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Incidence of Fatal Pedestrian Collisions and Vehicle Speed Control

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ABSTRACT: In our day nowadays life, time is incredibly vital factor thus everybody attempting to finish the task in less time is that the human tendency thus to finish the specified task as early as doable we must always increase the speed, for instance speed of auto. If we have a tendency to see the situations of auto density, its unceasingly happening increasing type.in addition because the drivers don't seem to be following the principles and regulation given by control department at specificareas. Most of the drivers drive the vehicle in no time in this restricted areas with and while not reasons. It's happened attributable to vehicle speed management is on drivers hand and over spread driving square measure there. The over speed of auto is that the major downside because of variety of accidents square measure raised way more.to beat these issues we have a tendency to projected automatic speed management of auto victimisation video process with tiny modification in existing system.it reduces the speed of auto step by step once the restricted square measure as are detected. For that video is finished through tiny camera of road scene and detect and identification of speed limit/college zone/hospital zone is finished victimisation CNN formula and vehicle speed is reduced and alert the motive force with a facilitate of buzzer and LCD display.

KEYWORDS: CNN algorithm, intelligent speed control, Deep learning method.

I. INTRODUCTION

Vehicle is an integral part of our daily life and its growth incremented day by days. The scenario of increased vehicle density in India from 2001 to 2015.Due to increased vehicle density and over speed driving causes more accidents. The time of driving the vehicle that is like use of mobile, drink while driving, disobey of traffic rules and regulation, crossing speed limits which is dangerous for your own safety and that of others and many more. These accidents are going on increasing because the whole control of the speed of the vehicle is in driver hand. They do not reduce and control the speed in restricted areas as per rules.

The purpose of the proposed work is to identify the factors contributing to fatal accidents. This is achieved by analysing road accidents using Convolutional Neural Networks by considering appropriate features and effectively clustering the records. Several combinations of attributes of large datasets are analysed to discover hidden patterns that are the root cause for accidents.

Classification is performed on data using some classification model suitable to the given set of data. The purpose is to find out the frequent item sets. During classification a model is constructed in which different records of data set with unspecified class labels are separated easily. Naive Bayesian classification is one of the probabilistic methods used to predicate the independence among variable pairs. It strongly assumes and auto correlates the information. Sometimes these assumptions may go wrong. Thus, a better classification technique proposed to efficiently classify the data is Convolution Neural Network. It assumes data based on the locality.

The classification technique proposed can be applied on the data to get effective results. The algorithm efficiently works based on relevant association rules for frequent item set mining. It uses a bottom up approach. The property followed by this algorithm says any subset of frequent item set must be frequent. It uses larger item sets and can be implemented easily. This algorithm is applied on roadway traffic fatal accident dataset to test the data.

II. RELATED WORK

The speed of vehicle is control automatically when the road sign of restricted areas are detected using video processing [1]. For that a small camera is mounted on vehicle and it records the video of road with traffic sign[2]. The recorded videos are transferred for video processing after every 1sec interval. Then these videos are converted into frames and compare it with the reference image available into the system database [12].

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When appropriate match is found the control signal is send to speed control mechanism of vehicle. The different algorithms are available for detection and matching of image, out of them CNN algorithm is used for this proposed system. It gives the high accuracy.

