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DEEP LEARNING BASED AUTO ACCIDENT DETECTIONAND ALERT SYSTEM FOR VEHICLES

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ABSTRACT

Currently, CCTV cameras on roads operate passively without utilizing advanced technology. There is a shortage of traffic police personnel at crucial locations, leading to limited monitoring capabilities. Many accidents occur due to pedestrian negligence, especially in remote areas. Present system further delaying response times. Authorities only gain access to footage after an incident has occurred. To address these challenges, we propose an intelligent system. This system actively monitors road conditions, processes live video streams, and generates real-time alerts without the need for additional sensors. By utilizing the cameras themselves, our solution aims to detect accidents as they happen, ensuring timely responses. The system can also be, enabling swift assistance and potentially saving lives. System that can identify accidents using CCTV footage and send alerts to the nearest control room.

1.INTRODUCTION

1.1 PROBLEM STATEMENT

The global toll of traffic accidents, claiming over one million lives annually and causing countless injuries, remains a critical concern. Strikingly, developing and underdeveloped countries, accounting for only half of the world's vehicles, bear the brunt of the highest road traffic accident death rates. India, in particular, grapples with a staggering average of 13 deaths per hour, summing up to 140,000 fatalities yearly. This grim reality necessitates urgent and innovative solutions to curb the alarming statistics. The primary objective is to develop a system capable of detecting

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accidents through videos equences captured by strategically placed cameras. The envisioned tool aims not only to identify accidents promptly but also to alert authorities for swift response and aid to the victims. The focus is on leveraging advanced deep-learning algorithms, specifically convolutional neural networks(CNN or ConvNet), to analyze frames extracted from the video feed. The deployment strategy prioritizes busy roads, where the risk of accidents is heightened. In many instances, timely assistance to accident victims is a rare luxury.

The proposed solution involves the installation of closed-circuit television (CCTV) cameras on the streets. These cameras will feed into the proposed collision detection model, swiftly analyzing each frame to detect potential accidents. In the unfortunate event of a collision, the system's ability to automatically notify relevant authorities can significantly reduce response times, potentially saving lives. The emphasis on busy roads acknowledges the critical role response time plays inaccident scenarios. Every minute gained in providing assistance becomes pivotal, often determining the thin line between life and death. Therefore, the system's real-time accident detection and reporting capabilities stand as a beacon for improved emergency response. The integration of advanced deep learning algorithms, particularly CNNs, underscores the commitment to cutting-edge technology. CNNs, renowned for their prowess in image analysis, empower the system to discern complex patterns within video frames swiftly. This ensures that accidents are identified within seconds, afeat previously challenging with traditional methods.

1.2 DESCRIPITION

The proposed system capitalizes on the widespread availability of CCTV systems, harnessing their potential for real-time applications. Modern CPUs, with their enhanced computing power, make complex real-time applications feasible. Video surveillance systems, with their ability to record and analyze visual data, have become indispensable in various domains. In the realm of traffic monitoring, the proposed system extends the capabilities of video surveillance to detect, track, and evaluate traffic dynamics comprehensively. Beyond accident detection, the system can contribute to traffic flow analysis, speed determination, and vehicle classification. These functionalities position the proposed system not only as a life-saving tool in emergencies

but also as a multifaceted solution for enhancing overall traffic management.

2.LITERATURE SURVEY

Paper: Real-Time Vehicle Detection and Tracking for Driver Assistance Systems

Authors: S. Maldonado-Bascon, S. Lafuente-Arroyo, J. Acevedo-Rodríguez.

Analysis: This study focuses on real-time vehicle detection and tracking, essential components for driver assistance systems. It explores advanced computer vision techniques for detecting vehicles in various scenarios, contributing valuable insights to the development of accident detection systems. Paper:A Review on Deep Learning Techniques Applied to Traffic-Related Problems Authors: Jonathan Beltrán and J. A. S. Montejo-Sánchez Analysis: This review provides an overview of deep learning techniques applied to traffic-relatedissues. It covers applications such as traffic flow prediction, congestion detection, andaccident analysis, offering a comprehensive understanding of the role of deep learning in traffic safety.

Paper: Deep Learning-Based Traffic Accident Detection and Prediction SystemUsingSocial Media Data

Authors: Kyungmin Lee, Jae-Gil Lee, and Sangheon Pack

Analysis: Focusing on leveraging social media data, this work proposes a deep learning-basedsystem for traffic accident detection and prediction.

The study explores the use of unconventional data sources for enhancing the accuracy and timeliness of accident detection.

