A DEEP LEARNING BASED ACCIDENT DETECTION SYSTEM

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ABSTRACT

Accidents have been a major cause of deaths in India. More than 80% of accident-related deaths occur not due to the accident itself but the lack of timely help reaching the accident victims. In highways where the traffic is really light and fast-paced an accident victim could be left unattended for a long time. The intent is to create a system which would detect an accident based on the live feed of video from a CCTV camera installed on a highway. The idea is to take each frame of a video and run it through a deep learning convolution neural network model which has been trained to classify frames of a video into accident or non-accident. Convolutional Neural Networks has proven to be a fast and accurate approach to classify images. CNN based image classifiers have given accuracy's of more than 95% for comparatively smaller datasets and require less preprocessing as compared to other image classifying algorithms.

1. INTRODUCTION

Over 1.3 million deaths happen each year from road accidents, with a further of about 25 to 65 million people suffering from mild injuries as a result of road accidents. In a survey conducted by the World Health Organisation (WHO) on road accidents based on the income status of the country, it is seen that low and middle-income or developing countries have the highest number of road accident related deaths. Developing countries have road accident death rate of about 23.5 per 100,000 population, which is much higher when compared to the 11.3 per 100,000 population for high-income or developed countries [1].

Over 90% of road traffic related deaths happen in developing countries, even though these countries have only half of the world's vehicles. In India, a reported 13 people are killed every hour as victims to road accidents across the country. However, the real case scenario could be much worse as many accident cases are left unreported. With the present data, India is on the way to the number one country in deaths from road accidents due to the poor average record of 13 deaths every hour, which is about 140,000 per year [2]. An accident usually has three phases in which a victim can be found. First phase of an accident is when the death of the accident victim occurs within a few minutes or seconds of the accident

about 10% of accident deaths happen in this phase. Second phase of an accident is the time after an hour of the accident which has the highest mortality rate (75% of all deaths). This can be avoided by timely help reaching the victims. The objective is to help accident victims in this critical hour of need. Third phase of an accident occurs days or weeks after the accident, this phase has a death rate of about 15% and takes medical care and resources to avoid. Fig. 1. Comparative analysis of population, income and road accidents The main objective is to incorporate a system which is able to detect an accident form video footage provided to it using a camera. The system is designed as a tool to help out accident victims in need by timely detecting an accident and henceforth informing the authorities of the same. The focus is to detect an accident within seconds of it

happening using advanced Deep Learning Algorithms which use Convolutional Neural Networks (CNN's or ConvNet) to analyze frames taken form the video generated by the camera.

2. LITERATURE SURVEY AND RELATED WORK

2.1 An enhanced accident detection and victim status indicating system: Prototype

Authors: Prabhakar, S., et al.

Abstract: In the speedy moving world, nobody is ready to look what's happening around them. Even when there occurs an accident nobody cares about it. This is an intention to implement an innovative solution for this problem by developing an Enhanced Accident detection System for Indicating Victim Status from the accident zone. This system has been developed and implemented using the biomedical smart sensors and microcontroller based mobile technology integrated with the evolving Lab VIEW platform. The system will automatically identify the accident, then immediately transmit the location of the accident and the status of the physiological parameters of the victims to the emergency care center phone number through Short Message Service (SMS). The victim's physiological parameters such as body temperature, Heartbeat, Coma stage recovery status have been transmitted in the SMS. So the proposed system ensures that to reduce the human death ratio by accidents. When the accident occurs and realizes that there is no severe collision, then the person involved in accident has to press the switch provision which has been made to indicate that the accident is diminutive and no communication will be established i.e. no further alarming SMS has been transmitted