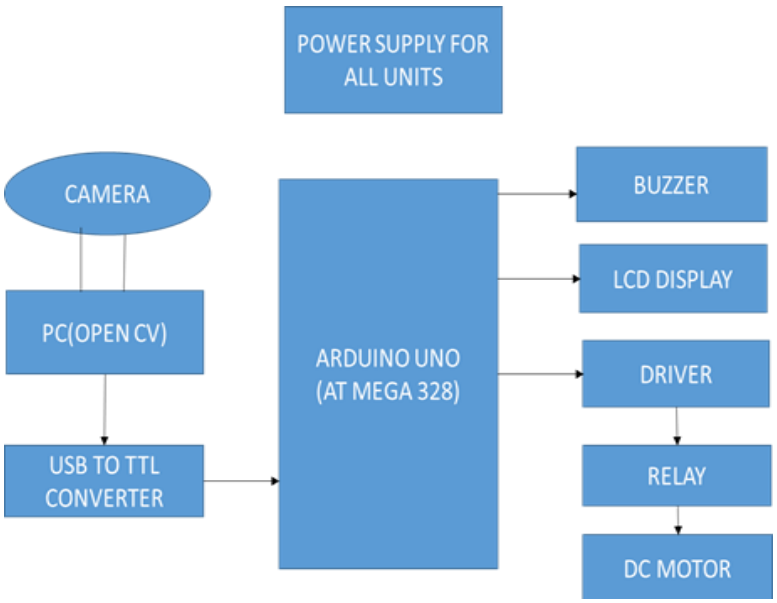

Fig1. Block diagram of Vehicle speed control

- Capture the zone images from camera using open CV library through image processing technique.
- Detecting the zone and communicate via serial to Arduino.
- When Arduino receives the serial data, it controls one by one
- Alert the driver with help of buzzer and LCD display.
- Then, it controls the vehicle speed of motor through relay and driver node.

III. PROPOSED ALGORITHM

A. *Main units of proposed algorithm:*

Vehicle speed control done by following units,

a. Video to frame conversion unit
b. Image detection and identification
c. Reference speed subsystem

1. Video to frame conversion unit:

The small camera mounted on the vehicle records the video signal and gives a primary input to this system. The recorded video has to convert into frames to identify and detect the desired traffic sign. While converting video signal into frames approximately 30 frames are produced in 1second.But30 frames per second contain the redundant data that is data wise similar frames which take more time for identify and detect of the desired traffic sign. Due to this system becomes sluggish and will not provide the fast response for control action. Therefore redundant data are reduced and only single frame per second is taken for the comparison purposes. So the time required for data processing is very less which will increases overall system performance.

2. Image detection and identification:

The frame coming from video to frame conversion unit is compared with the reference image stored into the database. By using the CNN algorithm the reference image compared with the Scene image on the basis of the feature points matched. As per the matching result control signal will generate and corresponding signal send to action subsystem block.

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3. Reference speed subsystem:

In this work we considered three traffic signs such as hospital, school and speed limit for testing purposes. These three reference images are taken from government department of traffic controller and kept in database. Then the control signal from the IDI will match with any one of the reference (three traffic signs) and accordingly control signal generate for the PC (Open CV).

B. *Description of the Proposed Algorithm:*

To implement convolutional neural networks a training dataset is considered as input. The dataset contains numerical values that correspond to some nominal data. The processing of training data set using Convolutional Neural Networks resulted in calculating the risk factor in an efficient manner. Various factors contributed for fatal accidents were identified using this classification technique in a most probabilistic approach. The results obtained were used to specify fatal conditions for an accident. Thus, safety measures can be provided to people moving on roads in such conditions. During the process, various attributes like collision type, light conditions, weather conditions, surface conditions, speed, drunk driver or not were taken into consideration to find out the risk factor. The risk factor specified the possibilities of fatal accidents at different areas. The results obtained in calculating the risk factor using Convolutional Neural Networks can be shown below. Efficiency of the classification algorithm, Convolutional Neural Networks can be known by calculating accuracy, precision, recall and f-measure on resulted data. Accuracy defines the trueness of occurred result. The actor's precision and recall specify the occurrence of relevant instances over retrieved instances and total number relevant instances respectively. Aim of the proposed algorithm is to maximize the network life by minimizing the total transmission energy using energy efficient routes to transmit the packet. The proposed algorithm is consists of three main steps.

IV. CNN IMPLEMENTATION

The steps needed for implementing CNN are:

1. Gathering data
2. Labeling data
3. Generating TF Records for training
4. Configuring training
5. Training model
6. Testing object detector

1. Gathering Data

Before we can get started creating the object detector we need data, which we can use for training. To train a robust classifier, we need a lot of pictures which should differ a lot from each other. So they should have different backgrounds, random object, and varying lighting conditions.

