SSN COLLEGE OF ENGINEERING
KALAVAKKAM-603110

INTERNALLY FUNDED STUDENT PROJECT - 2019

STOLEN CAR DETECTION USING IMAGE PROCESSING AND MACHINE LEARNING

KANISHKHA L.D.
B.E. ECE – III YEAR
RAJ VIGNESH K.
B.E. ECE – III YEAR
POOJAH G.
B.E. ECE – III YEAR

DR. N. EDNA ELIZABETH
PROFESSOR
DEPARTMENT OF ECE

Budget – Rs. 18,000

Project Duration – 12 MONTHS

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1.

2.

3.

Signature of the Project Students

Signature of the Project Guide(s)

Signature of the HOD

1. Project Title: Stolen car detection using Image Processing and Machine learning.

2. Broad Subject: Image processing.

3. Project Duration *(in months)*: 12

4. Budget *(in thousands)*: Rs. 18,000

5. Project Summary:

There are cameras being installed everywhere around the city in order to monitor traffic rule breakage and congestion. To make the installation more useful for public, MLCV can be used to alert the nearest police station in case a stolen car passes by the camera. In a common database, police will register the details of a stolen car and the camera will detect the license plate, car model and colour of the ones it captures and compares it with the details of stolen cars in the common database, if the details match, it will send an alert to the nearest police station that a stolen car is passing by in the area.

6. Keywords: Machine Learning, Computer Vision, License plate detection.

7. Objectives:

- To develop a prototype to detect location of stolen cars.
- To use image processing to efficiently detect the details of a car.
- To use suitable hardware to implement the above mentioned points.

8. Introduction:

Video processing systems use high performance computers and application oriented circuits in the current technology. It is because of the amount of data to be processed is large and processing this data in real time is a tedious task. Surveillance of traffic area is essential nowadays, because of rapid increase in the number of vehicles but road area remains the same causing congestion. It can be used for determining the density of the vehicles in the road and analysis of the surveillance of the video help a lot in traffic management systems [1].

Different techniques have been proposed to detect the vehicles and track them on desktop computers. One method is to detect vehicles based on rear lamp and license plate with dedicated traffic surveillance camera [2]. The system uses stationary camera to capture the traffic video. They extract frames from the video sequences and work on each frame of the video. Different techniques are being considered to detect rear lamp and license plate. Once after the localization of the vehicle parts, these parts are combined using Markov Random Field to model the relationship [3].

Vehicle detection can be done a model based on the Hybrid image template to detect vehicles. A template is made by extracting various features using 50–1000 frames. Vehicles are detected in three stages using SUM-MAX procedure [4]. In each step the local frame region with maximal score is computed. The results of is model demonstrate detection of all vehicles under certain conditions.

Many systems have been developed to detect, track and count the vehicle on a road, which are of high cost and hence limits the number of systems to be used at different locations. Hence, we come up with the new system which is portable, can change its capture rate at any given time and can access video data in real time through Mobile or Desktop computers in remote place. We introduce Raspberry Pi for detection of vehicles and track them. It also analyses the input video and can provide the vehicle count at any given time.

9. Definition of the Problems:

Theft control and methods to find stolen vehicles are lacking in current scenario. Thus our project explores Image processing and Machine learning techniques to find an effective Image Processing technique to detect vehicles and extract details such as vehicle registration number, vehicle model. It also locates the marked vehicle using the GPS location of the cameras.

10. Review of status of Research and Development in the subject

10.1National Status:

- **REAL TIME NUMBER PLATE RECOGNITION FOR INDIAN VEHICLES**-[5]. This paper is a proposed work for the extraction of vehicle number plate information from an image. A lot of research work has been done in this field, but none of them proposed an efficient real time mechanism. Hence we proposed a system for extracting the information form vehicle number plate in real time.

- **REAL TIME VEHICLE DETECTION AND COUNTING METHOD FOR UNSUPERVISED TRAFFIC VIDEO ON HIGHWAYS-[6].** This paper proposed algorithm that segments the image by preserving important edges which improves the adaptive background mixture model and makes the system learn faster and more accurately, as well as adapt effectively to changing environments.

10.2International Status:

- **VEHICLE DETECTION AND COUNTING SYSTEM FOR REAL – TIME TRAFFIC SURVEILLANCE** [7] - This paper considers road situation analysis tasks for traffic control and ensuring safety. The following image processing algorithms are proposed: vehicle detection and counting algorithm, road marking detection algorithm. The algorithms are designed to process images obtained from a stationary camera. The developed vehicle detection and counting algorithm was implemented and tested for an embedded platform of smart cameras. The results of the experimental research of proposed algorithms are presented.

