



Review Paper On Accident Detection And Traffic Regulation Using Image Processing

Mane Rutuja Vijaykumar, Prof. Mr. P. B. Ghewari

Amgoi, Vathar, Kolhapur

ABSTRACT

In cities, where the number of vehicles continuously increases faster than the available traffic infrastructure to support them, congestion is a difficult issue to deal with and it becomes even worse in case of car accidents. This problem affects many aspects of the modern society, including economic development, traffic accidents, increase in greenhouse emissions, time spent, and health damages. In this context, modern societies can rely on traffic management system to minimize traffic congestion and its negative effects. Traffic management systems are composed of a set of application and management tools to improve the overall traffic efficiency and safety of the transportation systems. Furthermore, to overcome such issue, traffic management system gathers information from heterogeneous sources, exploits such information to identify hazards that may potentially degrade the traffic efficiency, and then provides services to control them.

INTRODUCTION

Recent statistics shows that more people lose their life in an accident due to not getting the proper medical attention required. The project mentioned using the Internet of Things and Computer Vision [2]. There have been several excellent works of research on the subject of Accident prevention and detection like tracking of vehicles or alerting the driver with the help of LED indicators and alarms, Alcohol detection and taking necessary actions if the alcohol level is high. Tracking the eye to make sure the driver is attentive. Automation of accident detection is implemented by sensor-based ambulance management with the smart traffic management system [4]. The probability of an accident is determined based on speed and trajectory anomalies in a vehicle after an overlap with other vehicles. The proposed framework provides a robust method to achieve a high Detection Rate and a low False Alarm Rate on general road-traffic CCTV surveillance footage [5]. The paper deals with accident detection system that occurs due to carelessness of the person who is driving the vehicle. This introduces accident alerting system which alerts the person who is driving the vehicle. If the person is not in a position to control the vehicle then the accident occurs [3]. A new supervised learning method comprising of three different stages which are combined into a single framework in a serial manner which successfully detects damaged cars from static images is proposed [7].

KEYWORDS

Accident detection, Vehicle collision avoidance, Image Processing.

METHODS AND INVENTIONS

Different image processing techniques along with morphological operators and Canny Edge Detection are used for image enhancements and object outline detections. With analysis of continuous frames, the relative velocity and the distance from which the leading vehicles are moving could be computed which is further helpful in accident detection and thus prevention too. Histogram of Oriented Gradients (HOG features) are used for feature extraction. Different machine learning classification algorithms like SVM, MLP, and XGBoost are used for classification of the object. Different standard OCR tools like Pytesseract, PyOCR, Tesseract are used for the retrieval of the vehicle number from the extracted licence plate sub-image. Histogram of Oriented Gradients is preferred over the other feature descriptors as it helps in getting better accuracies from the ML classifiers as the features directly describe the shape of the objects in the image through magnitude and orientation. Learning the features that describe the shape of an object helps in predicting the objects that resembles with the shapes of the objects, this helps in achieving the object detection module more precisely.

Index terms –Accident Detection, Vehicle Collision Avoidance, Licence Plate Recognition, Image Processing, Morphological Operators, Canny Edge Detection, Histogram of Oriented Gradients, HOG, Machine Learning, XGBoost, Multilayer Perceptron, MLP, Support Vector Machine, SVM [1].

The Ultrasonic sensors are placed on the vehicle to detect any obstacle. The Vibration sensor which is attached to the axle of the vehicle is used for determining any unusual movement along with the accelerometer is stored and a message through the GSM module is sent via the help of Arduino Uno. The location is retrieved via the GPS module (Longitude & Latitude) and the message is sent via the GPRS module. After the accident is detected, all the safety procedures are carried out like opening of doors, unlocking of seating belts, hazard indicator turned on all this for fast exit from the vehicle. This system is developed for preventing and detecting accident of vehicles. This monitors the value of sensors continuously and reacts when the constraints are satisfied. The software part of this project is made which is expected to run according to the proposed system. Code for this module is made, and the hardware parts are collected. One of the main principles of it depends on the thresholds that are predefined in the program which is embedded in the Arduino coding platform.

