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Live video Tracking for Helmet Detection

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Abstract-Because of ascend in street mishaps, it has now gotten important to create a framework to restrict unplanned passings. The proposed framework plans to help law requirement by police, and in the long run bringing about changing danger conduct and thusly diminishing the quantity of mishaps and its seriousness. The target of this venture is to build up an application for authorizing helmet wearing utilizing live video following. This proposed framework accepts contribution as video and converts into edges and afterward each edge is changed over into dark scale image.The foundation deduction and morphological channels are then applied to each picture edge to guarantee simple recognition of articles. At that point highlights are extricated utilizing a haar course calculation and the head parcel is found and it is delegated helmet or non-protective helmet utilizing profound learning yolov3 algorithm.By dissecting the video, the photographs of people without helmet are returned as yield.

1. INTRODUCTION

In a high populated nation like India bikes are the most reasonable and the advantageous type of transportation, so there has been a fast expansion in cruiser mishaps because of the way that the vast majority of the motorcyclists don't wear a helmet. Over the most recent few years alone a large portion of the passings in mishaps are because of harm in the head. On account of this wearing a head protector is compulsory according to traffic rules, infringement of which causes powerful fines. The rate at which inclination of bikes in India is developing is multiple times the rate at which the human populace is developing. Because of ascend in street mishaps, it has now gotten important to produce a framework to restrict unintentional passings

Presently video observation based frameworks have become a fundamental hardware to keep a track on any sort of criminal or hostile to law action in current progress. The present studies say that human intercessions demonstrate incapable, because of the expansion in the hour of observing and furthermore because of the blunders made by people during checking. In this current day's various techniques are there for recognizing the engine bicyclist who doesn't wear a helmet yet have not had the option to precisely distinguish motorcyclists without caps under testing conditions like impediment, brightening, low quality of video, changing climate conditions

To manage this issue, profound learning procedures are utilized to identify the individual who is wearing a protective helmet. Profound learning has acquired a lot of consideration with cutting edge brings about muddled errands, for example, picture order, object acknowledgment, following, discovery and division because of their capacity to gain includes straightforwardly from crude information without depending on manual tweaking.

The framework accepts contribution as video and converts into outlines. In the wake of removing the casings the edges are changed over into dim scale pictures and afterward foundation deduction and morphological channels are applied on each picture. A Deep learning characterization model is worked to recognize the individual with helmetand without helmet by live video following. By investigating the video the tally of people with protective helmet and without helmet are returned as yield.

Profound learning calculations can be partitioned into two classifications. One part of them depends on district proposition, which is classified "two phase draws near" including R-CNN, SPP-net, Fast-RCNN, Faster-RCNN and R-FCN. Another part of them is an end-toend procedure which is classified "one-stage draws near" including YOLO and SSD. For the "two-stage draws near", some classification free district proposition from input pictures are created first and foremost. In the wake of separating the element vector from every proposition utilizing CNN, we train various classifiers for every classification to perform recognition. Be that as it may, with the "one-stage draws near", we view object identification as a relapse issue. At the point when a picture is input, we foresee bouncing boxes and class probabilities straightforwardly. Thinking about video location, it requires high preparing rate and recognition precision. YOLO is more appropriate for helmet discovery than R-CNN

There are for the most part 4 renditions of YOLO like YOLO, YOLOv2, YOLO9000 and YOLOv3. All have some streamlining dependent on YOLO. Since the video has a wide view, removed articles are too little to even think about identifying. YOLOv3 is more reasonable than different adaptations. The motivation behind why we pick YOLOv3 among the four forms of YOLO is that it performs best particularly in little article location and runs with the speed of 30 casings each second without losing

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identification precision.

2. LITERATURE SURVEY

According to the Research paper in 2016 titled 'Automatic Helmet Detection', the author has proposed the helmet detection system to ensure safety in bike riding using Support Vector Machine (SVM) Classifier and object tracking is done by mean shift but not focused on accuracy of the system. In order to increase the accuracy, YOLOv3 is used[9].

According to the Research paper in 2018 titled 'Real-time Vehicle Detection and Tracking', the author has proposed the helmet detection system using MatLab for image processing but not focused on speed of the system. In order to increase the speed we are using OpenCV[5] .

In [3], K. Dahiya et al. came up with helmet detection from surveillance videos where they used an SVM classifier for classifying between motorcyclist and non-motorcyclist and another SVM classifier for classifying between helmet and without helmet. For both classifiers, three widely used features - HOG, SIFT and LBP - were implemented and the performance of each was compared with that of other two features. They concluded that HOG descriptor helped in achieving the best performance.
In [7], C. Vishnu et al. proposed an approach using Convolutional Neural Networks (CNNs) for classification. In recent years, CNNs performing both automatic feature extraction and classification have outperformed previously dominant methods in many problems. Advances in graphical processing units (GPUs), along with the availability of more training data for neural networks to learn, have recently enabled unprecedented accuracy in the fields of machine vision, natural language processing, and speech recognition. Nowadays, all state-of-the-art methods for object classification, object detection, character classification, and object segmentation are based on CNNs. See for example the methods used in the ImageNet large scale visual recognition challenge .

OpenCV :

OpenCV (Open Source Computer Vision Library) is a library of programming functions mainly aimed at real-time computer vision and it is cross-platform. OpenCV upholds a great deal of calculations identified with Computer Vision ,Machine Learning . OpenCV-Python is the Python API of OpenCV. It consolidates the most desirable characteristics of OpenCV C++ API and Python language.

