 50 million people suffer as a result of its injuries. As a consequence of such traffic accidents people pays off their lives.Rapid growth of technology has made everything more facile and this advancement in technology additionally increased accidents. Due to this de- layed medical attention, the accident victims might die as well. As a solution to these problems, we introduce a system that detects road accidents and will provide an alert message to the most proximate control room immediately. Object Detection and Tracking System (ODTS) in combination with a well-known deep learning network, Faster Regional Convolution Neural Network (Faster R-CNN), for Object Detection and Conventional Object Tracking algorithm will be introduced and applied for automatic detection and monitoring of unexpected events on CCTVs in tunnels, which are likely to (1) Wrong-Way Driving (WWD),(2) Stop, (3) Person out of vehicle in tunnel (4) Fire. ODTS accepts a video frame in time as an input to obtain Bounding Box (BBox) results by

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Object Detection and compares the BBoxs of the current and previous video frames to assign a unique ID number to each moving and detected object. Vehicles using this system can detect the vehicle ahead in real time when the driver is driving the vehicle, and calculate the safety distance of the vehicle ahead, and judge at night Whether there are vehicles in the front and oncoming lanes to determine whether to turn on the high beam, so as to reduce light damage and safe distance traffic accidents.

FINDINGS FROM LITERATURE

We have systematically studied approximately 10 research papers inclusion year from 2015 to 2022, and some meaning full findings are highlighted in table 1.

NO	Year	Title	Authors	Methodology
1	2020	Accident Detection Using Deep Learning	Durgesh Kumar Yadav	Every year around 1.35 million people are cut off due to numerous crashes in case of road traffic accident. As per the statistics 20 to 50 million people suffer as a result of its injuries.
2	2020	A Deep Learning based Accident Detection System	Gokul Rajesh, Amitha Rossy Benny	In this fast-paced world, the number of deaths due to accident is growing at an expeditious rate. Major reasons for these accidents are rash driving, drowsiness, drunken driving, carelessness, etc.
3	2020	Real-Time Traffic Sign Detection using Capsule Network	Neelavathy Pari S	In the past few years, Deep learning has emerged as an enormous technology which has applications in Image classification and Natural language processing, Recommendation System, Automatic Machine Translation, Handwriting Recognition, etc.
4	2020	Application of Vehicle Detection Based On Deep Learning in Headlight Control	1st Zi-Han Huang	When driving at night, vehicle lights are the greatest guarantee for driving safety. Drivers often turn on the high beams to make the oncoming vehicle unclear, turn on the high beams of the oncoming vehicle to reduce their visual range or turn on the high beam when driving behind.
5	2019	An application of a deep learning algorithm for automatic detection of unexpected accidents under bad CCTV monitoring conditions in tunnels	Kyu Beom Lee, Hyu Soung Shin	In this paper, Object Detection and Tracking System (ODTS) in combination with a well-known deep learning network, Faster Regional Convolution Neural Network (Faster R-CNN), for Object Detection and Conventional Object Tracking algorithm will be introduced and applied for automatic detection and monitoring of unexpected events on CCTVs in tunnels, which are likely to (1) Wrong-Way Driving (WWD), (2) Stop, (3) Person out of vehicle in tunnel (4) Fire .

III. METHODOLOGY

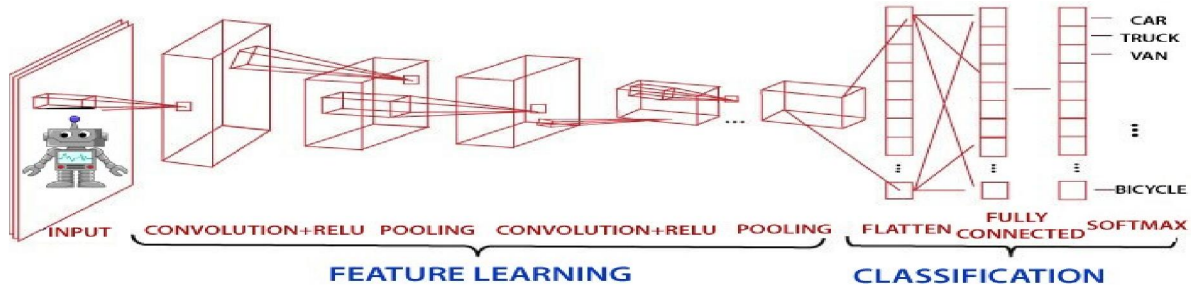### 3.1 Proposed Architecture of CNN

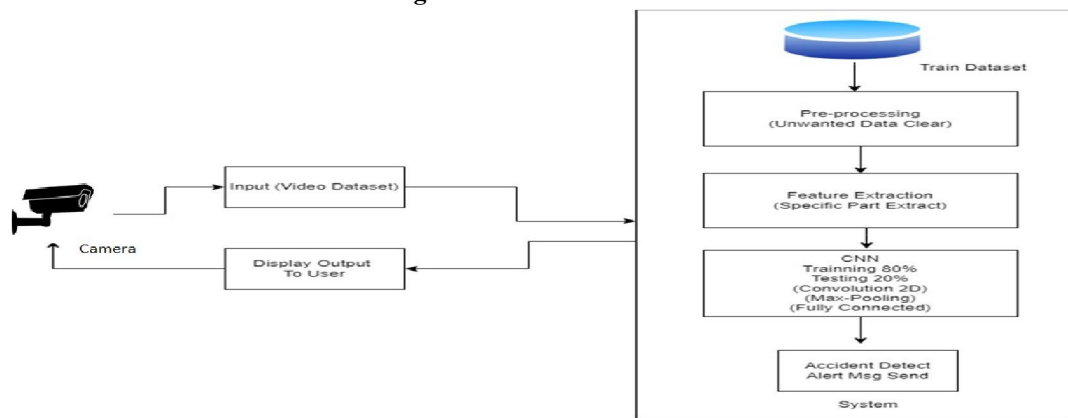**Fig 2. Architecture of CNN**

Fig 3. System Architecture Diagram

Then we proposed the system which based on vibration sensors and processing capabilities can be used to overcome the challenges of detecting traffic accidents and deliver the emergency message at short time.

The proposed system offers automated detection, reports, and assistance to passengers involved in road accidents by exploiting the capabilities offered by vehicular communication technologies.

IV. RESULTS AND OUTPUT

Fig 4. Accident Detection Output

V. CONCLUSION AND FUTURE WORK

Great strides have been made in the field of accident, which enables us to better serve the myriad applications that are possible with it. A system to process real-time CCTV footage to detect any accident will help to create better security and less human intervention. Moreover, research in related fields such as Activity Tracking can greatly enhance its productive utilization in several fields. By increasing the technology we can also avoid accidents by providing alerts systems that can stop the vehicle to overcome the accidents.The proposed system deals with the detection of the accidents. But this can be extended by providing medication to the victims at the accident spot. By increasing the technology we can also avoid accidents by providing alerts systems that can stop the vehicle to overcome the accidents.

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