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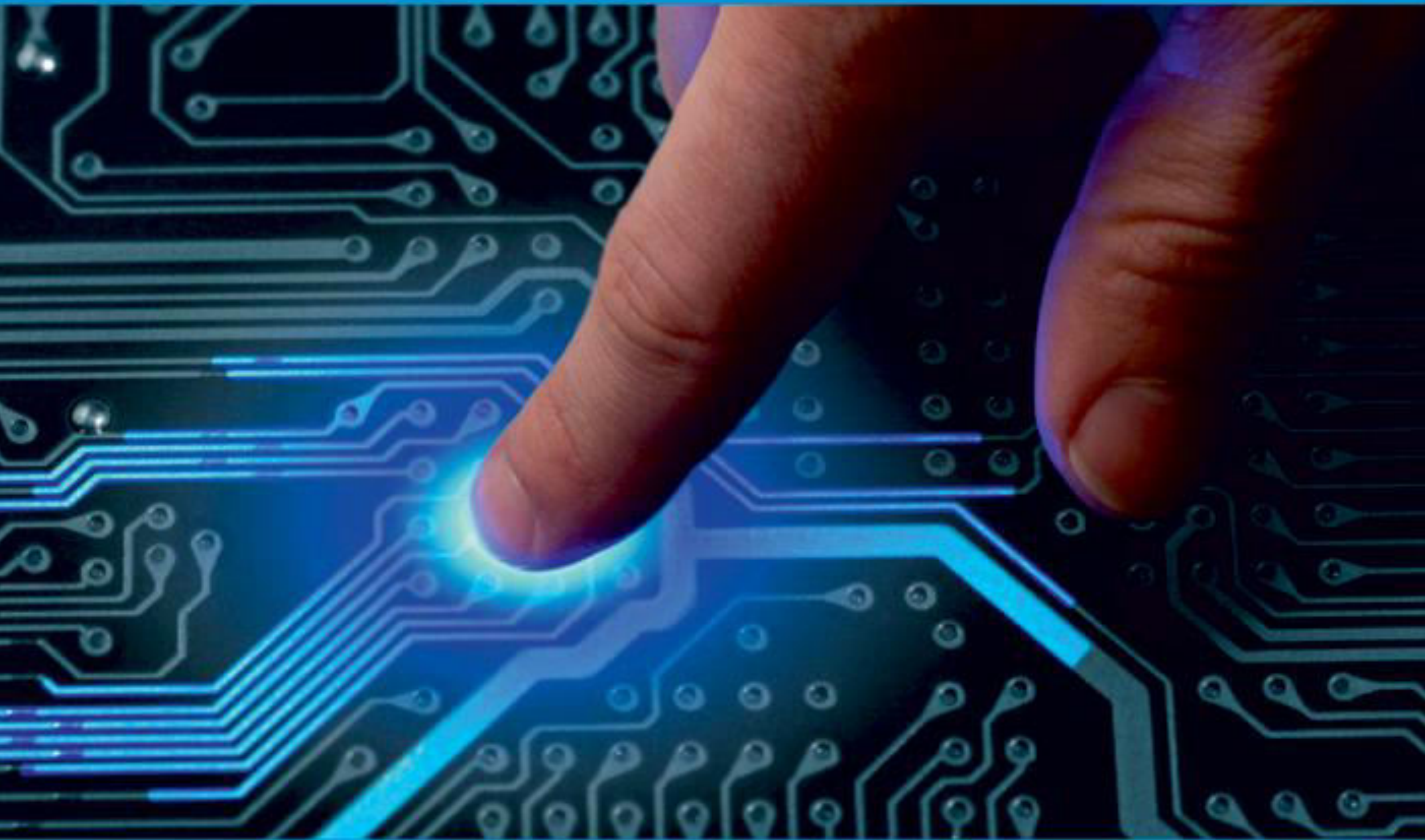

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Traffic Accident Detection using Video Surveillance

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ABSTRACT: The fast-growing world wide population with increasing economic levels are leading to significant vehicle growth. Increasing number of vehicles on the roads has brought about numerous difficulties for Several Authorities. Amongst different traffic related issues, road accidents are something worth giving attention to and have to be on the priority list. In general, many lives could be saved if emergency services could get accurate accident location and rescue the injured people at the shortest possible time. Using deep learning technique of CNN with the help of python programming language it is possible to accurately locate the scene of an accident and report it quickly to emergency services. This project helps at reducing the fatalities caused due to accidents occurring in roadways. Therefore, by implementing this in real life, it benefits from the need to save precious human lives.

