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Detect Speed Brakers and Prevent Accidents Using Sensors and AI

Sahil Dalvi[1], Asst. Prof. Gauri Ansurkar[2]

[1,2]Keraleeya Samajam's Model College, Dombivli East, Mumbai, Maharashtra, India

ABSTRACT

The goal of this study is to make awareness regarding the accidents and the number of life that lost in the accidents and how we can prevent accidents using artificial learning and also sensors which gives a data regarding the environmental changes happen in the surroundings. Identifying accident patterns is one of the most vital research foci of driving analysis. Some solutions have been proposed in the past literature Or automated accident detection that are mainly based on traffic data or external sensors. However, traffic data can be difficult to access, while external sensors can end up being difficult to set up and unreliable, depending on how they are used. Additionally, the scarcity of accident detection data has limited the type of approaches used in the past, leaving in particular, machine learning (ML) relatively unexplored. The main observations of this study are as follows: (1) CNN features with a SVM classifier obtain very promising results, outperforming all other tested approaches. (2) Feature engineering and feature learning approaches were finding different best performing features. Thus, in this paper, we propose a ML framework for automated car accident detection based on mutimodal in-car sensors.

INTRODUCTION

In this paper, we are discussing for the detecting speed brakers and the prevents accidents using AI . For, In the AI based program needs to be algorithm which used to process the data and used for prevention to prevent accident so that it will be very useful and the needy for the protection level. In the detection method , from a particular distance when speed brakers appers it will give you notification that speed brakers is at particular distance with the coordinates and the some mathematical algorithms. Accident detection is usually translated into a binary classification problem, where input data are used to train models representing accident and non-accident classes. ML-based accident detection studies can be categorized depending on the type of data used to train their model. Two large categories can be identified, one relying on traffic data, the other on external sensors such as smartphones, acoustic sensors or cameras. ML can be applied on in-car network data by following a standard framework usually referred to as the pattern recognition chain (PRC). Firstly, during data acquisition, the chosen sensors based on the nature of the classes and their availability are to be considered. In the second step, data pre-processing includes operations such as sensor calibration, unit conversion, normalization and segmentation to make the data suitable for further analysis. This paper is the first study investigating ML-based accident detection on basic in-car network data. Our work is a unique and innovative study on detecting real driving accidents from the most accessible and affordable data sources inside cars. A moving vehicle on road is considered safe if it would be capable enough to prevent the imminent threats from its surrounding and to deal with the various situations effectively without damaging itself. if the AI algorithm detects a speed breaker ahead, it could alert the driver with a warning sound or visual alert on the dashboard. Alternatively, it could automatically slow down the vehicle to an appropriate speed to ensure a safe passage over the speed breaker. This type of technology could be particularly useful in areas where speed breakers are not well-marked or where they may be difficult to see due to poor lighting or other environmental factors. By using sensors and AI to detect speed breakers, accidents and injuries caused by drivers failing to slow down for these obstacles could be significantly reduced. The system consists of sensors that are installed on the road to detect the presence of speed breakers and an AI algorithm that analyses the data from the sensors to determine if there is a speed breaker ahead. If a speed breaker is detected, the system will alert the driver and apply the brakes automatically to slow down the vehicle.

Related Work

A machine learning technique to detect road anomalies and braking events from accelerometer and magnetometer data is proposed in [6]. The method requires magnetometer for reorientation but magnetometer is not present in all phones which is susceptible to magnetic interference and increases battery consumption as well. Another method for detecting speed bumps and braking events was also proposed in [8] which did not differentiate between potholes and speed-breakers. It requires GPS for reorientation, increasing overall complexity and battery consumption. An early warning system that uses a smartphone-based application to alert the driver in advance when the vehicle is approaching a speed breaker, is being developed in [7]. The application constantly monitors the smartphone accelerometer to detect previously unknown speed-breakers. However, the authors did not describe in detail the methodology of warning system such as how to calculate distance between running vehicles and upcoming speed breakers. Their system depends only on accelerometer and built-in GPS sensor in smartphones. But sometimes the GPS service on smartphones takes a long time to get a fix in adverse environment and it does not always give the actual accuracy. In our proposed system, an autonomous system is unfolded for speed breaker data collection,

detection as well as to warn the vehicle-drivers and notify the owners which is efficient in terms of time and cost and requires less bandwidth as well as limited access to database. In the sensor detection method also when the sensor get the data from the

Environment so that when the device comes in the sensor range it will notify the user that after particular distance speed brakers appears. So, that user will get to know that the distance from the speed brakers and at what point he/she apply the brakes. In the ML and sensors the when the vehicle come close to speed braker at particular position the sensor sense it and provide signal in the from of data then the data will process using machine learning and it will provide the notification to the user that at a particular position speed brakers appears so drive as accordingly, as per the instructions user follow the instruction and apply brakes when come close to the speed braker. While some case in speed braker white strip is not drawn so that it very difficult to identify the speed braker so that accidents will happen. For, that reason this technology is very helpful to identify the speed brakers and also reduced the number of accidents. India's speed breakers are responsible for over **10,000 deaths** every year. The country already has one of the deadliest road networks in the world, **with 400 fatalities every day—**or about one death every four minutes.

