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Traffic Rules Violation Detection System

Dnyanendra Jagadish Borase[1], Girish Vilas Shimpi[2], Mahesh Gopal Chauthe[3], Mayur Dilip Patil[4], Mr. Anup Dange[5]
Computer Engineering, GHRCEM, Pune, India

Abstract: The paper presents a system that uses surveillance videos to automatically detect bike riders without helmets by us-ing object segmentation and background subtraction techniques. A consolidation approach is introduced to improve accuracy, and three feature representations are compared. The system achieves a detection accuracy of 93.80 percentage and has an average processing time of 11.58 milliseconds, making it a cost-effective and real-time solution for managing traffic violations related to helmet usage.
Keywords: Data Collection, Python Open CV, Object Detection, Tensorflow.

I. INTRODUCTION

In today's changing world, traffic crime is now a serious problem in 4,444 countries, mostly developing. There are 4,444 bikes on the road and 4,444 violations that are growing fast. Traffic monitoring is always difficult and risky for to investigate and deal with illegal activities. Although works for traffic, this is very difficult for . The difference between the 's license plate size, rotation and illumination is not the same when shooting images. Two-wheeled Wheeled vehicles are very popular means of transport in almost all countries. However, with less protection, the risk is very high. It is recommended that cyclists wear helmets to reduce the as-sociated risks. Seeing helmets as useful, the government has criminalized cycling without a helmet and made a guideline for catching criminals. However, current video analysis of is weak and requires human assistance [1].

Generally, such a process is ineffective due to human intervention and its effectiveness decreases over time. 4044 Strengthening security and strong monitoring of these crimes are necessary for this system to work, as it can also reduce the number of human resources needed. Many countries also use systems, including 4,444 security cameras in public places. Therefore, solution using existing methods to detect criminals is also expensive [2]:

1) *Real-time usage:* processing large amount of data in limited time is a difficult task. Therefore, applications include operations such as classification, extraction, classification, and search, and need to process large amounts of data in a short time to complete the goals achieved in a timely manner.
2) *Closure:* In real-world scenes, dynamic objects often block each other, so only a part of the object of interest is visible. For these partially visible objects, segmentation and classification becomes difficult.
3) *Direction of Movement:* 3D objects often look different viewed from different angles. It is well known that the accuracy of the classifier depends on the features used and thus in some respects. A suitable example might consider what a cyclist would look like from the front and side of the.
4) *Temporary Environmental Changes:* Over time, environ-ments, lighting, shadows, etc.
5) *Video Quality:* CCTV cameras usually capture low video.

Because of these limitations, tasks such as segmentation, classification, and detection are more difficult. As stated in, a successful application evaluation should have useful features such as real-time performance, accuracy, resilience to sudden changes, and predictions.

Considering these challenges and desirable features, we propose a method to detect helmetless cyclists using real-time mining fed by existing security cam-eras [2].

It is true that is still difficult for everyone to see these events, given the increase in traffic, and is also difficult to control traffic as it needs more power [3].

This problem can also lead to dangerous accidents and traffic violations. Therefore, this research paper proposes an automated system to keep the under control in the vehicle-stage, computer vision crime detection system and confirms to that the vehicle's license has been sent to the notification. Computer vision in general is about how the gets high quality data from the machine's input images or videos. This article discusses the process of finding and identifying car number . Neurons for Analysis of Visual Image . The project is built on TensorFlow and relies on libraries to perform the required tasks [4].

II. LITERATURE SURVEY

In the current system, the business is checked by a police officer and mugged, also the image of the vehicle violating the business rules is transferred to the sanctioned website grounded on the license plate number. This process is time-consuming and some vehicles may slip down when taking prints, because it's delicate to direct business and snap vehicles violating business rules at the same time(5).