Index Terms: Accelerometer, Arduino Uno, Ultrasonic sensor, Vibration sensor, GPS & GPRS modules, Open CV [2].

Once the accident occurs to the vehicle this system will send information to registered mobile number. The controller used in this project is Arduino which is used for controlling all the modules in the circuit. The two major parts other than controller is GPS module which is used as a receiver and other module is GSM. To receive the coordinates of the vehicle GPS module is used and GSM will send the received coordinates to the user through SMS. There is an additional LCD which is used for displaying status message or coordinates. When a person is driving the vehicle met with an accident then the vibrations of the vehicle is received by the vibration sensor and the sensor acts as a accident detection module which further send the information to the micro controller and the location of the vehicle is received through GPS module and the coordinates of the vehicle is send to the GSM module. The received information is send to arduino uno. The received coordinate's information is collected and is send to the respected person through SMS. The proposed system deals with the accident alerting and detection [3].

System consists of Crash sensor and MEMS sensor for detecting the accident in the vehicle and RF transmitter on the ambulance to communicate with the RF Receiver located on the traffic signal. This helps the ambulance to cross the junction switching the signals from Red to Green when the signal is received by the ambulance. This paper provides a solution by detecting and informing the occurrence of accident immediately to the nearby ambulance service MEMS and crash sensor are used to detect accidents. The accelerometer will monitor the forces of acceleration in 3 axes continuously. It will be considered as an incident if any sudden shift is observed in any of the axes. If accident is detected, microcontroller will send the location information to the ambulance service. The ambulance moves to the medical center without

and traffic by effective traffic management system. The traffic signal is then controlled on the ambulance's path. When the ambulance reaches the traffic junction, when it passes from the transmitter to the receiver, the encoder converts the serial data to parallel data. If the signal is red, it will automatically turn green. In the receiver section, the decoder converts the parallel data when it is returned to serial data. This helps the ambulance to cross the traffic junction efficiently.

Index Terms— *Microcontroller, Accident System, Vehicle Section, Ambulance Service, Traffic signal, Global System for Mobile Communications (GSM), Global Positioning System [4].*

A neoteric framework for detection of road accidents is proposed. The proposed framework capitalizes on Mask R-CNN for accurate object detection followed by an efficient centroid based object tracking algorithm for surveillance footage. The probability of an accident is determined based on speed and trajectory anomalies in a vehicle after an overlap with other vehicles. The proposed framework provides a robust method to achieve a high Detection Rate and a low False Alarm Rate on general road-traffic CCTV surveillance footage. This framework was evaluated on diverse conditions such as broad daylight, low visibility, rain, hail, and snow using the proposed dataset. This framework was found effective and paves the way to the development of general-purpose vehicular accident detection algorithms in real-time. The proposed accident detection algorithm includes the following key tasks: T1: Vehicle Detection T2: Vehicle Tracking and Feature Extraction T3: Accident Detection The proposed framework is able to detect accidents correctly with 71% Detection Rate with 0.53% False Alarm Rate on the accident videos obtained under various ambient conditions such as daylight, night and snow. *Index Terms*—*Accident Detection, Mask R-CNN, Vehicular Collision, Centroid based Object Tracking [5].*

CONCLUSION

In the above all systems, use of microcontroller, Arduino Uno for controlling and processing purpose. For detection of accident mostly image processing technique used but in some cases crash sensor and MEMS sensor. Accident can be detected by vibration sensor also.

RF transmitter, RF receiver used to communicate within devices. GSM module for location retrieveness. For image processing, morphological operators defined, canny edge detection, histogram of oriented gradients used.

PROPOSED WORK

Proposed work uses Image Processing Technique for Accident Detection and Ambulance Detection purpose. Capturing Images using USB Camera, Analysis of captured Images using edge detection algorithm and object counting methods on Raspberry Pi platform using Python. Generate the traffic signal timings based on a threshold value of traffic using Raspberry Pi. Detection of accident & manage traffic signals accordingly.

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