Because of this, a lot of deaths and the casualties where reduced and the safe way to tackle the speed brakers is the simplest way for users. it is seen that just before passing a speed breaker drivers slow down the speed of their vehicles and as soon as they pass the speed breaker, they increase the speed . Taking cognizance of the fact, this module gathers a volunteer vehicle's speed behavioural pattern against location and sends it to the cloud server. In cloud server all volunteer vehicles speed behavioural pattern are analysed and probable location for speed breaker are identified where vehicles satisfy the breaker speed threshold. To perform this operation, cloud server conducts analysis of variance (ANOVA) on the provided speed behavioural pattern [10] and breaker speed threshold is set by system administrator. As similar characteristic may be shown by the vehicles in other cases, this procedure is highly suspected to create false positive problems

Technical specification of sensors and AI tools

I. Infrared (IR) sensors: These sensors work by emitting an IR beam and detecting its reflection. They can be used to detect speed breakers based on the changes in reflection caused by the bump. These types of radiations are invisible to our eyes that can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, the resistances and these output voltages, change in proportion to the magnitude of the IR light received.

II. AVR ATMEGA328 Microcontroller: The ATmega328 is a single-chip microcontroller created by Atmel in the megaAVR family (later Microchip Technology acquired Atmel in 2016). It has a modified Harvard architecture 8-bit RISC processor core. The Atmel 8-bit AVR RISC-based microcontroller combines32 KB ISP flash memory with read-while-write capabilities, 1 KB EEPROM, 2 KB SRAM, 23 general-purpose I/O lines, 32 eneral-purposeworking registers, 3 flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter (8 channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and 5 software-selectable power-saving modes. The device operates between 1.8 and 5.5 volts. The device achieves throughput approaching 1 MIPS/MHz

III. Ultrasonic sensors: These sensors work by emitting sound waves and detecting their reflections. They can be used to detect speed breakers based on the changes in reflection caused by the bump. Ultrasonic sensors are based on measuring the properties of sound waves with frequency above the human audible range. The HC-SR04 module includes ultrasonic transmitter, receiver and control circuit. It is used to measure distance between two objects and this distance is calculated based on the time taken by the ultrasonic pulse to travel a particular distance. The Arduino ATmega328 GPS receiver Ultrasonic sensor Power supply LCD ESP8266 WIFI Module Buzzer Dc motors and Motor Drivers Camera PC module automatically sends a 40 kHz square wave and automatically detects the received pulse signal. The distance is calculated based on the time taken by the transmitted signal to return.

IV. Object detection algorithms: These algorithms use deep learning techniques to detect objects in images and video footage. By training the algorithm on images that contain speed breakers, it can learn to identify them in real-time. Object detection models are usually trained to detect the presence of specific objects. The constructed models can be used in images, videos, or real-time operations. Even before the deep learning methodologies and modern-day image processing technologies, object detection had a high scope of interest.

V. Image segmentation algorithms: These algorithms separate an image into different regions based on their properties (e.g., colour, texture). By training the algorithm on images of speed breakers, it can learn to segment them from the rest of the image. It comes under threshold-based segmentation. In Otsu's Segmentation, the input image is first processed, and then we try to obtain the histogram of the image, which will show the distribution of pixels in the image. Here we focus on peak value. The next step is to compute the threshold value and compare it with the image pixels. Set the pixel to white; if they are greater than the threshold else, set it to black.

Conclusion

The hardware performance may be improved, and additional functions can be added, to further enhance this system. Additional features cameras, and various sorts of sensors may be added to the system to improve its potential.

Acknowledgement

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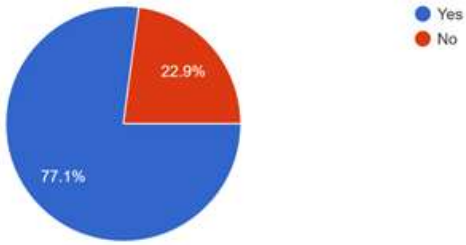
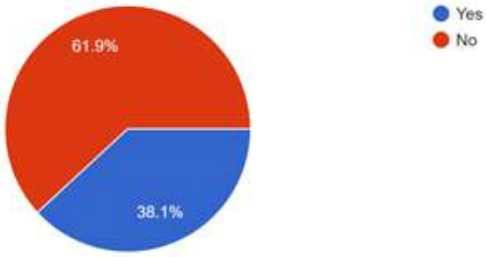
Figure And Survey Result

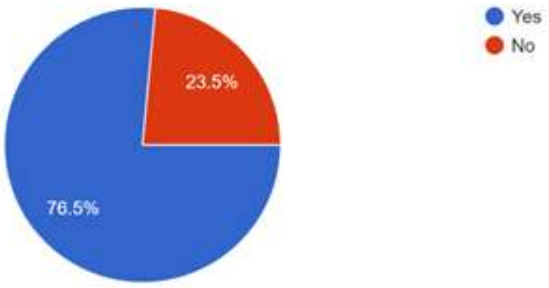
1. Can sensors be used to detect speed breakers?



2. Can AI be used to prevent accidents related to speed breakers ?



3. Is it possible to detect speed breakers using sensors and AI?



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