RomuereR.V.ve Silva, KelsonR.T.S. Veras " Helmet De-tection for Passengers "(1) In this composition,, system uses bracket and description to check vehicles, also 2 checks people in bus and whether they're wearing helmets. The styles used in design are Vehicle Segmentation and Classi- fication Back-ground Discovery Vehicle movement relative to a stationary object(road) The road is considered a reference background, with the levy test coming to. Segmentation of moving objects grounded on sub traction force is different from moving object(vehicle) background, it only provides the image of the vehicle and background will be removed rightly. Auto Bracket Auto is classified as motorcycle ornon-motorcycle, takes a point vector for each rendered image and passes to arbitrary timber classifier to classify auto as motorcycle ornon-bike. Helmet Discovery Deter- Mining RoI This step is done to elect only the area of interest on the which reduces the working time and increases the working time on the. The ROI generated above subtracts the main image(in this case the head) and inputs into a smatter to check if the biker is wearing a helmet. The design/ thesis is substantially about helmet exploration. For for tracking system, it should be suitable to capture the vehicle's license plate number to discipline the passenger interested.

Lokesh Allamki, Manjunath Panchakshari, Ashish Sateesha, KS Pratheek " 4 literacy 4 automatic License Plate Recog-nition "(2) This composition is about removing objects from images YOLO uses object discovery to perform the operation. The whole process includes 3 3segments 1. Helmet discovery-An- notated images for training the YOLOv3 model. After training the model, to fete the correct idea. 2. motorist's License Discovery — When people without helmets are detected, the group of people and their matching vehicles and their license plates are linked as, and their license plate figures are cut and stored. 3. License plate license plate recognition - Pass birth before feting plate for OCR(optic character recognition), module excerpts law and sequence and authenticates sequences. This composition doesn't mention the possibility to distinguish between, motorcycles and non-motorcycles, and since the input handed by the OCR is images only, this design doesn't come voluntarily use as a videotape input.

Felix Wilhelm Sieberta, Hanhe Linb " Chancing motorcycle helmet use with deep literacy "(3) This design is divided into 3 corridor where data is stored in videotape image, is prepro-cessed and used to capture motorcycle riders wearing helmets and Do not wear and tear helmets. 1. Dataset Creation and trailing- arbitrary data in videotape form from Myanmar are collected and preprocessed into every 100 frames of videotape, object discovery YOLO9000 algorithm ispre-trained heavy and with about 444 people and limited reference frame. 2. Helmet operation Discovery Algorithm - For object discovery, RetinaNet's one- step system is and it detects helmets. Starting with the bone- grounded ResNet50,, weighting preset from ImageNet. The model is which is used using python keras library with tensorflow as backend. in numerous cases 2 people traveling by motorcycle will have a and this model can not be honored if there's a wearing a helmet in the backseat, this is only sensible if someone is wearing a helmet and isn't true for CNN networks.

Swapna, Tahniyath Wajeeh, Shaziya Jabeen " A mongrel approach to rider helmet discovery "(4) In this model, numerous former styles unconnected to bus helmet discovery are advised and a new model is handed. An Automatic helmet discovery process, where the input is recording videotape and will also be recorded by the network camera. The system consists of 4 different way. one. Image Source Chancing This is the first step in imaging; where cameras are used to capture images of passengers on Route. 2. Preprocessing-this step is just to remove background noise from, ameliorate discrepancy and image binary. 3. Business distribution- For business distribution, this step is generally followed by the two i points of Aspect rate and size of a particular auto, also divide the auto. 4. Helmet Discovery- This step involves removing the head from the segmented image and feeding it to the ROI where the ROI match with the custom training determines if the helmet is. The model gives the number of violations as. OpenCVetc. It's also cost effective when we use open technology like for the development of objects. Also, the model can be used to descry people talking on the phone while using the and detecting people using the at high pets.

Vishnu, Dinesh Singh,C. Krishna Mohan and Sobhan Babu " Using Convolutional Neural Networks to descry Hel- metless Motorcyclists in Video "(5) This model tells us a4 people use it per day. Due to this adding use, there is a high rate of cases. Major incidents include head injuries caused by cyclists, of which violate helmet law. Since the is audited for safety purposes in numerous metropolises, we can use it to check on riders without helmets, so the would be a good value. This system includes lighting, rainfall changes,etc. Despite numerous problems, uses machine literacy ways, CNN(Con-volutional Neural Networks) to get good images. The process of this model consists of four different stages 1.