Paper: Enhancing Vehicle Safety through Deep Learning and Vehicular Sensor Networks

Authors: G. Marques, J. C. Oliveira, and P. Portugal

Analysis: This paper explores the integration of deep learning techniques with vehicular sensornetworks to enhance vehicle safety. It discusses the potential of combining sensor data withdeeplearning models for accurate accident detection and prevention.

Paper: A Survey on Deep Learning in Internet of Vehicles: Recent Advances and Challenges

Authors: Zubair Baig, Kashif Saleem, and Yaser Daanial Khan

Analysis: This survey provides insights into the application of deep learning in the Internet of Vehicles (IoV).

It covers various aspects, including accident detection, traffic management, and safety applications, offering a holistic view of deep learning's role in IoV. Paper: Machine Learning Approaches for Traffic Flow Prediction and Congestion Management: A Review Authors: Mohamadreza Arashpour, Mehdi Bahrami, and Reza Akbari Analysis: While primarily focused on traffic flow prediction, this review discusses machine learning approaches applicable to congestion and accident management. Understanding traffic dynamics is crucial for developing effective accident detection and alert systems.

Paper: Deep Learning for Vehicle Detection and Classification in Urban Traffic Environments **Authors:** Yunhui Guo, Dayi Zhang, and Yanning Zhang

Analysis: Focusing on urban traffic environments, this work explores the use of deep learning for vehicle detection and classification.

The study provides valuable considerations for implementing deep learning in complex traffic scenarios, relevant to accident detection.

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

Authors : Cesar Barrios and Yuichi Motai

Analysis: Focusing on predicting a vehicle's future location with accuracy, this work emphasizes the integration of the latest(GPS) with Kalman filtering.

Addresses challenges in intelligent transportation systems, particularly in obstacle avoidance.

3. SYSTEM DESIGN

3.1. Proposed system Architecture

We propose a robust system that leverages Convolutional Neural Network (CNN) technology for Accident classification, coupled with a Tkinter-based Graphical User Interface (GUI) for seamless interaction. This system addresses limitations found in existing methods by offering adaptability to diverse image conditions and real-time data augmentation. The proposed system combines state-of-the-art CNN technology with an intuitive GUI to advance the accuracy and versatility of accident detection processes. System that can identify

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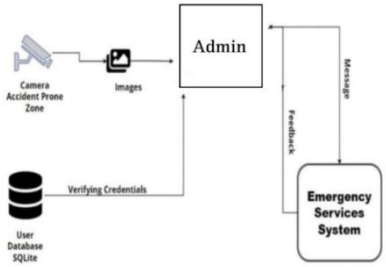
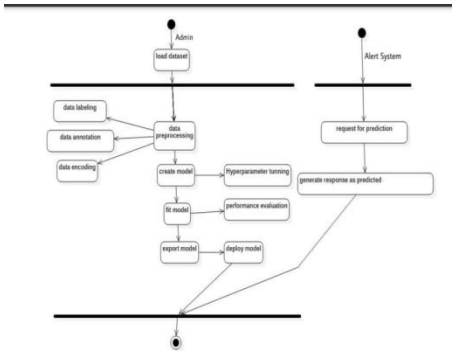
accidents using CCTV footage and send alerts to the nearest control room. The proposed system has various features like Real-time Data Augmentation, Seamless Interaction with GUI, Enhanced Accuracy and Versatility.

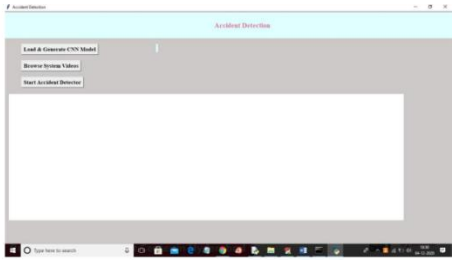


ACTIVITY DIAGRAM

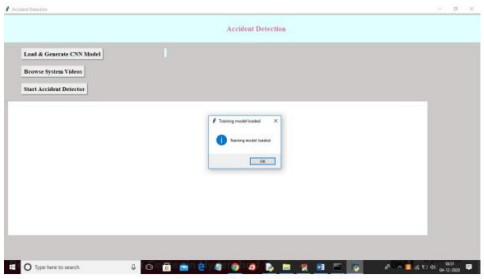


4.OUTPUT SCREENS

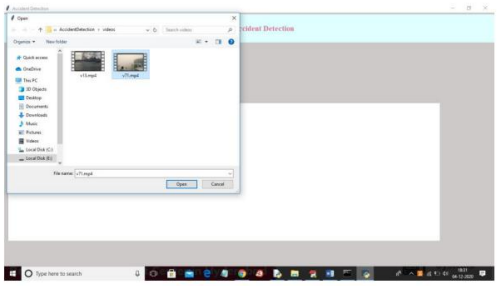
To run project double click on run.bat file to get below screen