2.2 Car Accident Detection and Notification System Using Smartphone

Authors: Hamid M. Ali,Zainab S. Alwan

Abstract: Every day around the world, a large percentage of people die from traffic accident injuries. An effective approach for reducing traffic fatalities is: first building automatic traffic accident detection system, second, reducing the time between when an accident occurs and when first emergency responders are dispatched to the scene of the accident. Recent approaches are using built-in vehicle automatic accident detection and notification system. While these approaches work fine, they are expensive, maintenance complex task, and are not available in all cars. On the other hand, the ability to detect traffic accidents using smart phones has only recently become possible because of the advances in the processing power and sensors deployed on smart phones. Most of the smart phone based accident detection systems rely on the high speed of the vehicle (extracted from the smart phone GPS receiver) and the G-Force value (extracted from smart phone accelerometer sensor) to detect an accident. As many references assure that 90% of road-traffic accidents occur at low speed of the vehicle. Hence, in addition to the high speed accident detection, this paper concentrated on low speed car accident detection. The main obstacle that encounters the low speed accident is how to differentiate whether the user is inside the vehicle or outside the vehicle, walking or slowly running. The effect of this obstacle is minimized, in this work, by a proposed mechanism that distinguishes between the speed variation of low speed vehicle

and walking or slowly running person. The proposed system consists of two phases; the detection phase which is used to detect car accident in low and high speeds. The notification phase, and immediately after an accident is indicated, is used to send detailed information such as images, video, accident location, etc. to the emergency responder for fast recovery. The system was practically tested in real simulated environment and achieved quite very good performance results.

2.3 Car: An IoT Based Accident Detection System

Authors: Arif Shaik,Natalie Bowen,Jennifer Bole,Gary Kunzi

Abstract: The Internet of Things (IoT) offers limitless possibilities to both the public and private sectors. Automobile manufacturers are interested in IoT applications to increase the safety of their vehicles, to meet customers' demands and ultimately to offer cutting-edge products which maximize profit. The healthcare industry is concerned with how the IoT can improve the speed and accuracy of communication. This paper describes the feasibility of equipping a vehicle with technology that can detect an accident and immediately alert emergency personnel. When there is a car accident someone has to actively seek help such as calling 911 for emergency services. There is no automatic notification to the police, ambulance, friends, or family. The Internet of Things (IoT) can be used to produce an automatic notification and response to the scene. A signal from an accelerometer and a GPS sensor are automatically sent to the cloud and from there, an alert message will be received by whoever is subscribed to that car. The signal will indicate the severity of the accident and the GPS location. The ambulance will use the GPS coordinates to get to the scene quickly.

3. EXISTING SYSTEM

we have tried to compare our work with other accident detection techniques. Most of the studies in this field revolve around the enhancement of tangible infrastructure rather than on Intelligent Transportation Systems (ITS) which include traffic congestion detection, accident detection, detecting the occurrence of an event etc. Even the few existing studies in the domain lack implementation details and are terrain specific i.e. there are constraints both in the geographical as well as demographic aspects

DISADVANTAGES OF EXISTING SYSTEM:

1. More than 80% of accident-related deaths occur not due to the accident itself but the lack of timely help reaching the accident victims.

4. PROPOSED SYSTEM

The proposed model is a fusion of CNN and LSTM layers for continuous video classification taken from a camera. The CNN part of the proposed model was mainly inspired by the Inception v3, but with certain tweaks it has fitted well to our training images. The LSTM layers were added to the existing Convolution Network to take into account temporal features along with spatial features. This is further divided into the convolution and recurrent parts of the model. In a CNN-LSTM network, the CNN is

primarily used for feature extraction from the images, which is passed on to the LSTM for sequence prediction. They are widely used in tasks similar to Activity Recognition, Image Description, Video Description etc.

ADVANTAGES OF PROPOSED SYSTEM:

1.Initially, the model had difficulties in predicting the right class since the only difference between cars and broken cars were dents, broken headlights etc.

2.Thus, random noise was being accounted during the prediction since not all the accident images were of high clarity.