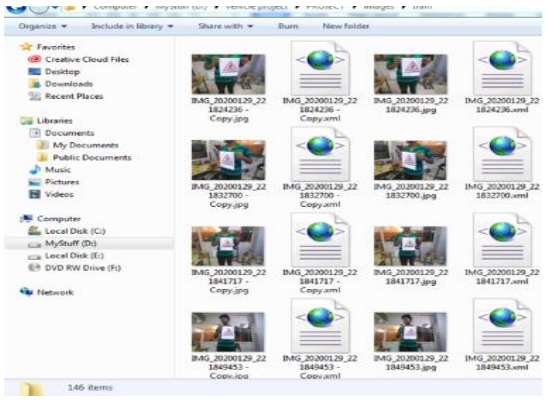

Fig2.Gathering data

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2. Labelling Data

Now that we have our images we need to move about 80 percent of the images into the object detection/images/train directory and the other 20 percent in the object detection/images/test directory. In order to label our data, we need some kind of image labelling software. Labelling is a great tool for labelling image. To create the bounding box the "Create RectBox" button can be used. After creating the bounding box and annotating the image you need to click save. This process needs to be repeated for all images in the training and testing directory.

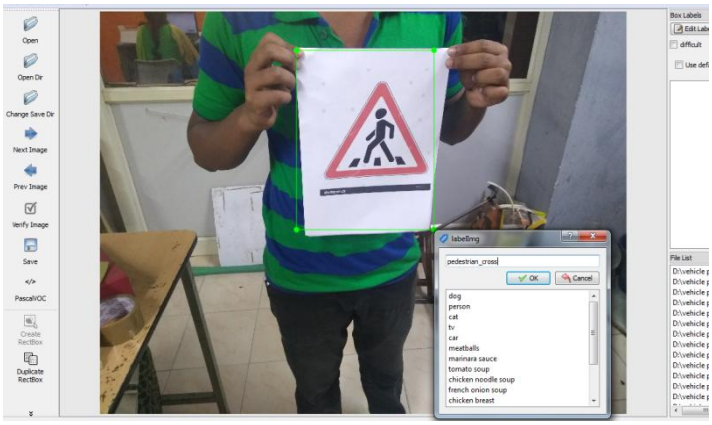

Fig3.Labeling data

3. Generating TF records For Training

With the images labelled, we need to create TF Records that can be served as input data for training of the object detector. In order to create the TF Records we will use two scripts from Data Tran's raccoon detector. Namely the xml_to_csv.py and generate_tfrecord.py files. After downloading both scripts we can first of change the main method in the xml_to_csv file so we can transform the created xml files to csv correctly.

4. Configuring Training

The last thing we need to do before training is to create a label map and a training configuration file. Creating a label map. The label map maps an id to a name. We will put it in a folder called training, which is located in the object_detection directory. The id number of each item should match the id of specified in the generate_tfrecord.py file.

5. Training Model

To train the model we will use the train.py file, which is located in the object_detection/legacy folder. We will copy it into the object detection folder an hen we will open a command line and type default code.

6. Testing Object Detector

In order to test our newly created object detector, we can use the code which we already created.

V. IMPLEMENTATION RESULTS

Pedestrian movement direction recognition is an important factor in autonomous driver assistance and security surveillance systems. Pedestrians are the most crucial and fragile moving objects in streets, roads and events where thousands of people may gather on a regular basis. People flow analysis on zebra crossings and in commercial Centre's or events such as demonstrations, are a key element to improve safety and to enable autonomous cars to drive in real life environments. This paper focuses on deep learning techniques such as Convolutional Neural Networks (CNN) to achieve a good and reliable detection of pedestrians moving in a particular direction. We present a novel input representation that leverages current pedestrian detection techniques to generate a sum of subtracted frames, which are used as an input for the proposed CNN. Moreover, we have also created a new dataset for this purpose.

A huge set of attributes form the input dataset. They are of different types such as accident-specific attributes, driver-specific attributes, circumstance-specific attributes and so on. The work mainly carried based on this data. Data Construction is also known as Data Preparation. Initially data will be cleaned by removing noise, missing values, and consistencies. Missing values are replaced by NULL values. Data will be selected and transformed based on the requirement. It may be either in numerical or nominal form. Data will be in nominal form in the dataset, it can be converted into numerical data while performing operations on it. Also, each attribute data is discretized in order to make it appropriate for further analysis.