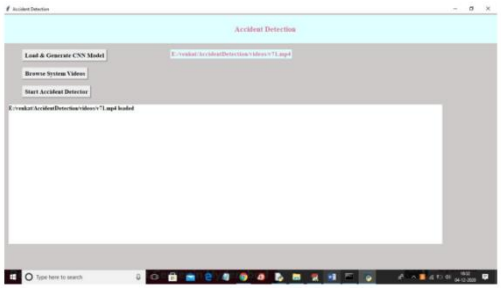
In above screen click on 'Load & Generate CNN Model' button to trained CNN with dataset and to load CNN model using tens or flow



In above screen tens or 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



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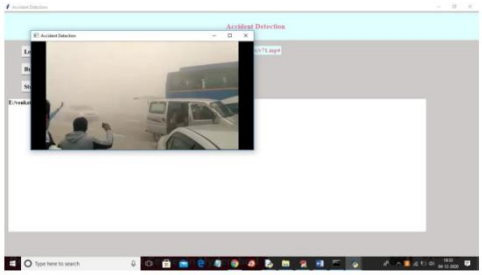
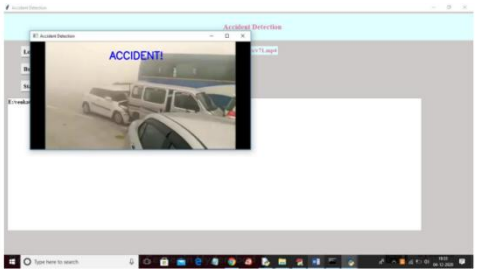
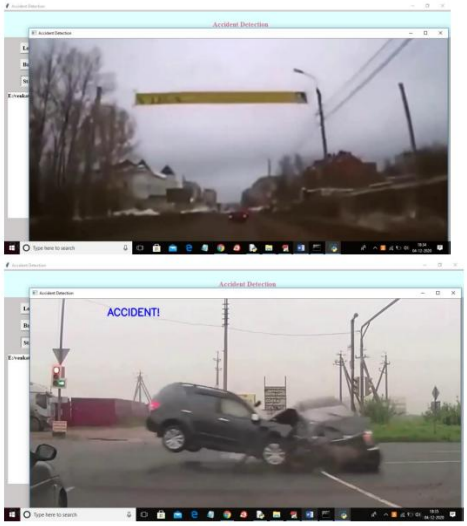
In above screen video is loaded and now click on 'Start Accident Detector' button to play video and detect accident



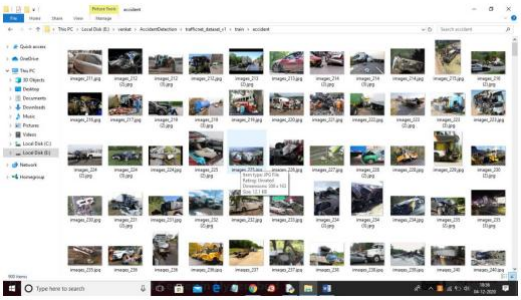
In above screen video start playing and upon accident detection will get below screen with beep sound



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



In above screen upon collision then accident display message will appear with beep sound In below screen application is trained with below images



5.CONCLUSION

Detecting accidents in real-time poses significant challenges, rendering it a complex undertaking, yet vital for improving road safety. Unfortunately, large-scale implementation remains elusive due to the intricate nature of real-time applications. The proposed system aims to address existing limitations and enhance current scenarios in accident detection. While in-vehicle accident detection systems offer rapid information for emergency responders, their widespread adoption is hindered by non-portability and high costs. The proposed vehicle accident detection system emerges as a solution capable of tracking accidents promptly at the moment of occurrence. Its superiority liesin its economic feasibility, reliability, and accuracy, distinguishing it

from systems reliant on costly sensors and extraneous hardware. This efficiency is primarily attributed to the model-based approach adopted by the proposed system. By steering clear of unnecessary complexities, the system aligns with the vision of intelligent accident detection, striving to make road safety a paramount priority.

6. FUTURE ENHANCEMENT

In the future , we can combine both supervised and unsupervised methods together to improve the system . We can use supervised learning models to identify the accidents from the frames which are flagged anomalously by unsupervised models. More sophisticated methods for tracking accident happened area. Algorithms like kelman can be used to predict the potential of a vehicle passing through the accident happened place. this will help the driver to avoid incident happen area and evade a potential traffic jam.

7.REFERENCES

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