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Background Modeling and Object Discovery- This step is used to replace the background to get the correct image and insure the has the same quality anyhow of day, night or rain and other factors. We use a Gaussian blend model that does n't need of the range. 2. Object Discovery Using Convolutional Neural Networks- This system is principally a feed forward neural network using, a back propagation network. The idea of using this fashion stems from the's capability to interactively prize information fromimages.This process includes several situations to control the product, we get data at each position and at the end of the last position all images are created. 3. Recognition of motorcycle from moving objects We use the bounding box fashion to fete motorcycle from other objects. These boxes are estimated by feeding them as input to the CNN model, which learns about motorcycles and other effects, and using colorful data from the model test. 4. Get to know helmet- wearing cyclists we use patches in the upper quadrant of the image to identify cyclists, because this is where the rider's head is always on. also we see that the birth of double images is the same. also ask CNN to take the printout. This model provides a well- defined way of holding the helmet against the and several ways out of the problem. So this is a new machine literacy system in addition to the former image processing system and other heritage styles.

III. EXISTING SYSTEM

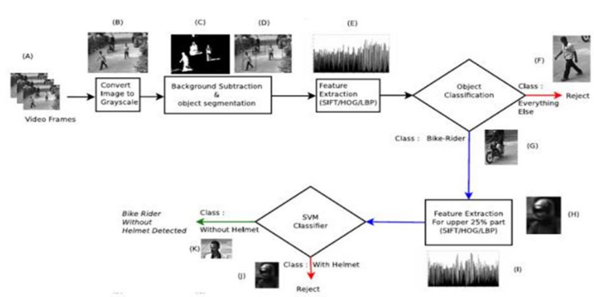
Automatic detection of helmetless cyclists belongs to the broad category of visual error detection in video analysis . Automatic quality control, as described in , typically includes the following activities: modeling the en- environment, de-tecting, tracking and classifying moving objects. proposed to Chiverton a method using the geometry of helmet and the variation of illumination in different parts of helmet [6]. It uses arc detection method based on Hough transform. The main limitation of this method is that the tries to capture the helmet in all frames; this is computationally expensive and often messes up helmet equipment. The also guarantees that the helmet is only suitable for cyclists. Chen et al. indicates a good maintenance method. Route suggested checking riders without helmets [7]. A) Input frame array, B) sample frame, C) mask for foreground sample frame, D) bounding box object around foreground, E) sample object for D, F) separate object without loop, G) items classified as bicycles, H) part of bicycles, I) H, J) bicycles classified as " with helmets", K) Cyclists are classified as "without helmets". examples for cycling lessons. There are cars in the city. It uses the Gaussian blending model and the original blob refinement strategy to extract the foreground. It uses Kalman filters to monitor vehicles and often votes to improve classification. In [8], Duan et al. A robust method for real-time vehicle detection from a single camera is presented. uses the IMAP processor (integrated memory array processor) for fast computation. However, this is not a practical solution due to the special hardware required. Silva et al. et al. A method has been proposed, starting with the discovery of cyclists It then detects the biker's head using the Hough transform and classifies it as either a head or a helmet. However, the Hough transform used to find the head of a cyclist is computationally very intensive [8]. The did the same only for the still images in the test. Overall, the existing projects discussed above suffer from two main limitations. First, plan is inclusive or passive in nature, is not required for actual operation. Second, the correlation between frames is not sufficient for a final decision , because results from consecutive frames can be combined to generate multiple crime alerts again. The proposed method overcomes the above limitations by providing an efficient solution for real-time implementation [9].

IV. PROPOSED SYSTEM

This section presents a method for real-time detection of unhelmeted cyclists available in two stages. First we capture the cyclists in the video. In step we see the cyclist's head and check if the cyclist is wearing a helmet.

To reduce the prediction error, we combine consecutive results for the final prediction. The block shows the different steps of the planning process, such as background subtraction, subtraction, classification, using the standard model [10].