KEYWORDS: CNN, Authorities, emergency services.

I. INTRODUCTION

The aim of this machine learning project is to enhance traffic safety through the development of a real-time traffic accident detection system using video surveillance. Leveraging computer vision techniques, the project focuses on analysing video feeds from surveillance cameras to identify patterns indicative of accidents. By training a machine learning model on a diverse dataset, the system aims to autonomously detect unusual events, such as collisions or abrupt changes in vehicle behaviour. The ultimate goal is to integrate this solution into existing surveillance infrastructure, providing timely alerts to authorities for swift response.

A. Objective

- Develop a Real-Time Accident Detection System: Create a system capable of swiftly identifying accidents in traffic surveillance videos.
- Implement algorithms for real-time analysis of video feeds to ensure timely identification of accident-related patterns
- Establish an efficient alert system that immediately notifies relevant authorities upon detecting a potential traffic accident**.**

B. Literature Survey

This paper proposed an ensemble model that uses the YOLOv8 approach for efficient and precise event detection. The model framework's robustness is evaluated using YouTube video sequences with various lighting circumstances. The proposed model has been trained using the open-source dataset Crash Car Detection Dataset, and its produced precision, recall, and m AP are 93.8 percent and 98 percent, 96.1 percent, respectively, which is a significant improvement above the prior precision, recall, and m AP figures of 91.3 percent, 87.6 percent, and 93.8 percent. The effectiveness of the proposed approach in real-time traffic surveillance applications is proved by experimental results using actual traffic video data. [1].

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N. C. Suriya et al. offer a full review of the You Only Look Once(YOLO) algorithm and its application in traffic accident detection and analysis in their paper published in 2020. The YOLO algorithm is found to be a popular and successful way of detecting traffic accidents in realtime, according to the research. It may be used to accurately analyse traffic flow and spot accidents, making it an invaluable tool for traffic management and emergency services. [2].
This paper presents a new efficient framework for accident detection at intersections for traffic surveillance applications. The proposed framework consists of three hierarchical steps, including efficient and accurate object detection based on the state of-the-art YOLOv4 method, object tracking based on Kalman filter coupled with the Hungarian algorithm for association, and accident detection by trajectory conflict analysis. A new cost function is applied for object association to accommodate for occlusion, overlapping objects, and shape changes in the object tracking step. The object trajectories are analysed in terms of velocity, angle, and distance in order to detect different types of trajectory conflicts including vehicle-to-vehicle, vehicle-topedestrian, and vehicle-to-bicycle. Experimental results using real traffic video data show the feasibility of the proposed method in real-time applications of traffic surveillance. In particular, trajectory conflicts, including nearaccidents and accidents occurring at urban intersections are detected with a low false alarm rate and a high detection rate. The robustness of the proposed framework is evaluated using video sequences collected from YouTube with diverse illumination conditions.[3].