Some computer vision applications are object detection, human features identification, motion detection etc. Modular structure is used in the OpenCV library; that means the computer vision algorithms have static or shared libraries. Some of the commonly used OpenCV algorithms are mentioned below.

YOLOv3:

The YOLOv3 algorithm is capable of accurate object detection (traffic participants) with near real-time

performance (~ 25 fps on HD images) in the variety of the driving conditions (bright and overcast sky, snow on the streets, and driving during the night).
YOLO v3 algorithm consists of fully CNN [7] and an algorithm for post-processing outputs from neural network. CNNs are special architecture of neural networks suitable for processing grid-like data topology. The distinctive feature of CNNs which bears importance in object detection is parameter sharing. Not at all like feedforward neural organizations, where each weight boundary is utilized once, in CNN engineering every individual from the part is utilized at each position of the info, which means learning one bunch of boundaries for each area rather a different arrangement of boundaries.

2.1 EXISTING METHOODS

Strategies for object location by and large fall into either AI based methodologies or profound learning-based methodologies. For Machine Learning draws near, it gets important to initially characterize highlights utilizing one of the strategies beneath, at that point utilizing a procedure, for example, support vector machine (SVM) to do the order. Then again, profound learning strategies that can do start to finish object location without explicitly characterizing highlights and are ordinarily founded on convolutional neural organizations (CNN).

2.1.1DRAWBACKS

- This system has issues like not detecting head location as it may be an empty vehicle without a rider on the motorcycle.
- In heavy traffic areas it is not able to detect multiple tasks of detection at one bit of moment. In cases where number of features for each data point exceeds the number of training data sample, the SVM will underperform.
- Its wont perform very well, when the given dataset is having more noise.

2.2 PROPOSED SYSTEM

The proposed system idea to automatically detect bike riders with helmets using surveillance video in real time. The proposed system first converts the video into frames and then converts each frame into gray scale image. The background subtraction and morphological filters are then applied to each image frame to ensure easy detection of objects.At that point highlights are removed utilizing a

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haarcascade calculation and the head divide is found and it is named helmet or non helmet utilizing profound learning yolov3 calculation.

Finally, the licence plate of the bike on which person without the helmet is extracted. The proposed system uses yolov3 to detect the helmet. It first divides the image into cells. Each cell is then responsible for predicting a number of boxes in the image and for each bounding box the network predicts the confidence that the bounding box actually encloses the object. The result is a large number of bounding boxes that are consolidated into a final prediction by a post-processing step. Region proposal methods limit the classifier to the specific region. YOLO accesses to the whole image in predicting boundaries.

3. OBJECTIVES

- The objective of the proposed system is to develop an application for enforcing helmet wearing using live video tracking.
- Video capturing and frame extraction extracts the frames from input video.
- Background subtraction and morphological filters for object recognition.
- Haar cascade extracts the features of the object.
- A deep learning classification model identifies the person with and without a helmet.
- The images of persons without helmets are given as output.

Fig 3.1 Original image

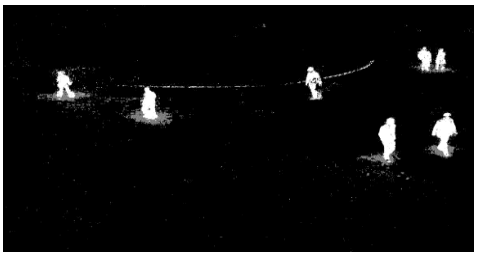

Fig 3.2 BackgroundSubtraction

4. SYSTEM DESIGN

4.1 System Architecture

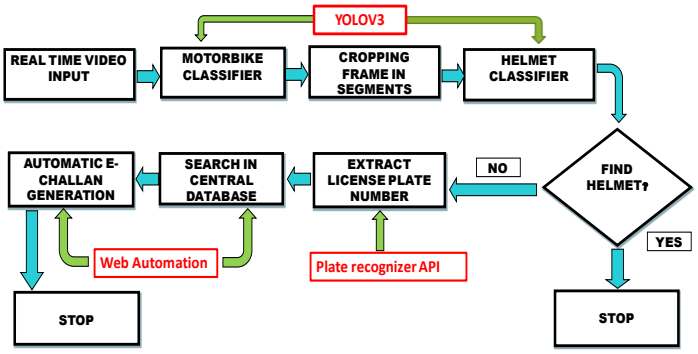

Fig 4.1 flow diagram

The Fig 4.1 is the block diagram of the helmet detection system, consisting several stages: Video capturing, Converting into video frames, Background subtraction and morphological filters, Feature extraction using haar cascade algorithm, Pre-trained dataset, Deep learning model, helmet detection and analysis of result.

The video capturing and frame extraction phase takes video from the camera or stored video file as input and then divides the video into frames by applying image processing functions. Background subtraction and morphological filter modules is very important for identifying the object.

After the background subtraction, morphological filters such as erosion and dilation are applied for each frame. Cascade classifier module is used to extract the features of an object by collecting a dataset which contains positive and negative samples. Haar cascade is basically an object detection algorithm used to identify objects in an image or video.

5. CONCLUSION

In Highly populated countries like India there has been a rapid increase in motorcycle accidents due to the fact that

most of the people don't wear helmets so this project aims to identify the persons who are not wearing helmets. This project gives the photo of the licence plate of the bike if the rider is not wearing the helmet.

In this project we take the sample video and return the count of persons with helmet and without helmet. This project makes use of background subtraction which is invariant to various challenges such as illumination, poor quality of video, occlusion, varying weather conditions. The use of Haar cascade algorithm provides best results in detection of face and body parts in an image. The use of Deep learning technique improves the detection rate and reduces the false alarms resulting in a more reliable system.

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