Major attributes selected in this study are accident conditions like, manner of collision, light condition, weather condition, roadway surface condition, speed limits and drunk driver. Also, these attributes hold some values listed

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below. Manner of Collision: Not Collision with Motor Vehicle, Front-to-Rear (Includes Rear-End), Front-to-Front (Includes Head-On), Angle-Front-to-Side (Same Direction), Angle-Front-to-Side (Opposite Direction), Angle-Front-to-Side (Right Angle (Includes Broadside)), Angle-Front-to-Side (Angle-Direction Not Specified), Sideswipe (Same Direction), Sideswipe (Opposite Direction), Rear-to-Side, Rear-to-Rear, Other, Unknown.

Light Condition: Daylight, Dark, Dark but lighted, Dawn, Dusk, Unknown. Weather Condition: Blowing sand soil dirt, clear cloud no adverse condition, Fog smog smoke, Other, Rain mist, severe crosswinds, Snow or blowing snow, unknown. Roadway Surface Condition: Dry, Ice frost, oil, Other, Sand dirt mud gravel, Snow or slush, unknown, Water, Wet. Speed Limits: 5, 10, 15, 20, 25, 35, 45, 55, 60, 65, 70, 80, 85, 95, 99 (kmph). Drunk Driver: It has two conditions either yes or no. All these factors affect the rate of accident occurrence and were used to determine whether it is hazardous for the people moving on roads during these conditions.

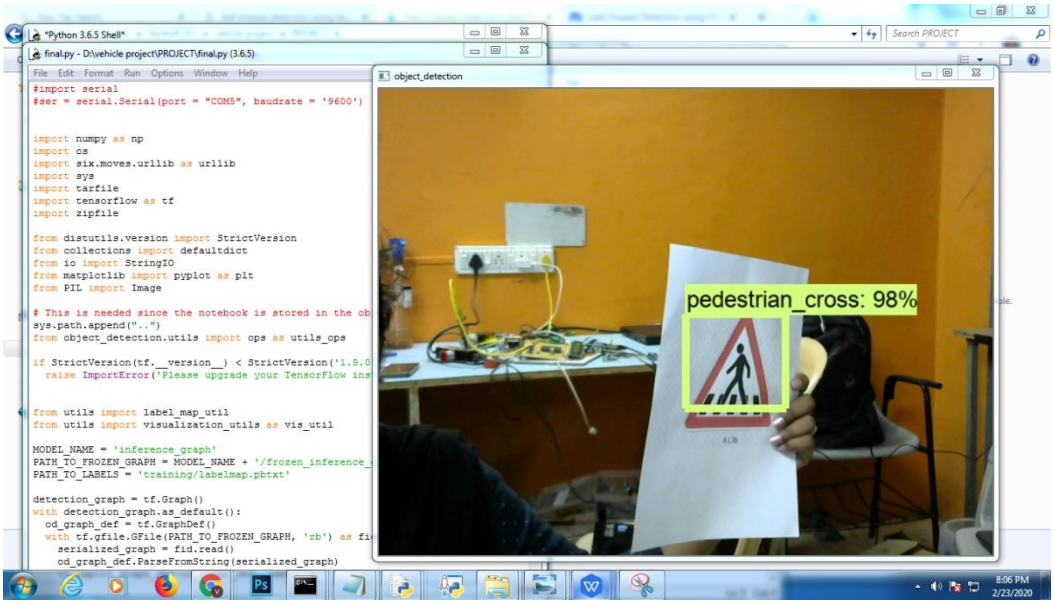

Fig.3 snapshot of sign identification 1

Fig. 4. Sign identification 2

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VI. CONCLUSION AND FUTURE WORK

In this work, a classification technique named Convolution Neural Networks has been used that effectively identified the conditions contributing to fatal accidents. Using these conditions, the public could identify dangerous zones and take measures to avoid accidents. Experimental results have shown that CNN is more efficient than Naïve Bayes classifier in identifying the risk factor and also vehicle speed will be reduced without any invention. In the future it could be planned to make analysis on road accident dataset by considering more features and more clusters and to use deep learning techniques.

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