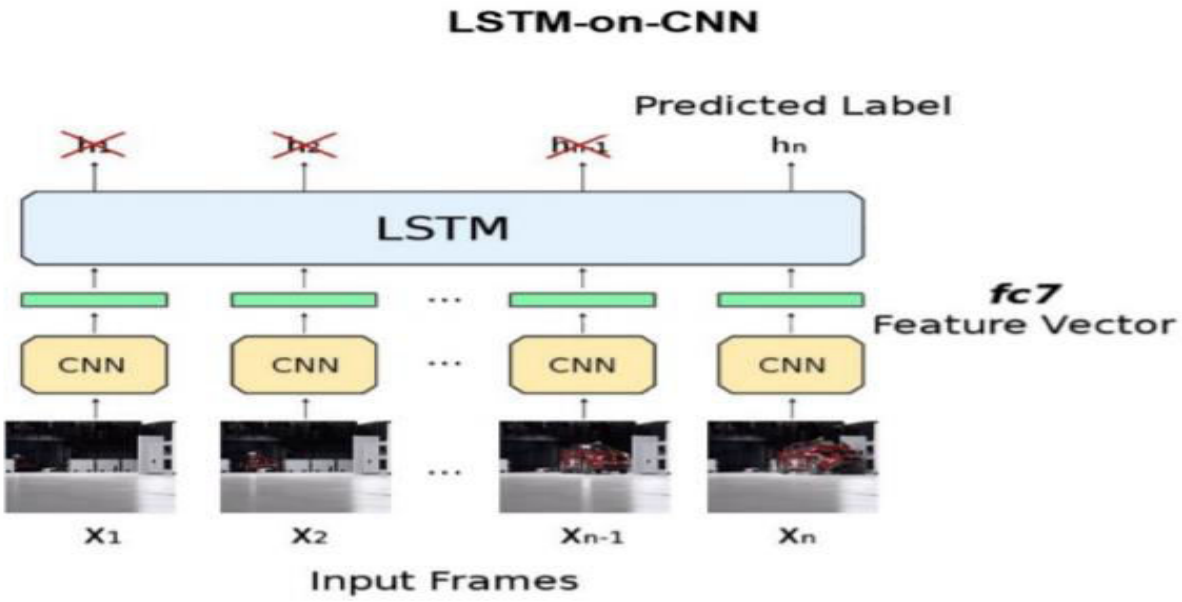


Fig. 5. Feeding Sequences of Frames to the LSTM Layer

FIG1- SYSTEM ARCHITECTURE

5. METHODOLOGIES

MODULE

1.Load & Generate CNN Model

In this module we load and trained CNN with dataset.

2. Browse System Video

In this module user upload video to the system.

3. Start Accident Detector

In this module uploaded video is loaded ,start video play and detect accident

SOFTWARE ENVIRONMENT

Python is a high-level, interpreted scripting language developed in the late 1980s by Guido van Rossum at the National Research Institute for Mathematics and Computer Science in the Netherlands. The initial version was published at the alt. Sources newsgroup in 1991, and version 1.0 was released in 1994.

