International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 08 Issue: 07 | July 2021 www.irjet.net p-ISSN: 2395-0072

The Smart Traffic Management System

Prof.Hyder Ali Nooruddin Hingoliwala [1], Snehal Mhaske [2], Akshada Pachpande [3], Rutuja Amande [4], Manisha Dukare [5]

[1]Prof. Hyder Ali Nooruddin Hingoliwala, Dept. of Computer Engineering, JSCOE, Pune, Maharashtra, India
[2]Snehal Mhaske, Dept. of Computer Engineering, JSCOE, Pune, Maharashtra, India
[3]Akshada Pachpande, Dept. of Computer Engineering, JSCOE, Pune, Maharashtra, India
[4]Rutuja Amande, Dept. of Computer Engineering, JSCOE, Pune, Maharashtra, India
[5]Manisha Dukare, Dept. of Computer Engineering, JSCOE, Pune, Maharashtra, India

---

Abstract - *Motorcycle accidents are on the rise Many years in many nations. More than 37 in India Millions of people use bicycles. Therefore, it is necessary Develop a system to automatically detect helmet wear For road safety. Hence, there is a custom object detection model Created using machine learning based algorithms that can Find motorcyclists. In search of helmets Rider, license plate removed and license plate The number is identified using an optical character recognizer. License plate identification (LPR) plays an important role in this busy world due to the growth of vehicles are being stolen day by day breaking traffic rules the size of the dam is also increasing in a limited space This law is for identifying registration . In Basic process steps such as number plate identification Division of characters and identification of each from the characters, the department plays important art, ever since Identification accuracy is based on how accurate it is The partition is done. To avoid problems like unwanted Illumination, the tilt that damages the partitions that occur through it numerous algorithms affect recognition accuracy Developed for this work. This paper presents a solid Techniques for localization, segmentation and identification Characters in the located plate. Image on still camera Or videos are received and reproduced in grey scale images.*

Key Words: Artificial Intelligence, Machine Learning, Keras, Tesseract, Machine Learning, image processing, SVM ,helmet.

1.INTRODUCTION

Helmets are the main safety equipment of motorcyclists. The helmet saves the motorcyclist from an accident. Although In many countries the use of helmets is mandatory, there are Motorcyclists who do not use or abuse it. On it A lot of work has been done in traffic in recent years Including analysis, vehicle detection and classification Helmet search. There was an intelligent traffic system Implemented using computer vision algorithms, such as: Looking for background and foreground images for the section To move the image in the view and to describe the image Features. Computer intelligence algorithms are also used Such as machine learning algorithms for sorting objects.

Machine learning (ML) is an area of artificial intelligence Which works manually using trained model input Paid during the training period. Machine learning algorithms So create a mathematical model of the known sample data "Training data" for making estimates or judgments And are also used in object detection . Because of that we train model with specific dataset , helmet The search model can be applied. We can easily identify helmet lower rider by using helmet finding model. Class-based rider's license plate found Cropped and saved as image. This image is given Optical Character Recognition (OCR) Model J Recognizes text and assigns license plate numbers Output in machine encoded text format. And it can Activate in real time using a webcam. The objective of this paper is to present a novel and practical safety helmet detection method grounded on image processing and machine learning in power substation. In order to reduce detection range of surveillance video, the ViBe background modelling algorithm is adopted to segment motion objects in foreground frame. After that, we extract Histogram of Oriented Gradient (HOG) feature of pedestrians in corresponding range and use Support Vector Machine (SVM) to classify the human. Finally, the color feature is exploited to determine whether the human wearing safety helmet or not. Our proposed method includes machine learning like extracting HOG features and training SVM, meanwhile includes image processing like color feature recognition in RGB color space. Extensive experimental results in power substation illustrate the effectiveness and efficient of our proposed method.

