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Smart Accident Detection And Handling

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Abstract: The number of automobiles in use in road traffic has increased dramatically during the past several years. Due to this circumstance, there had been a marked increase in accidents as well as other traffic issues that had caused significant losses. ability to automatically identify hazardous circumstances and swiftly communicate this information to neighboring vehicles is one of the most significant road safety technologies. An accident victim may go unnoticed for a long time on highways with minimal traffic and quick speeds. The goal is to develop a system that could recognise an incident based on a live video feed from a Surveillance camera that has been mounted on a roadway. After the detection process, our project will deal with the aftermath of the situation. Like informing the accident of the nearest Hospital and ambulances to reach the place of an accident at the earliest. And after picking up the accident victim, we will provide the shortest route with less traffic congestion to reach the Hospital as soon as possible. At the same will file an E-Complaint to the police station. Each frame of a video should have been processed by a deep learning convolutional neural network model that has been trained to identify among accident- and non-accident-related video frames. There has been demonstrated that Convolutional Neural Networks provide such a quick and reliable method for classifying photos.

Key Words: Convolutional Neural Network, Accident Detection, Deep Learning, Video Classification

1. INTRODUCTION

Road accidents cause more than 1.3 million deaths yearly and another 25 to 2.5 billion people may suffer only minor injuries. The World Health Organization (WHO) found that low- and moderate-income or developing countries have the highest number of road accident-related deaths in research conducted on road accidents based on the income status of the nation. The death rate from traffic accidents is usually 23.5 per 100,000 people in developing countries, which is considerably higher than the 11.3 per 1 million people in high-income or industrialized nation.

The location of the accident scene is crucial for the rescue effort. Emergency assistance will arrive quickly in situations with heavy traffic or in urban areas, but it can be challenging to deliver it quickly on roads or in low-traffic areas. It has been noted that delays in hospital treatment cause serious injuries to result in fatality. The victim's probability of survival greatly is dependent on how quickly an emergency reaches the scene of an accident and transfers the victim to the hospital. Road safety is receiving a great deal of attention from both businesses and researchers as the number of traffic accidents continues to rise. Technologies that can detect and alert to accidents intelligently need to be implemented to reduce the fatalities that result from road accidents.

There are many different deep learning algorithms that can be used for accident detection, but not all of them are created equal. Some algorithms, like the Convolutional Neural Network (CNN), may be more accurate than others but can be much more computationally intensive. Other algorithms, like the Long Short-Term Memory (LSTM) network, may be less accurate but can run very quickly. Ultimately, the best algorithm to use will depend on the specific needs of the application. The goal is to use cutting-edge Deep Learning Algorithms which use Convolutional Neural Networks (CNNs) to analyze frames collected from the footage the camera generates to identify an accident as soon as it occurs. There are many benefits of using a Convolutional Neural Network (CNN) for accident detection over other algorithms. CNNs can automatically learn features from data, which can be very helpful for detecting patterns in images that may be difficult for humans to see. Additionally, CNNs are very efficient at classifying images, and can often do so with high accuracy. Finally, CNNs are not susceptible to overfitting, which can be a problem with other machine learning algorithms.

There are various benefits of using a CNN for accident detection over other algorithms. It can automatically learn features from data, which can be very helpful for detecting patterns in images that may be difficult for humans to see. It is very efficient at classifying images and can often do so with high accuracy. It is not susceptible to overfitting, which can be a problem with other machine learning algorithms. We concentrated on installing this technology on highways where there is less congestion and prompt assistance for accident victims is uncommon. On highways, we can install CCTV cameras at a distance of about 500 meters that serve as a surveillance tools. We can also install the suggested system that uses the CCTV camera footage and the suggested accident detection algorithm to identify accidents.

The number of people using autos is rising. Accidents are occurring daily as a result of congested roads. As a consequence of the ambulances' arrival delays at the accident scene or during their transit to the hospital, lives have been lost. The accident sufferer must therefore be rushed to the hospital as soon as possible. Every time an accident happens, the investigating unit must be notified. To order to reduce the amount of time needed for the investigation, it is also beneficial to inform the inquiry department.

An emergency medical facility that arrives at the scene of the accident can significantly lower the rate of death. Thus, the concept of an alert system is born, which, upon detecting an accident, will send an emergency notification to a local medical facility and also to the closest police station.