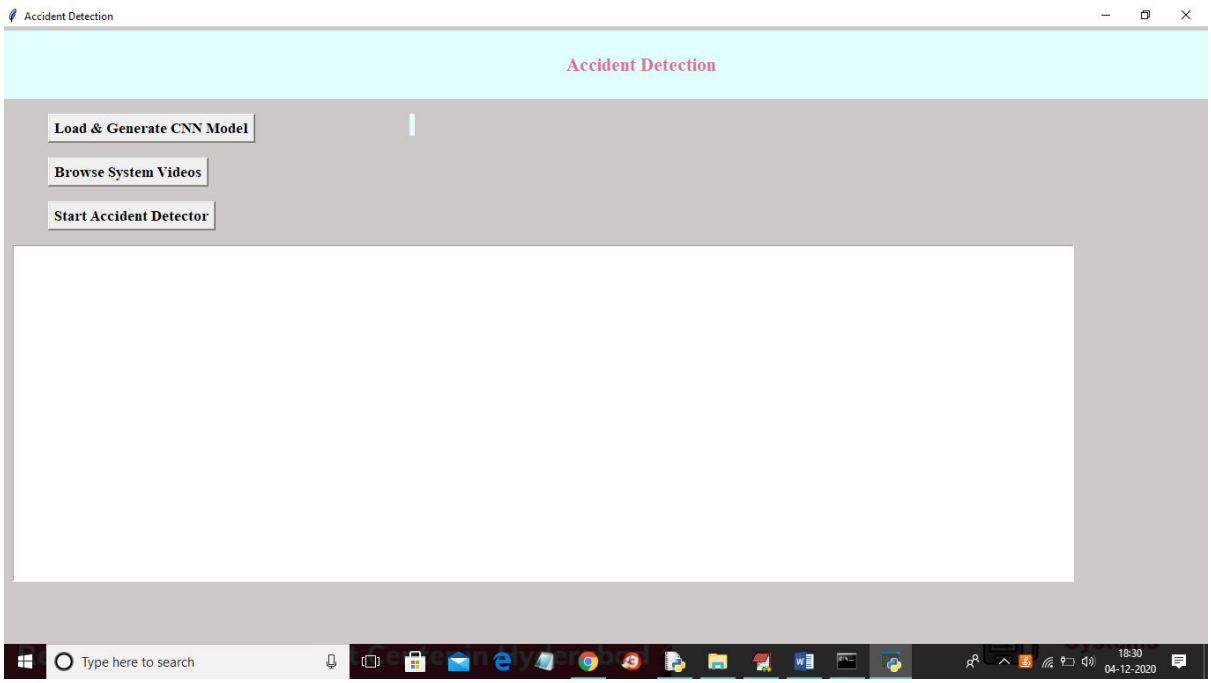
Python 2.0 was released in 2000, and the 2.x versions were the prevalent releases until December 2008. At that time, the development team made the decision to release version 3.0, which contained a few relatively small but significant changes that were not backward compatible with the 2.x versions. Python 2 and 3 are very similar, and some features of Python 3 have been back ported to Python 2. But in general, they remain not quite compatible.

Both Python 2 and 3 have continued to be maintained and developed, with periodic release updates for both. As of this writing, the most recent versions available are 2.7.15 and 3.6.5. However, an official End of Life date of January 1, 2020 has been established for Python 2, after which time it will no longer be maintained. If you are a newcomer to Python, it is recommended that you focus on Python 3, as this tutorial will do.

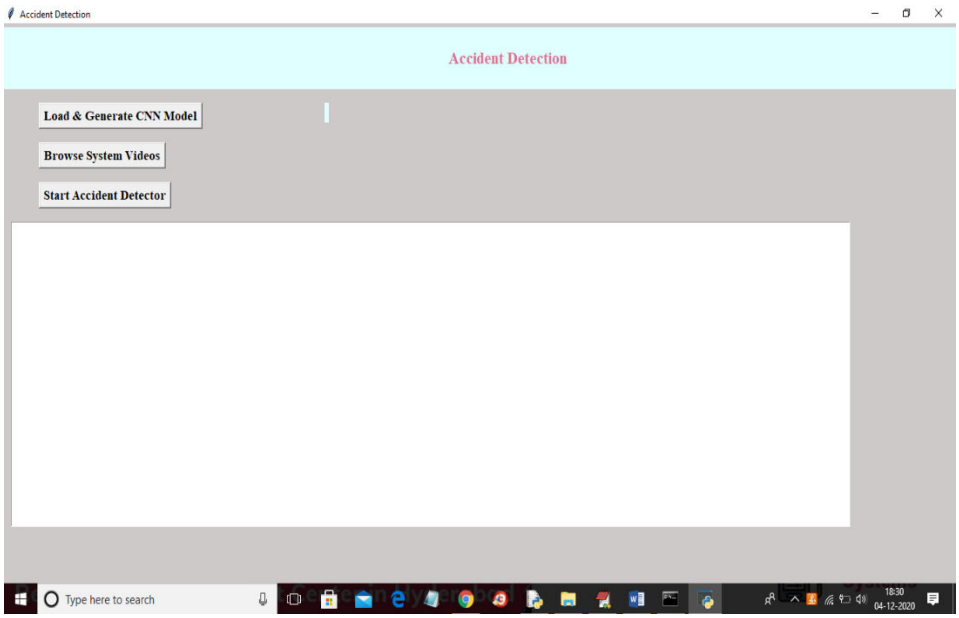
Python is still maintained by a core development team at the Institute, and Guido is still in charge, having been given the title of BDFL (Benevolent Dictator For Life) by the Python community. The name Python, by the way, derives not from the snake, but from the British comedy troupe Monty Python's Flying Circus, of which Guido was, and presumably still is, a fan. It is common to find references to Monty Python sketches and movies scattered throughout the Python documentation.

