License Plate Recognition Of Over Speeding Vehicle

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Abstract

Accidents on highways are increasing at a very fast rate. Although the roadways have signboards to indicate maximum speed limit for the sake of safety but still people do not obey traffic rules. This results major accidents. Over the years, a lot of devices have been implemented to detect rash driving. However, most of the approaches require human concentration and manual effort, which is not always efficient. This poster presents a system that can detect the over speeding vehicle and localizes the license plate using various image processing techniques and recognizes the license plate using the CNN-RNN . The system would help the traffic authorities with the efficient arrangement of identify wrongdoers.

Objective

- To design an automated system that reduces the human resource.
- To detect the speed of the over speeding vehicle and capture its photo.
- To extract and recognize the characters in vehicle's number plate.

Introduction

Over speeding of vehicles is one of the major issues that needs to be addressed in terms of road safety. Road accidents are increasing in context of Nepal due to driver's negligence by driving the vehicles above the maximum speed limit enforced. With the advancement in the intelligent transportation system, automatic license plate detection has attracted considerable research interests. It has a variety of potential applications in security and traffic control. License plate recognition and over speed detection is a mass surveillance method that uses optical character recognition on images to read the license plate on vehicles and capture the image of over speeding vehicles. Number plate recognition systems are used in various traffic and security applications, such as parking, access and border control, or tracking of stolen vehicle. The motivation factor for the project is its potential application in traffic security.

Theory

Haar Cascade Classifier

Vehicle is detected in the video feed using Vehicle haar cascade files. Haar Cascade uses a machine learning approach to classify required object from positive image (containing required object) and negative images.

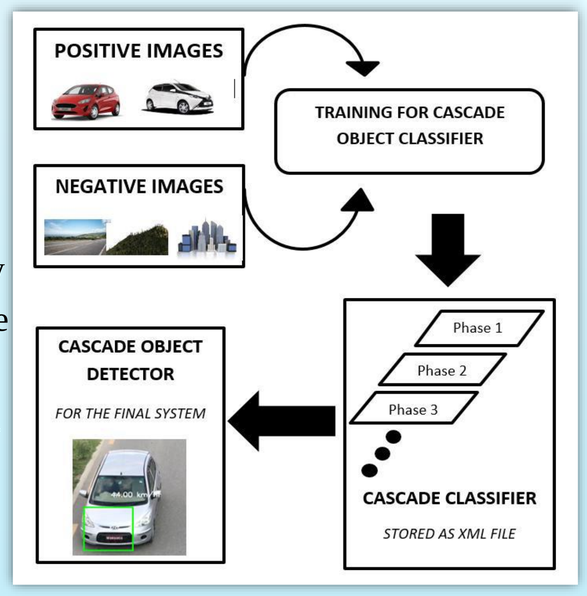

Fig: Vehicle haar cascade classifier

Image Pre-processing

Image pre-processing is used for the detection of the license number plate from the car in OpenCV using the contour option. Initially the input image is converted to grey scale image, followed by a bilateral filter that removes the unwanted details from an image. The sharp edges in the image is detected by the process of edge detection finally the contour is detected.

Plate Recognition

License number plate is an identification plate that is unique for each vehicle. The registration of the vehicle is attached to the vehicle's license number plate which is issued by the *Zonal Level Transport Management Office*, a government undertaking from the Ministry of Transportation. The plates are required to be either in Devanagari or Latin scripts. Plate recognition uses optical character recognition on image of license plate to read it. For recognition and extraction of the desired region various algorithms can be used

Methodology & System Setup

A traffic surveillance video feed is given as input to the system. The vehicle is identified by the vehicle Haar cascade classifier. The correlation tracker is used to tracked the vehicle, estimate the pixel displacement and the speed is calculated using pixel per meter and frame per second calculation. Over speeding is determined from the threshold value and license plate is localized for the over speeding vehicle. The localized license plate is fed to the neural network which is combination of CNN and RNN using BGRU for recognition and finally displayed in the user interface.

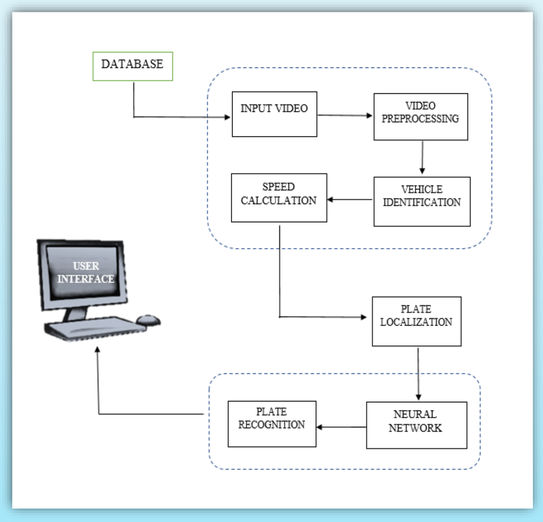

Fig: System setup diagram

Results and Analysis

For speed calculation, 12 vehicles with their known actual speed from speedometer was tested with the speed calculated from our system. The vehicle speed was determined from 7 video feeds. From the calculated data, accuracy of 88.88 per cent was achieved.

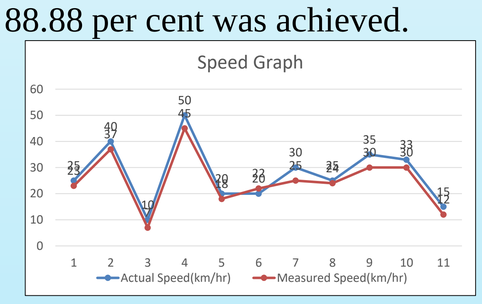

Fig: Speed approximation graph

Actual Speed(km/hr)	Measured Speed(km/hr)
25	23
40	37
10	7
50	45
20	18
20	22
30	25
25	24
35	30
33	30
15	12
Average 27.54545455	24.81818182

Fig: Speed approximation

For the license plate recognition, the CNN-RNN model was trained on 5400 images, which was preprocessed to be a gray scale and of a size of 128x64. The training was done on 30 epochs which took around 12 hours to get completely trained as each epoch took approximately 1400 seconds for training. At the end of the 30 epochs the accuracy and loss were observed as below:

DATA	Model Accuracy	Model Loss
TRAINING	78.6%	2.7
VALIDATION	73.5%	3.4

Fig: Resultant Model

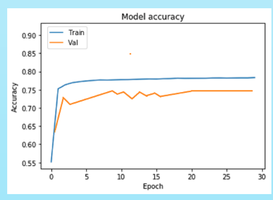

Fig: Model Accuracy

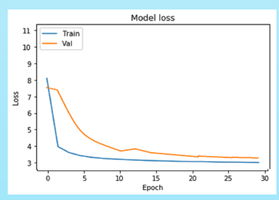

Fig: Model loss

Conclusions

In this poster we present a system that detects the speed, localize the license plate of the vehicle using various images processing techniques and finally extract the distinct and unique characters on the license plate. Although this system comes with some restrictions like the existing equipment we have does not provide full accuracy, however it can be optimized with the use of all the required components. Therefore, the shortcomings can be handled wisely with some alterations.

References

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