Traffic accidents are the cause of a high percentage of violent deaths. The time taken to send the medical response to the accident site is largely affected by the human factor and correlates with survival probability. Due to this and the wide use of video surveillance and intelligent traffic systems, an automated traffic accident detection approach becomes desirable for computer vision researchers. Nowadays, Deep Learning (DL)-based approaches have shown high performance in computer vision tasks that involve a complex features relationship. Therefore, this work develops an automated DL-based method capable of detecting traffic accidents on video. The proposed method assumes that traffic accident events are described by visual features occurring through a temporal way. Therefore, a visual features extraction phase, followed by a temporary pattern identification, compose the model architecture. The visual and temporal features are learned in the training phase through convolution and recurrent layers using built-from-scratch 4 and public datasets. An accuracy of 98 is achieved in the detection of accidents in public traffic accident datasets, showing a high capacity in detection independent of the road structure.[4]

In this paper, we propose an accident detection system using YOLOv3, a state-of the-art version of YOLO. The proposed system is designed to detect three types of accidents, namely vehicle rollover, rear-end collision, and head-on collision. The system uses a pre-trained YOLOv3 model trained on the COCO dataset, which is fine-tuned on a custom dataset of accident images. The proposed system achieves an average precision of 0.94 for vehicle rollover detection, 0.93 for rear-end collision detection, and 0.92 for head on collision detection. The system also shows promising results in terms of real-time performance, with an average processing time of 0.03 seconds per frame on an NVIDIA GeForce GTX 1080 Ti GPU. The proposed system can be integrated into intelligent transportation systems to provide real-time accident detection and alerting, improving the safety of drivers and passengers on the road.[5]

This research uses CNNs to find anomalies (accidents) from videos captured by the VTSS and implement a rolling prediction algorithm to achieve high accuracy. In the training of the CNN model, a vehicle accident image dataset (VAID), composed of images with anomalies, was constructed and used. For testing the proposed methodology, the trained CNN model was checked on multiple videos, and the results were collected and analysed. The results of this research show the successful detection of traffic accident events with an accuracy of 82 percent in the traffic surveillance system videos.[6]

C. Design

Data Collection: Data collection is the process of gathering and measuring information from countless different sources. Collecting data for training the DL model is the basic step in the machine learning pipeline. The predictions made by DL systems can only be as good as the data on which they have been trained.

Preprocessing Data: preprocessing is a process of preparing the raw data and making it suitable for a machine learning model. It is the first and crucial step while creating a deep learning model.

Training Model: A training model is a dataset that is used to train an DL algorithm. It consists of the sample output data and the corresponding sets of input data that have an influence on the output. The training model is used to run the input data through the algorithm to correlate the processed output against the sample output. The result from this correlation is used to modify the model.

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Testing Model: In machine learning, model testing is referred to as the process where the performance of a fully trained model is evaluated on a testing set. The testing set consisting of a set of testing samples should be separated from the both training and validation sets, but it should follow the same probability distribution as the training set.

Reporting System: If the model detects an accident then, the Reporting module will send a SMS notification to the emergency service.

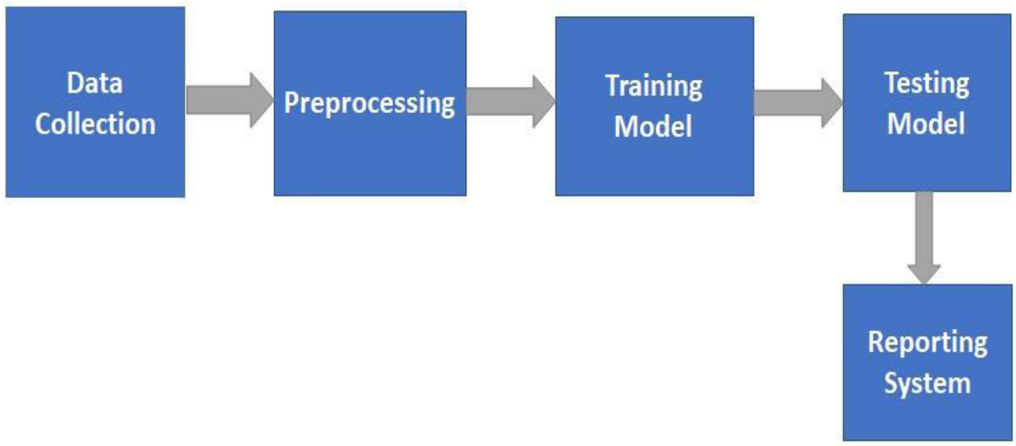

Figure 1. Block diagram

D. Implementation

The system is designed to process video data rather than individual images. The process would likely involve breaking down the video into a series of frames, pre-processing each frame, extracting features from each frame, and then using a CNN for classification. The model would be trained on a dataset of video clips. Then it show the result with accident is happening or not, if accident occures it will notify the authentification persons. The final output of the model would be a report indicating whether or not an accident is present in the input video.