A. Road Accident Causes

The following are the primary causes of traffic accidents:

1. Drunk driving is the practice of operating a vehicle after consuming excessive amounts of alcohol. Alcohol consumption impairs vision owing to dizziness and decreases concentration.
2. Over-speeding: When an engine is driven faster than it was intended to go, either intentionally or accidentally. The majority of fatal accidents are triggered by speeding. The risk is increased the faster the speed. If going at a faster pace, an automobile needs a longer stopping distance.
3. Driver-Impaired Distractions: It should come as no surprise that driving distractions are a significant contributor to car-related accidents, injuries, and fatalities. Distractions can be of many types some of them are as following 1. Adjustment of mirrors while driving. 2. Stereo/Radio elements 3.Animals on the road
4. A Red Light Jumper: Running a red light refers to driving through it without stopping. As a car may be travelling on the road from the opposite side, it might result in an accident.

B. The Causes of Road Accidents Below are some of the various road-related factors that cause accidents:

1. Drivers: violating the posted speed limit, driving drunk, driving quickly, not paying attention to signs, and breaking traffic laws.
2. Pedestrian: illiteracy, carelessness, jaywalkers, etc.
3. Passengers: Extending their bodies outside of the vehicle, grabbing a bus that is already moving, conversing with drivers, etc.
4. Vehicles: Break failure, an unmaintained engine, defective parts, and loading a vehicle above its carrying capacity.
5. Road Conditions: Road Conditions: incorrect road-to-highway merging, improper placement of speed bumps, etc.
6. Weather Conditions: Prolonged periods of heavy rain that might cause storms, snow, etc.

C. Accident Prevention Measures:

1. Raising public awareness of it and educating people about traffic safety regulations
2. Correct application of law enforcement.
3. Engineering of the road infrastructure, vehicle design, and vehicle design.

D. Accidents Consequences Acting Directly:

1. A fatality..
2. Damage to persons
3. Property damages.

Goals:

1. To assist assistance to accident victims at this crucial time.
2. To include a technology that can analyze video footage from a camera to identify accidents.
3. To avoid fatalities brought on by a delay in receiving medical attention.
4. To stop the accidents by notifying the police station and hospital.

2. SURVEY OF EXISTING SYSTEM AND ITS LIMITATIONS:

There are many existing accident detection systems, but they all have limitations. Some systems can only detect accidents that have already happened, while others can only detect accidents that are about to happen. Additionally, many systems require expensive hardware or are only effective in certain conditions. Ultimately, no existing accident detection system is perfect, and there is always room for improvement. Emergency responders receive critical information from the accident detection and alert system as soon as it is available. Mortality rates can be decreased by shortening the period between an event and its discovery. To verify the car's reliability and functionality, the complete work must be connected with it. Thus, even on rural highways, our work will significantly lower the accident-death ratio. Therefore, it is very significant in people's daily lives in a nation like India. Even in sparsely populated areas, this proposed activity will provide crucial information regarding accidents.

The most widely used accident detection technologies are cellular data, radar, onboard cameras, radar, and GPS. Wireless technologies such as SONAR for accident prevention, GPS modem for determining the vehicle's exact location in terms of latitude and longitude, as well as GSM for sending messages on mobile at the receiver end, are used to design and implement an automatic accident prevention and reporting system.

If properly implemented, the proposed system for accident detection systems can prove to be a significant help in developing smart transportation systems in shortly the near future. Additionally, the technology can be utilized by the proprietors of transportation firms, etc. to track a vehicle's location in real-time and check its speed. These qualities can be used if the event that vehicle theft etc.

Table 1. Previous Algorithms with Limitations.

Algorithm / Method	***Limitation***
CVIS is the foundation of the accident detection method.	Real-time performance is poor, for one.
Predicting the future positions of traffic participants and their trajectories. Convolutional LSTM Auto-Encoder use.	If participants get obstructed, this approach cannot identify an accident.
Use of a variety of Google technologies and services, including the open-sourced version of TensorFlow.	The node scheduling and placement techniques were insufficient to determine the timing and location of the execution of various nodes.