2. EXISTING SYSTEM

Automatic identity of motorbike-riders without helmets in surveillance videos comes underneath the specific category of anomaly detection. As described powerful automated surveillance generally consists of the subsequent responsibilities: modeling, identity, tracking and type of transferring items within the environment. Chiverton recommended a technique in that uses the geometric form of the helmet and the variant of lights at various parts of the helmet. This uses a way for detecting circle arcs primarily based on the transformation of the Hough. By this strategy the exactness was exceptionally high anyway the quantity of test pictures taken was extremely less so it wasn't a lot

dependable.The greatest weakness of this methodology is that it endeavors to find the helmet in the entire picture, which is computationally expensive, and it can also confuse more fashionable gadgets like helmets. It additionally supervises the fact that helmets are best appropriate only for cyclists.

3. PROPOSED TECHNIQUE

1. Machine Learning:

we apply the concept of machine learning. The main aim of our research is to apply the concepts of machine learning algorithms for creating an automated system for helmet detection. Machine Learning is the subset of Artificial Intelligence that deals with the extraction of patterns from datasets. Machine learning is the act of utilizing algorithms to parse information, gain from it, and afterward make a prediction or expectation about something in the world. In our new system, we apply the techniques of deep learning which is a subset of machine learning algorithm that utilizes complex artificial neural networks. One of the main areas of research for our proposed innovation includes the usage of pre-trained real time object detection models.

2. Support Vector Machine (SVM) :

Support Vector Machine" (SVM) is a supervised machine learning algorithm which can be used for both classification or regression challenges. However, it is mostly used in classification problems. In the SVM algorithm, we plot each data item as a point in n-dimensional space (where n is number of features you have) with the value of each feature being the value of a particular coordinate. Then, we perform classification by finding the hyper-plane that differentiates the two classes very well (look at the below snapshot).

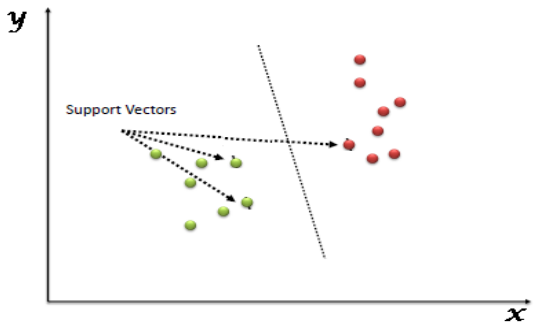

Fig 1. SVM

Support Vectors are simply the co-ordinates of individual observation. The SVM classifier is a frontier which best segregates the two classes (hyper-plane/ line).

3. Tesseract :

Tesseract is an optical character recognition engine for various operating systems. It is unrestricted software, released under the Apache License. Tesseract was in the top three OCR engines in terms of character accuracy in 1995. It is existing for Linux, Windows and Mac OS X. However, due to restricted resources it is only rigorously tested by developers under Windows and Ubuntu.Tesseract up to and including version 2 could only accept TIFF images of simple one-column text as responses. These early types did not contain layout analysis, and so inputting multi-columned text, images, or equations created garbled output. Since version 3.00 Tesseract has supported output text formatting, hOCR positional information and page-layout analysis. Support for a number of new image formats was new using the Leptonica library. Tesseract can detect whether text is monospaced or proportionally spaced.The initial versions of Tesseract could only recognize English-language text. Tesseract v2 additional six additional Western languages (French, Italian, German, Spanish, Brazilian Portuguese, Dutch). Version 3 extended language provision significantly to include ideographic (Chinese & Japanese) and right-to-left (e.g. Arabic, Hebrew) languages, as well as many more scripts.

4. Pytesseract or Python-tesseract :

Pytesseract or Python-tesseractis an Optical Character Recognition (OCR) tool for python. It will read and recognize the text in images, license plates, etc. Here, we will use the tesseract package to read the text from the given image. Mainly, 3 simple steps are involved here as shown below:-

Loading an Image saved from the computer or download it using a browser and then loading the same. (Any Image with Text). Binarizing the Image (Converting Image to Binary). We will then Pass the Image through the OCR system.

