Automatic Helmet Detection Using K- Nearest Neighbour Algorithm

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Abstract- *In this paper propose of video-based motorcyclist monitoring system to detect helmets of motorcyclists on the road. Then the detection of helmet using video capture and using the moving object of tracking in image processing. This propose of video camera using background subtraction, HAAR cascade and k-nearest neighbour algorithm. Due to the propose in detect the person who are not wearing the helmet. Then the video takes the identify the number plate and send to the police along with fine. The main purpose of project helps the classify the motorcycles in public transportation. Keywords-Background subtraction, Object tracking, Region of Interest, HAAR cascade and K-nearest neighbour algorithm.*

I. INTRODUCTION

In the automatic Helmet detection using the traffic scene videos in person wearing helmet or not. Then the framework for automatic detection of motorcyclists driving the road in with or without helmet in the video camera. Then the video has various difficulties of occlusion, illumination, poor quality of the video. We proposed approach use the background subtraction on the camera frames in get the moving objects [3]. Then occlusion is dynamic object usually occlude each other due to which object of interest may only in partially visible.

In the background subtraction using IGMP (Internet group management protocol) and noise reduction of GF in this algorithm and capture the video taking frames in positive and negative sample video. In the object tracking using the accuracy and speed. Region of Interest in capability of surveillance camera is limited and video may be low resolution. In the object has many significantly because lightning, different angles and environments.

In the **HAAR** cascade algorithm using the train and classifier of frames in the feature extraction in detect the helmet in moving object in the road and identify the faces or non faces in the train a classifier.

In the **K-nearest neighbor algorithm** using the extracted object in classified as a motorcycle or other object. KNN algorithm is using the Euclidean distance and then k is nearest neighbor of the node. Finally, KNN algorithm is used which classifies which the extracted head is wearing a helmet or not wearing a helmet.

II. LITERATURE SURVEY

Development of a safety index to identify differences in safety performance by postal delivery motorcyclists based either in different regional post offices or within the same regional office team says motorcyclist are among drivers most vulnerable to road accident then cause of overbracking , speeding and lack of attention.Its more advances in tracking and sensing technologies have facilitated for identify risky driver maneuvers.Then the experiental evidence of the safety index values are calculated for measuring driver performance and providing the information as immediate feedback to drivers affected behaviour and reduced the accidents.

Automatic detection of bike-riders without helmet using surveillance videos in real-time of this paper for an automatic detection used background subtraction of video detects the bike riders in helmet or not wearing of visual features and binary classifier.its results show detection accuracy of 93.80 %on real world of survelliance video.

Helmet an intelligent motorcycle helmet for rear big track/bus intimation and collision avoidance team says integrates IR sensors used image sensor and adopt the image recognition methodology recognize big vehicles approached and related initimation to avoid accidents.

Smart Helmet Sensors for Accident Prevention of this paper used infrared imaging system for mounting on a helmet includes passive infrared camera head pack having a removable narrow of band filter cover.Then electronic circuit of smart sensor includes wireless video,neural network pattern chip.

Automatic detection of motorcyclists without helmet of this paper aims helmet of main safety of motorcyclist.Its an

automatic method for detection and classification on Public roads.Then this paper used by feature extracted by histograms of oriented gradients and local binary pattern of traffic images captured by cameras were used.

Automatic number plate recognition for motorcyclists riding without helmet of this paper says motorcyclist not wearing a protective helmet for fatalities of accidents. Its most useful method for motorcyclist wear helmet is traffic police monitoring at road junctions of CV footage video. This propose of this paper of this automated system for detecting motorcyclist not wearing helmet and objects are classified the head portion is located and its helmet or not.

Then number plate of motorcycle is detected and characters on its are extracted for not wearing the helmet.

To define of detect of motorcyclist without helmet in video using CNN mandatory Tom and his team says this proposed approach in two datasets. It's using the supervised learning of analyses data and perceptron's of machine learning. Use of adaptive background for detect the motorcyclist on busy roads while handle challenges such as weather change, illumination effects [3].

A smart helmet and intelligent bike system mandatory prof. chitte P.P and his team says the protection system of the helmet in the good bike rider. Then the microcontroller using the bike unit has Arduino Lilypad and helmet unit ARM7 IPC 2148. In this Arduino using programmable piece of software [4].