3. METHODOLOGY

A device called the Smart Accident Detection System is used to identify accidents and give drivers information to help them avoid collisions. The Smart Transportation System includes it. To identify accidents and notify drivers, it analyses data from numerous sensors. It is a very helpful tool for drivers to prevent collisions. Accident detection is a worry of the suggested system. Providing the accident victims medicine on the site, though, could make this process take longer. As technology progresses, we may also avoid accidents by creating alert systems that can stop a car to order to avoid them. The accident detection and handling application can be improved in several different ways.

Fig1: Accident Detection Dataset

Image Segmentation: Image segmentation is the division of an image into several segments (sets of pixels), and it is frequently used to identify objects and image boundaries (such as lines, curves, etc.). The result of this technique is either a collection of segments that collectively cover the full image or a collection of image contours that aid with edge identification.

4. ANALYSIS/ALGORITHM

The different algorithm used in developing accident detections models are:

- Transfer Learning
- CNN

Transfer Learning: Transfer learning is a machine learning technique that allows a model that has been trained for one task to be used again for another related task. When modeling the second task, this optimization method allows rapid advancement or enhanced performance. Instead of developing a model from scratch, deep learning is implemented by employing one that has already been learned. To save time when training a new model, the model's weights are removed.

Convolutional Neural Network (CNN): CNN, or convolutional neural network: Convolutional neural network, or CNN: A Convolutional Neural Network (ConvNet/CNN) is a Deep Learning technique that can take an input image, assign different components and entities in the image significance (trainable values and biases), and be able to differentiate between them.

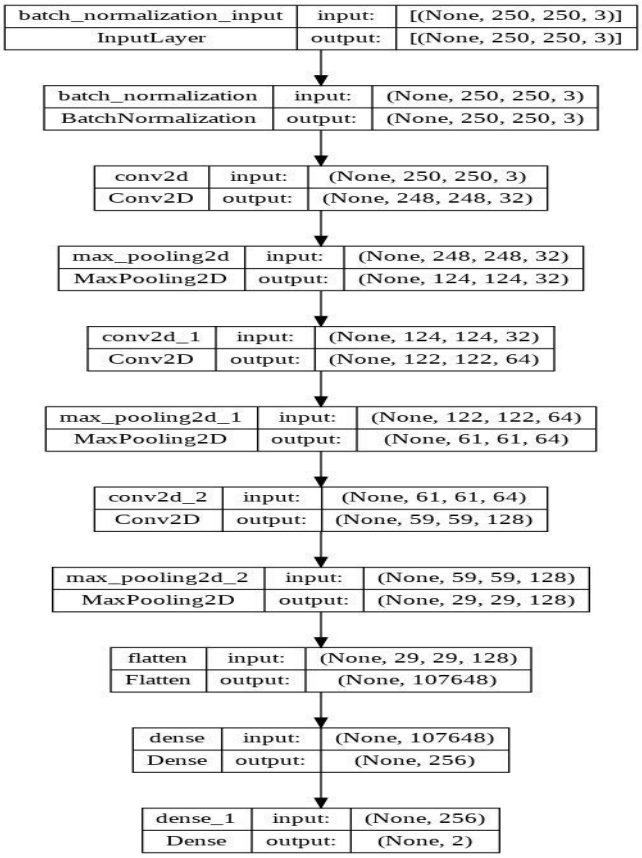

Fig2: CNN Architecture.

This system aims to detect Accidents which will be captured on the CCTV cameras. The detection is not the sole purpose of the project but to combine the Geographical data of nearby Hospitals and the Police institution. The CCTV captures the accident but we are going to make use of Deep Learning to Detect the Accidents and try to automate the process for the betterment of the Person involved in the accident. The model will not only detect the accident and we are going to make an application to support this detection and provide help to the victim. The Hospital data will come into the picture now. The nearest hospital to the geolocation of the camera will be notified about the accident and the Hospitals will prepare in advance about it. The ambulance will be sent to the people in need. The next process will be to take care of the law. That's where the police data comes into the picture. Most accident happens in the case of Hit and Run, where the guilty person takes and the law needs to take care of that. Therefore we have thought of implementing an E-Complaint system where the nearest police stations are informed about the crime or the accident that occurred.