Since the helmet only affects cyclists, of the full image processing becomes a computational overhead of and adds no value to detection. In the next step, , we apply background subtraction to grayscale frames () to distinguish between moving and static objects (). Background step previous models are described below [11,12].

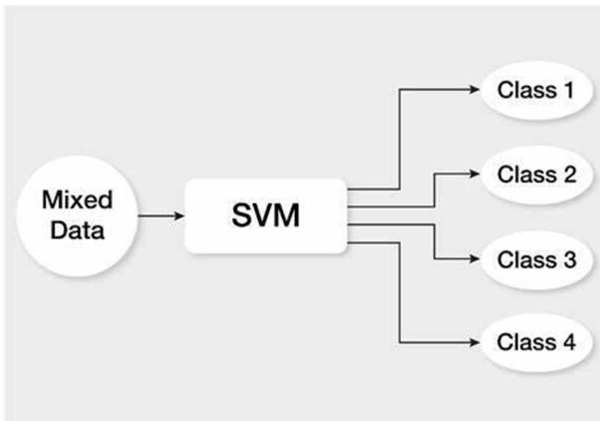


V. METHODOLOGY

A. Image Processing

1) *Grayscale and Blur:* It is very important that achieves the best accuracy before processing the input, and blurs and grays the video using the Gaussian Blur method. Grayscale is used to remove noise and achieve the best quality.
2) *Background Subtraction:* Background Subtraction uses the current image to subtract the background from the reference image , the result will be the desired area of the object . Equation (1) shows ways. distance(i) = saturated(–frame1(i) frame2(i)–).
3) *Binary Threshold:* Use the binary method to remove noise and other interference from the input video. Holes and noises are removed during this operation. Equation (2) shows how the binary threshold of is. dist(x,y) = MaxVal if frame(x,y) ¿ starts , otherwise
4) *Expansion and Contours:* When we start the expansion and contours , type and size the hole, re-image according to the contours for a good display Calculate the shape. b. The object detected by CNN has regions.

B. Object Detection



Fields with CNN properties. Our Phase Project:- A. We are using Supplementary Machine Learning (SVM). objects can be extracted from Image B. Using the Convolutional Neural Network (CNN), we are able to extract features from each image of regions. C. Identify all zones using SVM [13].

VI. RESULT AND DECLARATIONS

When the signal failure detection system is enabled on the input video collected remotely from the CCTV, the inputs are preprocessed and after presentation of the pre-determined line system output: Wherever has a violation of road traffic rules, the system maintains a CCTV camera photos, from which useless images are then read, providing functionality for the vehicles in the photos that require RCNN. RCNN is used to judge whether vehicle in the photo is illegal. Finally, when vehicles violate the traffic rules, the system cuts the image of the violating vehicles into an image almost the same as the photo[16,17].

VII. CONCLUSION

A. Object Classification

Object Classification After preprocessing, moving objects come from images. Vehicle classification model divides goods transported into four classes - 4 wheels, 2 wheels, 3 wheels are not transported [13].

B. Violation Detection

Once a vehicle is detected, three violations occur -

1) *Signal Violation:* If a vehicle crosses a predetermined line in lane when a red light is detected as a traffic violation signal.
2) *Illegal Parking:* Illegal parking is detected if the vehicle is parked in a no parking zone within a predetermined time.
3) *Direction Violation:* When the vehicle comes from the wrong direction of place, it is detected by vehicle detection. The orientation of a vehicle is determined from its current position and various previous positions[14].

VIII. DATASET USED

For this purpose, we collected our own data under the supervision of , Hyderabad Institute of Technology, India, as there is no publicly available data. Here we collected 2 hours of observation data at 30fps frame rate. We used first hour videos to train and test the model. There are 42 bicycles, 13 cars and 40 people in the training video. During the experiment, videos included 63 bicycles, 25 cars and 66 people [15].

In this article, we propose a framework for real-time detec-tion of helmetless cycling against criminals (). The concept will also help police track criminals in unusual environments (bright sunlight, etc.). Experimental results show that the accuracy of cyclic detection and crime detection is 98.88, respectively [17]. The average operation time is 11.58 ms and it is suitable for time use. Frame has also been adapted to new scenes and needs tweaking. This framework could be extended to follow and notify the perpetrators' license [18].