A Detection of helmet wear analysis in Intelligent traffic surveillance team says using the Bluetooth capabilities and controls of communication devices using chats with other person take the calls directly through your helmet within build the microphone. Then the images do not focus on different view angles [1].

A small team of Automatic Detection of bike riders without helmet using the first detects the video in cross correlation analysis. In cross correlation measurement tracks of 2 valuable set of data relative each other [2].

In this propose of this project using detect the helmet or not in the capture the video find the number plate recognition using the background subtraction [3] of identify is motorcyclist or non- motorcyclist. Then number plate is identifying the motorcyclist is detected and the character on it are extracted.

III. PROPOSED SYSTEM

In the proposed system of the helmet detection of the motorcyclist in open CV of the modules and capture the video which scanning object of helmet in machine learning of python.

We apply the Haar cascade and K-Nearest neighbor algorithm.

A. Haar Cascade Algorithm

In the haar cascade Algorithm using program used the coding library called Open Computer Vision Library (OpenCV) and training libraries from two sources. The first source came from the Open Images Dataset and the second one was from our recorded videos. Initially, the learning step runs before the detecting step. As this algorithm requires many input images, approximately 10 videos were used (30 fps) and some image databases from the internet. In this algorithm using Gaussian blur, frames etc.,

$$G(x,y)=12\pi\sigma 2e-(x2+y2)/(2\sigma 2),$$

where x is the distance from the origin in the horizontal axis, y is the distance from the origin in the vertical axis and σ is the sstandard deviation of the Gaussian distribution.

FRAME IMAGE:

BLUR IMAGE:

B. K-Nearest Neighbour Algorithm

In this algorithm is used to solve classification model problems. K-nearest neighbor or K-NN algorithm basically creates an imaginary boundary to classify the data. Therefore, larger K value means smooth curves of separation resulting in less complex models. whereas, smaller k value tends to koverfit the data and resulting in complex models. It's very important to have right k-value when analyzing the dataset to avoid overfitting and underfitting of the dataset.

All the instances correspond to points in an N-dimensional feature space. Each instance is represented with a set of numerical attributes. Each of the training data consists a set of vectors and a class label associated with vector. Classification is done by comparing feature vectors of different k nearest points.

For classification of motorcycle, K-Nearest Neighbor is used. Based on closest training examples, KNN method for classifying the objects is used. Euclidean distance is used and is given by

$$d(p, q) = \sqrt{\sum i\,(pi - qi)\,2}$$

The similarity measures between arc and a circle is given by

$$c = \mu r\, \sigma r$$

where σr, μr is the standard deviation and mean of the distance r from the head centroid to the head contour. These features are extracted because the head portion which contains a helmet is more circular than a head without a helmet, which reflects in high circularity of head contour.

View Invariant Motorcycle Detection for Helmet Wear of nearest classification feature to be extracted. It is denoted as μ, computed individually from a gray scale image as

$$\mu l = 1 / N \sum_{i=0}^{N-1} Ii$$

where Ii is an intensity of the ith pixel, N is the pixel count in the head. These features are employed since the intensity on the top and the back of the head without helmet are mostly dark.

These features are normalized with the help of maximum gray scale intensity. In the video capture identify the persons head not wear the helmet feature which is computed exclusively by:

$$\mu H = 1 / N \sum_{i=0}^{N-1} Hi$$

where Hi is the ith pixel and N is the pixel count in the head.

Calculate the distance from point K with its neighbors using Euclidean distance formula,

$$\sqrt{(X1-X2)^2 + (Y1-Y2)^2}$$

Advantage:

Create feature and target variables.
Split data into training and test data.
Train or fit the data into the model.
Predict the future.

IV. ARCHITECTURE

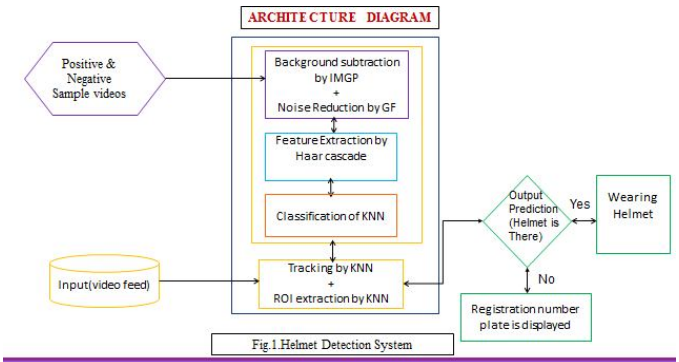


Fig.1.Helmet Detection System

In the architecture based on the video capture the image highlight of positive and negative frames take in the IGMP of the background subtraction.Then using filter the image of data in metadata set loaded in the preprocessing using remove unwanted dataset and train and test of the data.Then the dataset create to the threshold value of the noise reduction of Gaussian filter of the Helmet &motorcyclist has identified.