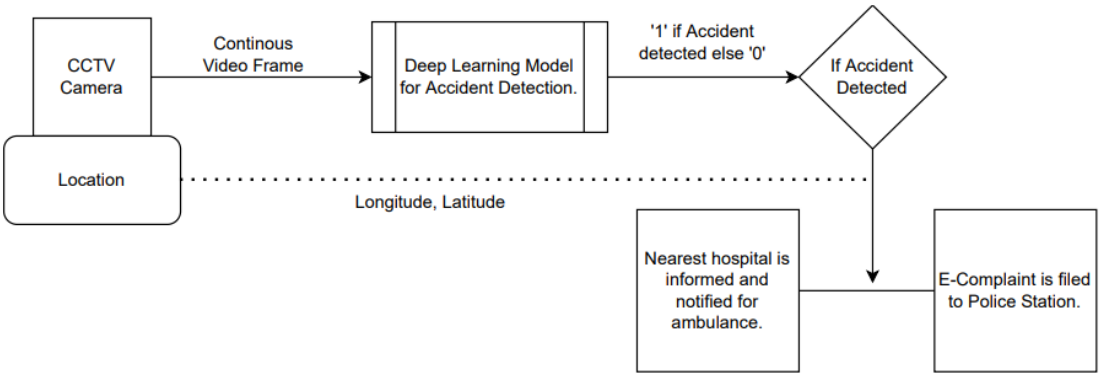

Fig 3: Application Architecture.

5. CONCLUSION

The emergency responders can quickly access vital information due to the accident detection and notification system. Mortality rates can be decreased by shortening the period between an event and its discovery. The car must be integrated into the entire project to verify its dependability and functionality. Thus, even on rural roads, our work will significantly lower the accident-death ratio. Therefore, it is very significant in people's daily lives in a nation like India. The suggested car accident detection system can identify accidents as they happen and instantly notify neighboring hospitals and police stations by SMS about the accident, along with information like the timing and location. The suggested system is far more cost-effective and reliable than other systems now in use, which are made up of pricey sensors and unnecessary technology.Thus, the project contributes to a social cause and aids in the development of a system that ensures no person is abandoned or rendered helpless in the case of an accident, thereby securing and upholding the highest quality standards of life.

6. REFERENCES

[1] "Accident Detection Using Android Smart Phone" by P. Kaladevi, T. Kokila, S. Narmatha, and V. Janani March 2014 J. Clerk Maxwell, Third Edition, Volume 2 of A Treatise on Electricity and Magnetism. Clarendon, 1892, Oxford, pp. 68–73.
[2] "Accident Prevention and Reporting System Using GSM (SIM 900D) and GPS" by Rashida Nazir, Ayesha Tariq, Sadia Murawwat, and Sajjad Rabbani was published in 2014.
[3] "Proposed Model for the Smart Accident Detection System for Smart Vehicles Using Arduino Board, Smart Sensors, GPS and GSM," Pratiksha R. Shetgaonkar, Vijay Kumar NaikPawar, and Rajesh Gauns 2015 July–August.
[4] "Accident Detection and Reporting System Using GPS and GSM Module," by Mr. Dinesh Kumar HSDK, Shreya Gupta, Sumeet Kumar, and Sonali Srivastava May 2015.
[5] Pattern Recognition Using Neural and Functional Networks, Vasantha Kalyani David, and S. Rajasekaran, "Applications of MicroARTMAP".
[6] A KNN-SVM hybrid model for cursive handwriting detection was developed by Cleber Zanchettin, Byron Leite Dantas Bezerra, and Washington W. Azevedo and published in Neural Networks (IJCNN), The 2012 International Joint Conference.
[7] Mahendra Vucha, S Monika, T Kalyani, and B Naresh, March 2019. The mechanism for alerting and detecting accidents. The International Journal of Innovative Technology and Exploring Engineering (IEEE), ISSN: 2278-3075, is published in 2019.
[8] "Global Status Report on Road Safety 2018" by the World Health Organization, available at HTTPS://www.who.int/violence injury prevention/road safety status/2018/en/
[9] A traffic accident predictive model based on a neural network algorithm and rough set theory was published in Applied Mechanics and Materials in 2011 by Li Qiu, Chen Liang, Cheng Changguang, and Pan Yuexiang.
[10] Singh, D., and C.K. Mohan, 2018. Using a stacked autoencoder, the deep spatiotemporal representation may detect traffic accidents. IEEE transactions on intelligent transportation systems, 20(3), pp.879-887.