5.TensorFlow :

TensorFlow is an end-to-end open source platform for machine learning. It has a complete, flexible environment of tools, libraries and community resources that lets researchers push the state-of-the-art in ML and developers easily build and deploy ML powered applications. Build and train ML models easily using intuitive high-level APIs like Keras with eager execution, which makes for instant model iteration and easy debugging. Robust ML production anywhere Easily train and deploy models in the cloud, on-prem, in the browser, or on-device no matter what language you use. Powerful experimentation for research A simple and flexible architecture to take new ideas from concept to code, to state-of-the-art models, and to publication faster.

6.Keras :

Keras is a powerful and easy-to-use free open source Python library for developing and evaluating deep learning models. It wraps the efficient numerical computation libraries Theano and TensorFlow and permits you to define and train neural network models in just a limited lines of code. Build and train ML models easily by intuitive high-level APIs like Keras with eager execution, which makes for immediate model iteration and easy debugging. Robust ML production anywhere Easily train and deploy models in the cloud, on-frame, in the browser, or on-device no matter what language you use. Powerful experimentation for research A simple and flexible architecture to take new ideas from concept to code, to state-of-the-art models, and to publication faster.

4. UNDERSTANDING THE MATHEMATICS BEHIND SUPPORT VECTOR MACHINES

1.Length of a vector :

The length of a vector x is called its norm, which is written as ||x||. The Euclidean norm formula to calculate the norm of a vector x = (x1,x2,...,xn) is:

||x||=x21+x22+...+x2n−−−−−−−−−−−−−√

2.Direction of a vector :

The direction of a vector x = (x1,x2) is written as w, and is defined as:

w=(x1||x||,x2||x||)

If we look at figure 1, we can see that cos(θ)=x1‖x‖ and cos(α)=x2‖x‖. Thus, the direction vector w can also be written as:

w=(cos(θ),cos(α))

3.Linear separability :

Linear separability is one important concept in SVM. Although in practical cases the data might not be linearly separable, we will start from the linearly separable cases (since they are easy to understand and deal with) and then derive the non-linearly separable cases.

Figure 2 shows the two-dimensional data are separated by a line. In this case, we say the data are linearly separable. Figure 5 is an example of non-linearly separable data, which means we can not find a line to separate the two-dimensional data. Similarly, for three-dimensional data, we say the data are linearly separable if we can find a plane to separate them