6. RESULTS AND DISCUSSION SCREEN SHOTS

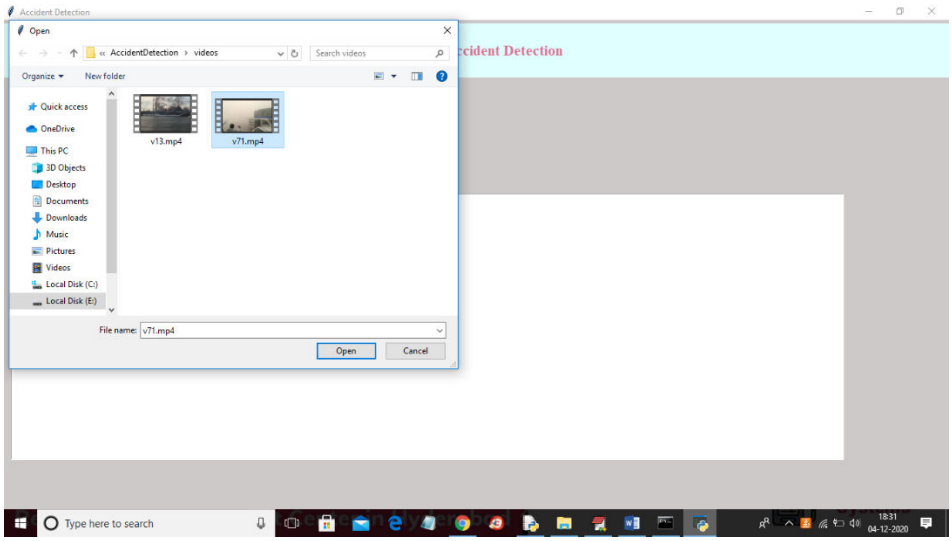
To run project double click on run.bat file to get below screen



