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Accident Detection and Warning System

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ABSTRACT

Recently, the number of traffic accidents, especially those involving two-wheeled vehicles, has increased significantly. Timely medical assistance can helpsave lives. The system aims to quickly notify the nearest medical center of an accidentmedical help. Roads are passively monitored with the help of CCTV cameras. H. Professionals do not always generated via CCTV cameras. Injuries often occur for the following reasons:Neglecting pedestrian means, ran aground in the distance. come further,Even most people around random scenes are busy clicking pictures.A video that doesn't know the truth that their little carelessness should be worth a lifetime. To overcome this, weSmart devices that can use common CCTV cameras with night vision.

The proposed device captures the video stream, computes the input, and the device signal is generated in real time, so additional sensors may not be needed. The digital camera itself is also intended to detect injuries in real time and send signals to ambulances and fire departments. Ensure the timely availability of the right assets needed to save lives. Additionally, the vast majority of people near the scene of an accident are busy taking pictures and videos, not knowing that carelessness can cost their lives. To overcome this, I recommend a clever device that can leverage his existing CCTV cameras with night vision capabilities.

Keywords:Convolutional Neural Network, ResNet, Traffic net, openCV, LSTM, GPS, REST.

1. INTRODUCTION

Currently, the accident rate is increasing rapidly. The use of vehicles such as cars and bicycles for job hunting has increased, and accidents due to speeding are occurring frequently. Accident rates cannot be reduced because advanced technology is not available. In order to reduce the domestic accident rate, this paper presents a solution. Introduced an automatic accident detection and warning system. The main purpose is to control accidents by using wireless communication technology to send messages to registered mobile phones, hospitals and police stations. In the event of an accident, for example in a city, a message will be sent in a short time to the registered mobile phone via the GSM module. The main goal is to allow the system to detect accidents based on the video sequences sent by the cameras. A tool to support accident victims who need it by detecting accidents at an early stage and reporting them to the government.

The goal is to detect accidents in seconds by analyzing frames of video generated by cameras using advanced deep learning algorithms using convolutional neural networks (CNN or ConvNet). The focus is on installing systems on high traffic roads. Incomplete and timely assistance to accident victims is rare. Surveillance cameras can be installed on the street. This camera allows you to set up a proposed system that takes footage from CCTV cameras and runs them through a proposed collision detection model to detect accidents.

RELATED WORK

2.1 Accident Detection using Convolutional Neural Networks

CNNs are used for modeling spatial data such as photographs. CNNs have been successful in tasks such as photo classification and object recognition. LSTM is an algorithm used to model sequential data and make predictions based on it. Standard LSTMs are readily applicable to continuous data with spatial centers. Therefore, CNN LSTM structures are preferable for performing tasks involving photo or video sequences. For non-stop video captured by cameras, the proposed version is a fusion of CNN and LSTM layers. His CNN portion of the proposed version was specifically inspired by Inception v3, but with a few tweaks it blended nicely with the educational photography. An LSTM layer was added to an existing convolutional network to obtain both temporal and spatial features.

2.2 Accident Detection, Severity Prediction, Identification of Accident Prone Areas in India and Feasibility Study using Improved Image Segmentation, Machine Learning and Sensors.

"Accident detection, severity prediction, identification of accident-prone regions in India and feasibility studies using enhanced image segmentation, machine learning and sensors", in this paper, the system We provide a three-tier solution that uses machine learning and computer vision to analyze traffic accidents in india.The solution lies in the classification of car accidents. This step can be performed using any object detection and image segmentation algorithm. I tried the You Look Only Once (YOLO) algorithm. However, accidents are very likely to be misclassified, which is a big problem when using real-time data. The YOLO algorithm found the limitation that the region of interest was sufficient, but misclassified and lost some of the cars visible in the input video image.

2.3 Improving Estimation Of Vehicle's Trajectory Using the Latest Global Positioning System With Kalman Filtering

"Improving Vehicle Trajectory Estimation Using the Latest Global Positioning System with Kalman Filtering" Accurately predicting the future position of vehicles in advanced traffic systems is an important but difficult problem. Obstacle avoidance systems currently being investigated is limited to line-of-sight sensors. Much research has been done on the possibility of using GPS data received from different vehicles to predict the future position of each vehicle. The methods used to make these predictions are very simplistic and do not give accurate results, especially if the predicted future position of the vehicle is not a straight line such as a curve. Current research shows that better techniques are needed to predict vehicle trajectories under a variety of conditions. In this situation, the Kalman Filter (KF) is used.

1. PROPOSED SYSTEM

The proposed model is a fusion of CNN and LSTM layers for classifying continuous videos captured by cameras. The CNN part of the proposed model was largely inspired by ResNet-50, but with certain adjustments it fit the training images well. His LSTM layers were added to an existing convolutional network considering spatial and temporal properties. This can be divided into the convolutional and recursive parts of the model. In CNN-LSTM network, CNN is mainly used for image feature extraction, and for sequence prediction he is passed to LSTM. CNNs are used to model spatial data such as images. CNNs have been successful in tasks such as image classification and object detection. LSTMs are used to model sequential data and make predictions based on it. A standard LSTM can be applied directly to sequential data in the input space. Therefore, if you are working with a series of photos or videos, you should use the CNN LSTM architecture. GPS includes various properties in the prediction, such as current location data, vehicle speed, and direction. When the machine learning model detects an accident, the proposed system will send alerts to relevant authorities and nearby vehicles.

2. METHDOLOGY

We collected the datasets from an online data store called traffic-net, which classifies the datasets as accidents, heavy traffic, fires, and sparse traffic. It's part of DeepQuest AI, which trains machine learning systems to find, understand, and troubleshoot problems in any environment. It contains 4400 images with 4 classes. Each category has 1,100 images, with 900 illustrative images and 200 test images. An Android application was used for real-time alerting. Incident coordinates are sent to the Android client user and compared to the user's location. This allows users to make good decisions.