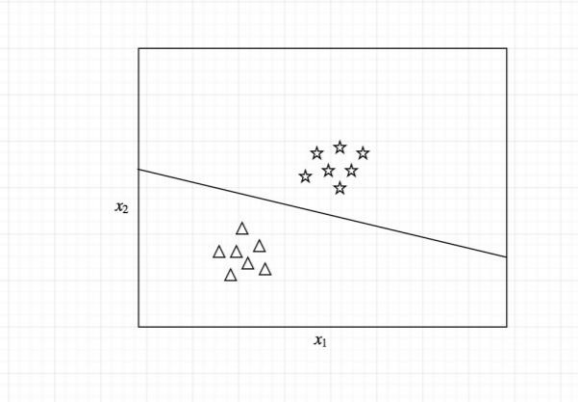

Fig 2. Two-dimensional data are separated by a line

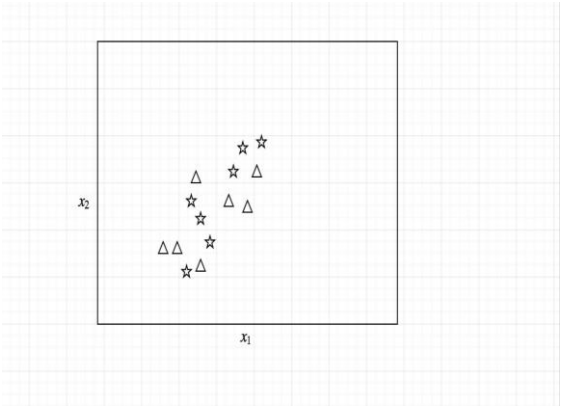

Fig 3. Non-linearly separable data

5. SYSTEM ARCHITECTURE

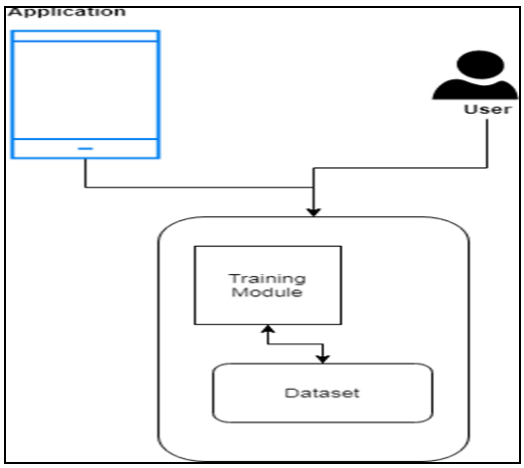

Fig 4.System Architecture

1. Image procurement: A camera is used to capture vehicle on road in traffic. It is the very first part of any vision system.
A. Preliminary processing techniques:

In this step mainly focuson removal of background noise, enhancing of contrast and banalization of images.
B. Vehicle classification:
By considering two parameters (Aspect ratio and area) of a particular vehicle, Motorcycles are classified and processed further.

2. Helmet detection: After extracting head part classifier which is being trained by a certain amount of pictures of helmets. By trained features, it will be determined whether motorcyclists is wearing a helmet or not.

3. Number plate recognition detects the motorcycle in camera and captures the license plate image.

4. If rider not wearing helmet Apply Appropriate fine on that particular rider. (using extracted number plate information and database of a rider).

6. FLOWCHART

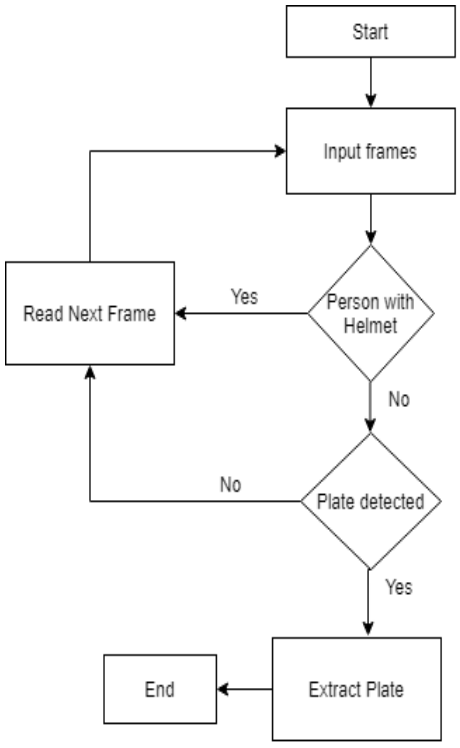

Fig 5. Flowchart

7. SYSTEM REQUIREMENTS

1. Software System requirement :

- Desktop 4.0 and Above

- 2GB RAM

- Processor Speed 1.2GHz and Above

2.Hardware Requirements:

- 8GB RAM PC

- At least 2GHz Processor

- Windows 7/8/10

8. METHODLOGY

A. User Interface Module and Helmet detection :

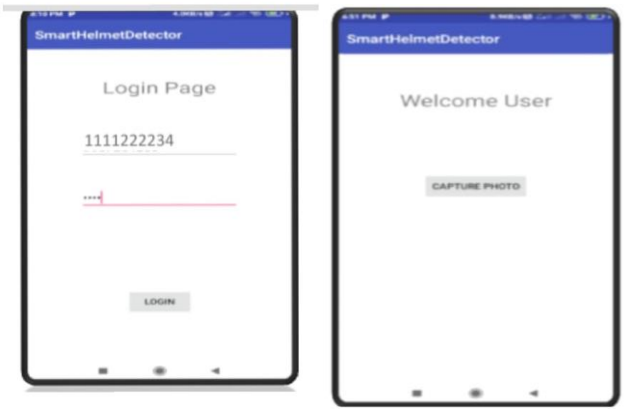

Fig 6. User Interface Module login page

In our Project first we have User interface module. For that we need to login with our User id that is register mobile number and then your password. After that we have login successfully and the Welcome user window will be open . On that window we have one button named as 'Capture Photo' to capture the image of Person or number plate.