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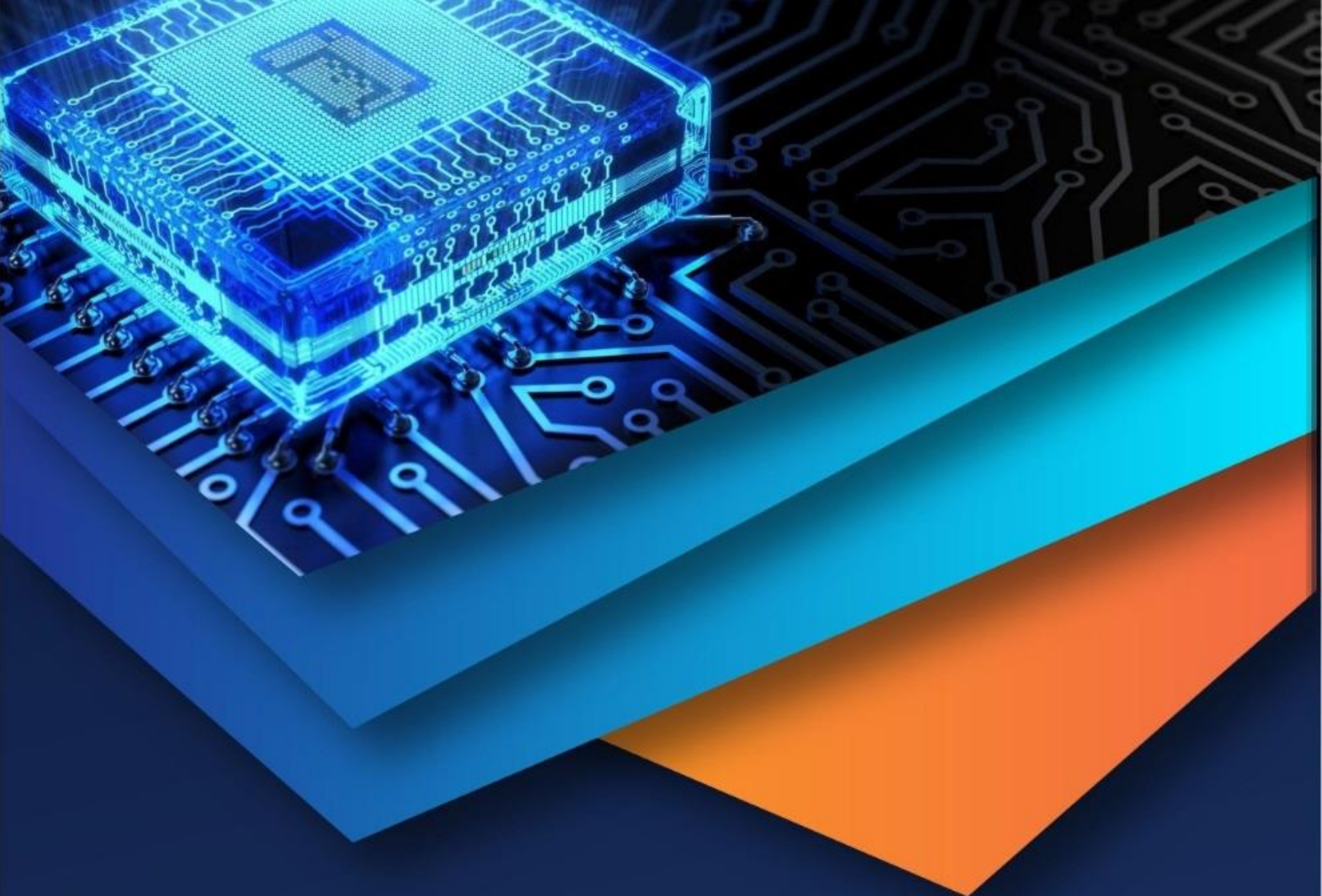

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