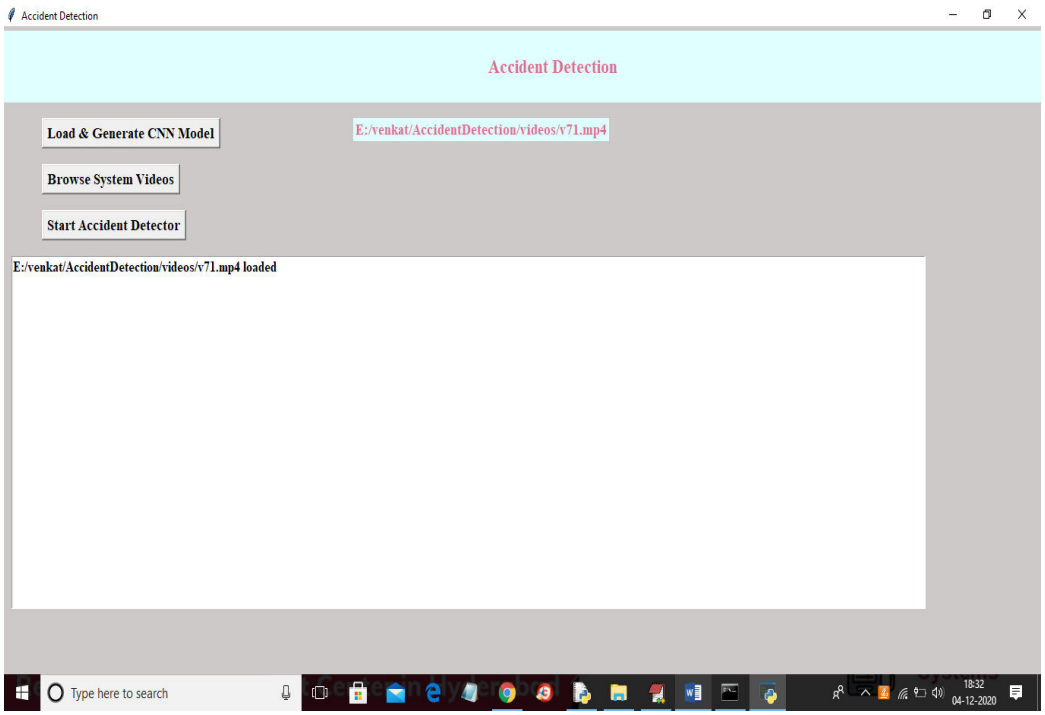
In above screen click on 'Load & Generate CNN Model' button to trained CNN with dataset and to load CNN model using tensorflow



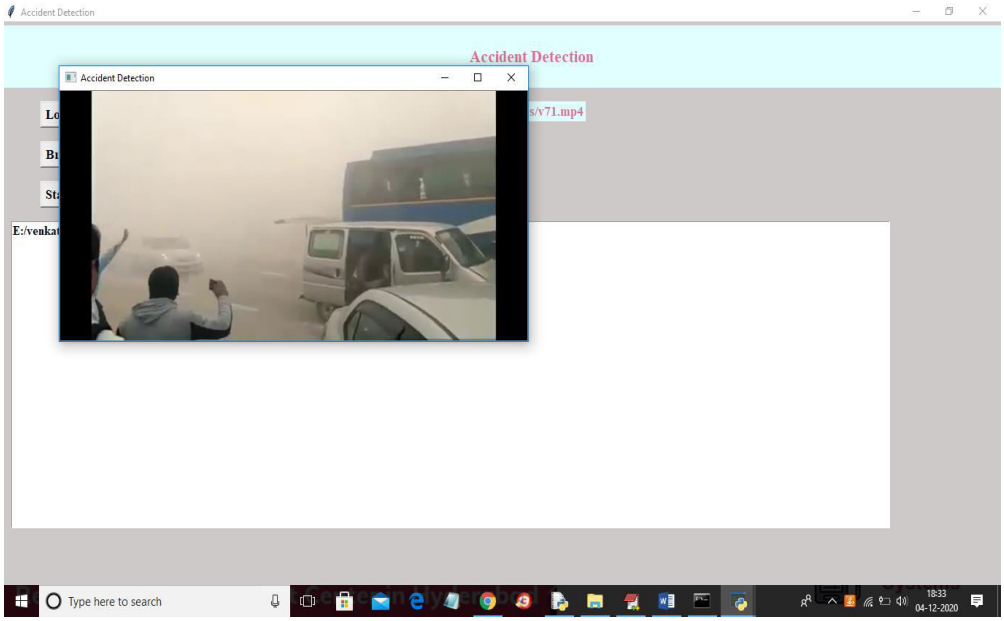
In above screen tensor flow model is loaded and now click on 'Browse System Video' button to upload video