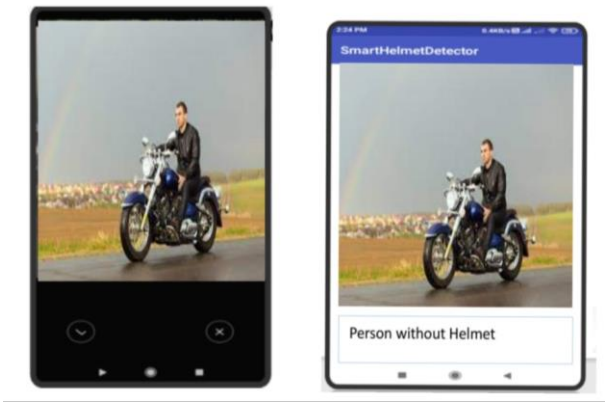

Fig 7. User Interface Module helmet detector page

After clicking on capture image button the mobile camera will be open in first image and we need to click the image of person. In second image we have captured photo the person and one description box and one report button to send image to server.

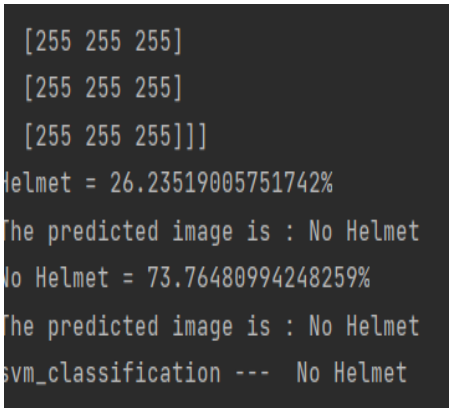

Fig 8. Helmet detecting results

When image came to the server that will be proceed and detected that the person is not wearing helmet.

B.Number plate detection :

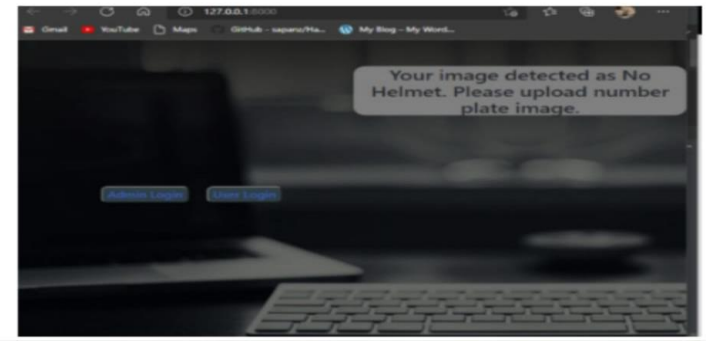

Fig 9. Fine apply Module

For number plate detection and helmate detection we need to login to server side database. After that we first proceed the without helmate person image and then we proceed for number plate detection. When our image is detected as No helmate we upload number plate image.

Fig 10. Prediction result for number plate

As shown in snapshot we got number plate detected by server.

C.Fine Applied :

Fig 11. Fine applied mail

When number plate is detected the fine applied mail will be sent to user.

8.1 NUMBER PLATE DETECTION MODULE

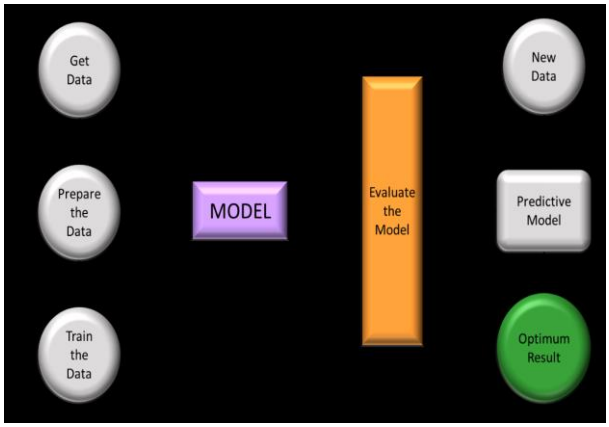

Fig 12. Number plate detection module

By default, Tesseract expects a page of text when it segments an image. If you're just seeking to OCR a small region, try a

different segmentation mode, using the — psm argument. There are several ways a page of text can be analyzed. The tesseract API provides 14-page segmentation modes if you want to run OCR on only a small region or in different orientations, etc.