Figure 2. Architecture Diagram

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E. Result

Figure 3: No Accident

Figure 4: Accident

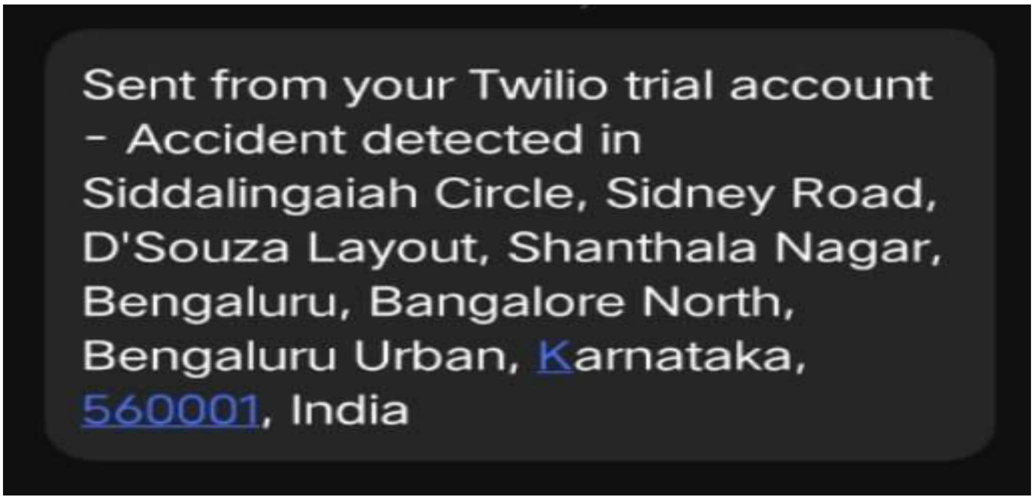

Figure 5: Reporting System

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II. CONCLUSION

video-based traffic accident detection system with an alerting mechanism not only improves road safety but also enhances overall traffic management and emergency response. By leveraging advanced computer vision and machine learning algorithms, this technology can quickly and accurately identify accidents, enabling swift intervention by emergency services. This proactive approach not only reduces response times but also minimizes the impact of accidents on traffic flow, leading to smoother and safer transportation for commuters. Furthermore, by providing real-time accident data, this system can help authorities make informed decisions to prevent future accidents and improve overall road infrastructure.

REFERENCES

[1] Sahil Kandhare Saurabh Mohole Sanket Sona Satej Tupare Deepak T. Mane, Sunil Sangve. Real-time vehicle accident recognition from traffic video surveillance using yolov8 and opencv. researchgate,, May 2023.
[2] German Sanchez-Torres Sergio Robles-Serrano and John Branch-Bedoya. Automatic detection of traffic accidents from video using deep learning techniques. In MDPI, Nov 2021.
[3] Huang J. Yang W. Li, Y. Object detection in videos: A survey and a practical guide. arXiv preprint arXiv, 2021.
[4] Chengjun Liu Hadi Ghahremannezhad, Hang Shi. Real-time accident detection in traffic surveillance using deep learning. arXiv, Aug 2022.
[5] Vishal Kumar Jain Manohar S Rohit Mitra, Rhythm Deep Singh. Accident detection using yolo. ijrtc., 11, June 2023.
[6] Muhammad Irfan Khalid Roobaea Alroobaea Saddam Hussain Jawaid Iqbal Jasem Almotiri and Syed Sajid Ullah Sardar Waqar Khan, Qasim Hafeez. Anomaly detection in traffic surveillance videos using deep learning. PMC, Sep 2022.

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