4.1 ARCHITECTURE

The video stream from CCTV is sent directly to the preprocessing part. This preprocessing is done by the openCV library which converts the video to still images. These images are sized and formatted to be compatible with the ResNet-CNN model. The CNN model used here is ResNet50[5]. Realized by a high-speed, high-performance computer system. An Android application is used for the user interface. The alert system uses a REST API to communicate with users and relevant authorities over the HTTP protocol. A relational database stores user data.

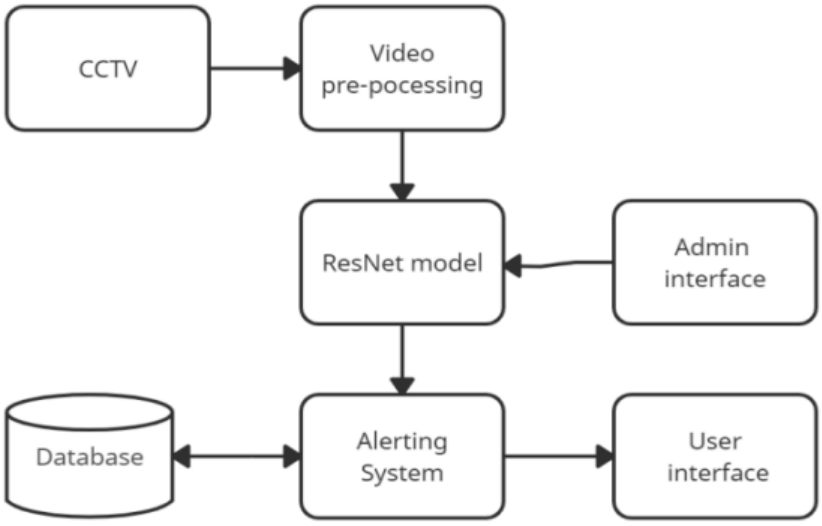


Fig. 1 Architecture Diagram.

A. Pre-Processing

The collected datasets are preprocessed before being input to the CNN model. This preprocessing makes the data compatible with the model and also maintains homogeneity. Preprocessing is done via the openCV library. This library is available in Python.

B. Building and training the ResNet-50 model

The main implementation of the ResNet 50 model architecture uses an open source library called imageai. ResNet-50 is a 50-layer deep convolutional neural network. You can load a pretrained version of the network trained on over 1 million images from the ImageNet database. A pretrained network can classify images into 1000 different object categories. As a result, the network learned detailed feature representations of different images. The network accepts images with a resolution of 224x224.

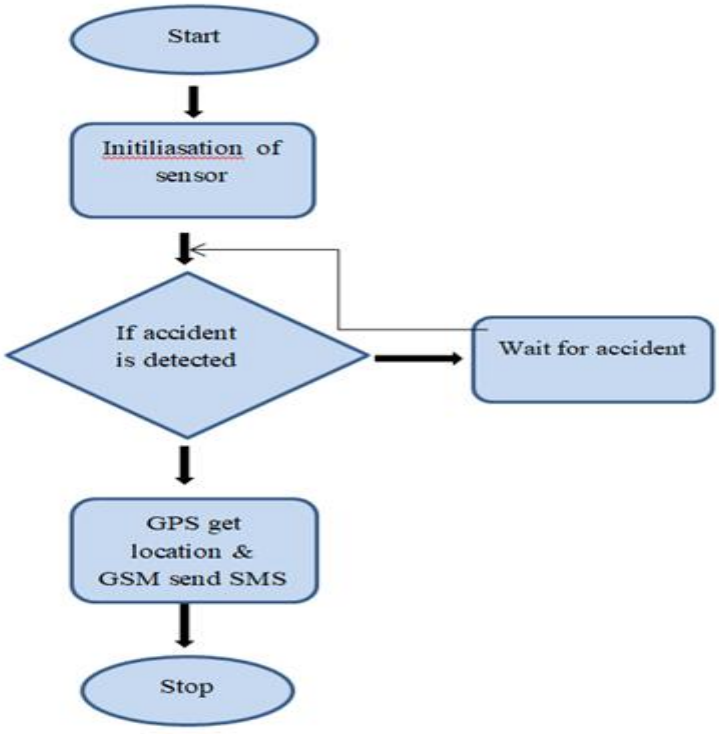
C. Alerting system

The alert module checks the output of the ResNet model in real time and alerts the user if there is a high probability of an accident. I use an Android application for the client side. Coordinates of the accident location are forwarded to an Android app along with an alert forwarded to emergency teams such as ambulances and fire brigade. An alert system written in Python uses REST APIs to communicate with Android applications.

D. GPS Module

To find a position on Earth, the whole thing is broken down into a number of coordinates that can be easily located by a module called the GPS module. The GPS used here is SIM28ML. This GPS module detects the location of the vehicle, receives the information obtained from the GPS receiver via coordinates, sends the received data to the Arduino first, and then transfers the information to the contact stored via the GSM module. Send ahead. The frequency operates in the 1575.42 MHz range and the output of the GPS module is in NMEA format containing data such as real-time position.

- **FLOW CHART**



3. CONCLUSION

The proposed programmed accident detection system can save the lives of people in accidents. The proposed system is very easy to understand and easy to use even for non-experts. The proposed vehicle accident detection system can track accidents as they occur. Compared with other deployment systems consisting of expensive sensors and unnecessary hardware, the proposed system is more economical, reliable and accurate than similar systems, mainly due to its model-based approach.

4. REFERNCES

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