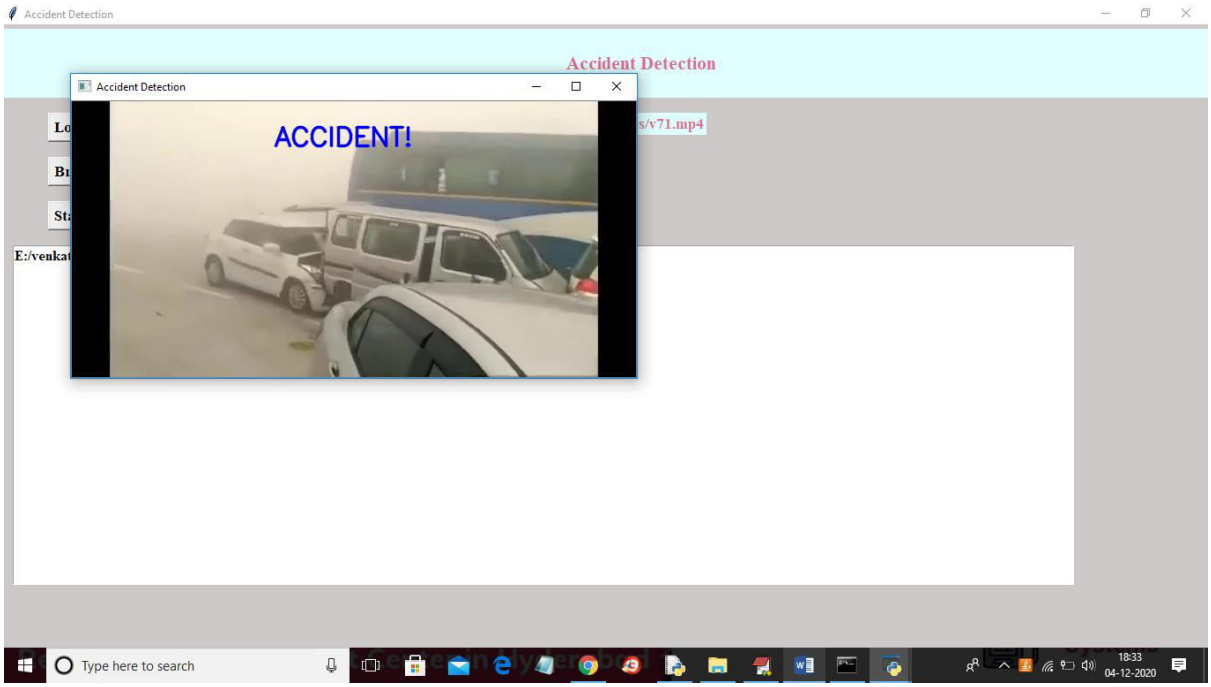
In above screen selecting and uploading video and then click on 'Open' button to load video



In above screen video is loaded and now click on 'Start Accident Detector' button to play video and detect accident



In above screen video start playing and upon accident detection will get below screen with beep sound



In Above screen playing another video without message if normal driving appear

7. CONCLUSION AND FUTURE SCOPE

Accidents are one of the most common problems that humanity faces on a daily basis, leading to loss of both life as well as property. The proposed system provides a very viable and effective solution to this problem. The proposed vehicle accident detection system can track an accident at its moment of occurrence and sends an instantaneous alert SMS regarding the accident to the nearby hospitals and police stations which includes details like timestamp and the geographical location. Unlike other systems in use, which consists of expensive sensors and unwanted hardware, the proposed system is much more cost effective and foolproof with a much-improved accuracy rate than its counterparts mainly due to a model-based approach. The experimentation, testing and validation has been carried out using images and the results show that higher sensitivity and accuracy is indeed achieved using this method, henceforth, making it a viable option for implementing this system in most of the state and national highways of the country.

Future Scope is being planned to further analyze and enhance the protocol towards a social cause and helps create a system which guarantees that no individual is left unattended or helpless in an unforeseen event of an accident, in turn, securing and maintaining the quality of life to the highest standards.

8. REFERENCES

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