1.Pre-processing for Tesseract :

To get the best results and ideal accuracy while using Tesseract, you need pre-processed form of the images. This includes thresholding, erosion, deskewing, etc. Whilst implementation of pre-processing, we will use OpenCV.

2.OpenCV :

openCv is a cross-platform library using which we can develop real-time computer vision applications. It mainly focuses on image processing, video capture and analysis including features like face detection and object detection. Let's start the chapter by defining the term "Computer Vision".

3.Computer Vision :

Computer Vision can be defined as a discipline that explains how to reconstruct, interrupt, and understand a 3D scene from its 2D images, in terms of the properties of the structure present in the scene. It deals with modeling and replicating human vision using computer software and hardware. Computer Vision overlaps significantly with the following fields –

A.Image Processing – It focuses on image manipulation.

B.Pattern Recognition – It explains various techniques to classify patterns.

9. ADVNTAGES OF SYSTEM

1. The developed application aims to help law enforcement by police, and eventually resulting in changing risk behaviors and consequently reducing the number of accidents and its severity.

2. Smart traffic management is a sophisticated software application comprising Android and ML system and web interface. System developed for the purpose of providing an comprehensive solution for Traffic officers and Traffic Policemen.

3. Efficient use of technology in providing an easy, efficient and comprehensive traffic enforcement system which will ensure nation-wide data sharing and lead to better traffic discipline and road safety.

4. Minimizing time and efforts of citizen in making payments or follow-up actions which they face after getting challan on Road.

5. Connecting all the stakeholders through a common system which is ensuring data integrity, reliability and transparency. End to end automation of the process will ensure efficiency at each level of users. 100% digitization and documentation of records will help in improving the visibility on offenders, types of offences frequently committed, payments received on time etc.

10. FUTURE SCOPE

A lot of training data is gathered from cameras, the system can become much more robust and reliable than it is now. This project can be further improved by implementing advanced safety measures like to check collision detection, capturing images of vehicles with who breaks the rule by talking on phone and driving. This lessens the work of traffic police and with affordable cost. Once installed correctly, this system will work and generate databases for greater period of time under proper maintenance.

11. CONCLUSIONS

The software of the helmet detection has been thoroughly tested and implemented we have very good exercise in high level language and have realized the ingenuity and patience with this job has to be done. In our project we provided the SVM based Helmet detection and also made a detailed study about CNN. We used Jupiter notebook to implement the program and we successfully implemented the program. Our project was tested successfully tested in python. We also made study of applications and future scope of the project. Our project can be linked with the traffic cameras and with some modifications it can be used to detect helmets in the real time system. Furthermore we can merge the algorithm of automated license plate detection and make a system which generates challans for those who don't wear helmet.

REFERENCES

[1] Navneet Dalal and Bill Triggs, "Histogram of orientedgradients for human detection".
[2] Ross, Jeff, Trevor and Jitendra "Rich feature Hierarchyfor Accurate object Detection"
[3] Shaoqing Ren, Kaiming He, Ross Girshick, Jian Sun, "Fast R-CNN" (Submitted on 4 Jun 2015 (v1), last revised6 Jan 2016 (this version, v3)).
[4] Joseph Redmon, Ali Farhadi, "YOLO9000: Better, Faster, Stronger", University of Washington, Allen Institute Of AI.
[5] Wei Liu, Dragomir Anguelov, Dumitru Erhan, Christian Szegedy, Scott Reed, Cheng – Yang Fu, Alexander C. Berg.
[6] Joseph Redmon, Ali Farhadi, "YOLOv3: An Incremental Improvement", University of Washington,AllenInstituteofAI.