Its dataset using testing of the image of attribute extract from the haar cascade algorithm.

Then the image input values from get the output object using X and Y values of the extraction and apply CSV

file of the tabular form and calculate the value and target of the value is two wheeler and helmet in CSV file of the region.

Let the input value apply train and testing of evaluation in cross validation data of value get accuracy and efficiency of testing data in classified of K-Nearest Neighbour Algorithm and get tracking of the region value of Helmet.

In the K-Nearest Neighbour Algorithm using the Region of Interest can apply the output and identify the bike or car.

If the helmet is wear of output can predicted then the helmet is not wear can identify the registeration number plate is display in capture the video in dataset and get the details collect by police send message to particular person can pay the fine.

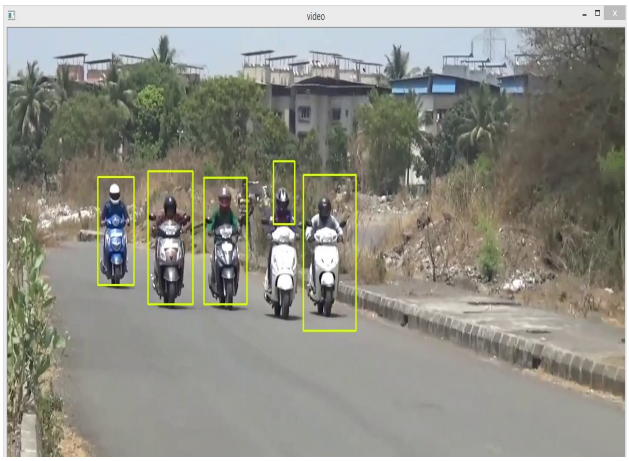
V. EXPERIMENTAL SETUPS AND RESULTS

This experiment are conducted on a machine learning of python using anaconda of pentium IV 2.4GHz,windows 10x64,8Gb RAM.

A. *Datasets:*

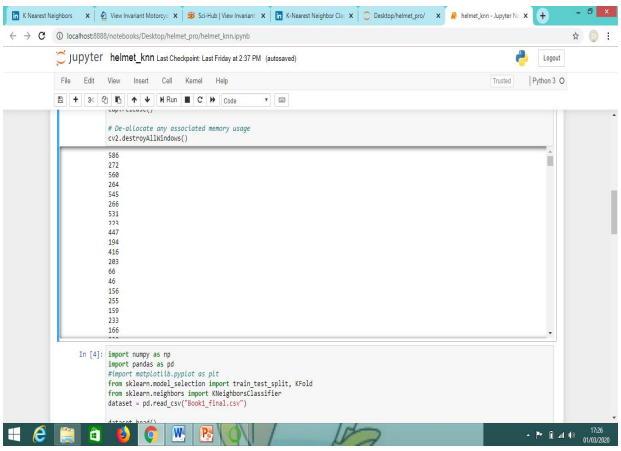
This dataset of preprocessing in removing unwanted data and attach the data of helmet then it take training and testing we need the import_train_split in the code then its blur ,threshold values in the dataset.

In this video using 2D image of motorcyclist in wearing the helmet.