- **VEHICLE DETECTION BASED ON THE DEFORMABLE HYBRID IMAGE TEMPLATE** [8] - This paper proposed a vehicle detection method based on a deformable hybrid image template. Their method contains two steps: constructing our hybrid image template and its probability model, and detecting vehicles from traffic images by using a three-stage SUM-MAX procedure. In the template construction step, small image patches constituting the hybrid image template are automatically learned from training images.

11. Novelty Importance of the proposed project in the context of current status:

This product focuses on locating stolen vehicles by implementing real-time detection of moving vehicles using surveillance camera footages. Vehicle details such as vehicle registration number, vehicle model can be extracted. Current products available in the market have not implemented RT detection and processing of vehicle data.

12. Patent details *(domestic and international),* if applicable:

13. Work plan and detailed technical information

13.1 Methodology

- Uploading the stolen vehicle's data onto a secure cloud platform by the police.
- Allowing the cameras placed at particular locations, controlled by Raspberry Pi, to access the data from the cloud at all times.
- Feed the appropriate Machine Learning-Computer Vision algorithm onto the Raspberry Pi for detection of the vehicles' details.
- The location of the camera can be stored in the cloud using GPS.
- Compare the details of the vehicles captured from the camera and the details of the stolen vehicles from the cloud.
- If the details match between a captured vehicle and a vehicle uploaded in the cloud, the complainant and the police should get a message.
- The message should be based on a template with the names of the vehicle model, colour, license plate number, the location of the camera which captured the stolen vehicle and the captured time.

14. Time schedule of activities giving milestones

14.1 Time Schedule of Activities through BAR Diagram

15. Deliverables

- A prototype of real time surveillance system.
- Possible filing of patent.
- A referred journal publication.

16. Target beneficiaries of the proposed work

- Police department.
- Video recognition system.

17. Suggested plan of action for utilization of research outcome expected from the project

17.1 As journal publication
17.2 Patent filing
17.3 Project preparation for submission to external funding

- Find possible extensions and attempt for external project contests.

- Exhibit the outcome for external funding agencies.

18. References

[1] Bin Tian; Ye Li; Bo Li; Ding Wen, Rear-view vehicle detection and tracking by combining multiple parts for complex urban surveillance, in: IEEE Transactions on Intelligent Transportation Systems, vol.15, no.2, pp. 597–606 (April 2014).

[2] Ye Li; Bo Li; Bin Tian; Qingming Yao, Vehicle detection based on the and– or graph for congested traffic conditions, in: IEEE Transactions on Intelligent Transportation Systems, vol.14, no.2, pp.984–993 (June 2013).

[3] M. Anandhalli, V.P. Baligar, Improvised approach using background subtraction for vehicle detection, in: Advance Computing Conference (IACC), 2015 IEEE International, pp. 303–308, 12–13 (June 2015).

[4] Ye Li; Bo Li; Bin Tian; Fenghua Zhu; Gang Xiong; Kunfeng Wang, Vehicle detection based on the deformable hybrid image template, in: 2013 IEEE International Conference on Vehicular Electronics and Safety (ICVES), pp.114–118 (28–30 July 2013).

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[6] Real Time Vehicle Detection and Counting Method for Unsupervised Traffic Video on Highways Unsupervised Traffic Video on Highways Mrs. P.M.Daigavane † and Dr. P.R.Bajaj †† , S. D. College of Engineering, M.S., INDIA G. H. Raisoni College of Engineering, M.S., INDIA, IJCSNS International Journal of Computer Science and Network Security, VOL.10 No.8, August 2010

[7] Vehicle detection and counting system for real-time traffic surveillance, Boris A. Alpatov ; Pavel V. Babayan ; Maksim D. Ershov, 2018 7th Mediterranean Conference on Embedded Computing (MECO), INSPEC Accession Number: 17898669,
DOI: 10.1109/MECO.2018.8406017

[8] Vehicle detection based on the deformable hybrid image template Ye Li ; Bo Li ; Bin Tian ; Fenghua Zhu ; Gang Xiong ; Kunfeng Wang, Published in: Proceedings of 2013 IEEE International Conference on Vehicular Electronics and Safety, DOI: 10.1109/ICVES.2013.6619614

19. List of facilities and Equipments available with Department for the project

- Raspberry Pi 1.0

20. Budget Estimates: Rs. 18,000

21. Budget Justification

S.No	COMPONENTS	QUANTITY	PRICE (in Rs)
1.	Raspberry Pi 4.0 processor	2	7,500
2.	Camera module for Raspberry Pi 4 1080p	2	6,000
3.	Battery Pack for Raspberry Pi, 4000mAh	2	3,500
4.	Miscellaneous expenses (Connecting wires, Jumper cables, etc)		1,000
TOTAL AMOUNT (IN RUPEES)			18,000