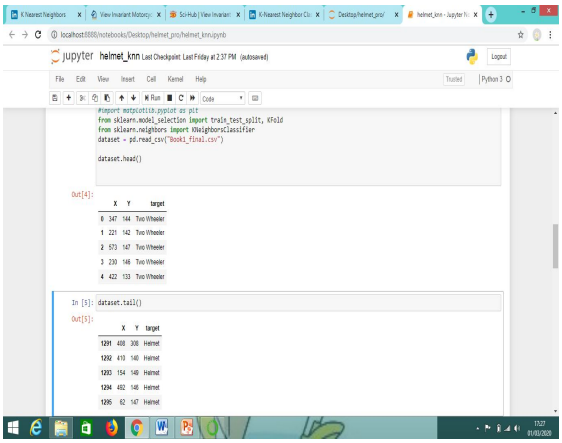


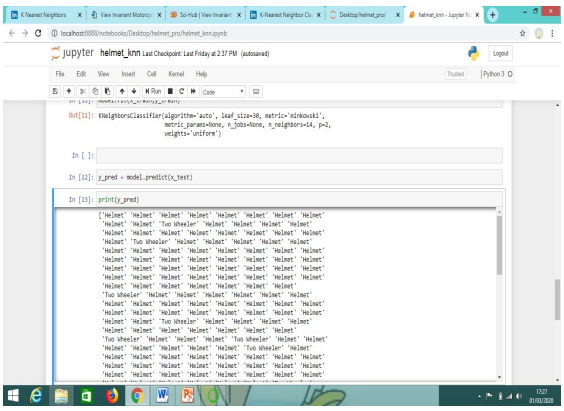
Two wheeler detect the helmet image

Then the dataset identify values get is helmet and twowheeler.



Next dataset using x and y values calculate the image is helmet and two wheeler





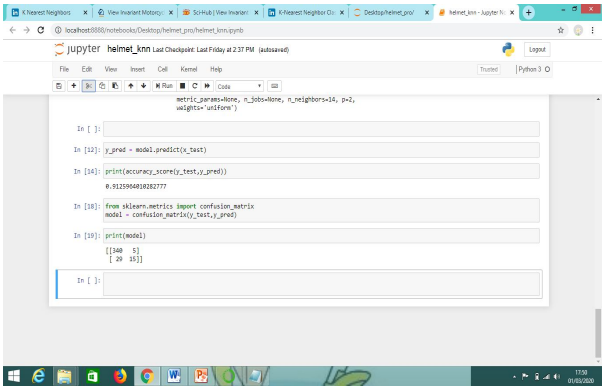
Values of helmet and two wheeler in k-nn

In the dataset of K-Nearest Neighbour using the confusion matrix is the field of machine learning and specifically the problem of statistical classification, a confusion matrix, also known as an error matrix.

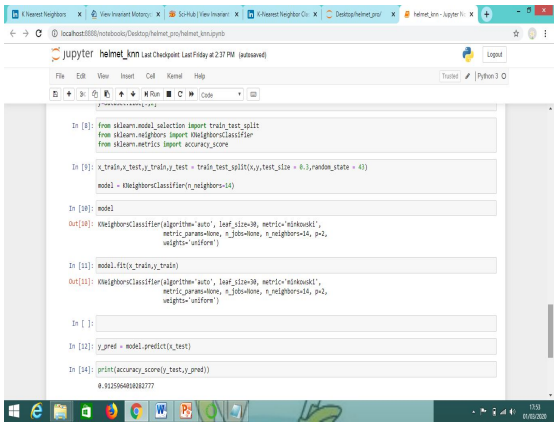
A confusion matrix is a table that is often used to describe the performance of a classification model (or

"classifier") on a set of test data for which the true values are known. It allows the visualization of the performance of an algorithm.

It allows easy identification of confusion between classes e.g. one class is commonly mislabeled as the other. Most performance measures are computed from the confusion matrix.Then matrix using positive and negative.There are problems with accuracy. It assumes equal costs for both kinds of errors. A 99% accuracy can be excellent, good, mediocre, poor or terrible depending upon the problem.



Values the confusion matrix image and next image final values of matrix



VI. CONCLUSION AND FUTURE WORK

In this propose using algorithm these features are used to detect the motorcyclist wears helmet or not even under different illumination changes which are usual in real time. The proposed algorithm helps to segment motor cycles on public roads which act as an important task. This can be used to motivate the two wheeler riders to wear helmets via providing awareness. This can estimate accident with and without helmet, speed computation and vehicle tracking. The recognition accuracy ratios which is in training and testing for detection is approximately 70:30 and 80:20. We apply KNN algorithm to predict the helmet detection.The machine can take 30 pictures in 10 seconds.Number plate detection for sending a warning message when the motorcyclist without helmet is detected.

In the future work system.In future,communication between multiple helmets to make it more user friendly can be targeted. Also, a force sensing resistor can beused to avoid the wrong accident triggering by enabling the features of helmet only when it is worn.

Additionally, a solar panel can be implemented to increase the power backup and to make efficient use of natural resource.

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