REALTIME HELMET DETECTION AND NUMBER PLATE RECOGNITION USING MACHINE LEARNING

PRESENTED BY,

N. Neha , 923819104029
S. Priyadharsini , 923819104035
A.Saranya , 923819104040
M. Yazhini , 923819104059

GUIDED BY,

Ms.P.S.Uma, AP

INTRODUCTION

· Current situation, we come across various problems in traffic regulations in India which can be solved with different ideas. Riding **motorcycle without wearing helmet is a traffic violation** which has resulted in increase in number of accidents and deaths in India. Existing system monitors the traffic violations primarily through CCTV recordings,

• The number of people using motorcycles is increasing dayby-day. In Proposed we **used yolo v3 for object detection** and **CNN for detecting the number plate**. Once fully trained, computer vision models can perform object recognition and detection and even track movement.

• Inthis study , yolov3 and CNN are used to compare motercycle helmet and licence plates detection. Our Application can **be implemented in real-time using a Webcam or a CCTV as input**.

OBJECTIVE

- The main aim of this thesis is to compare the machine learning algorithms that detect motorcycles' license plates and helmets. Here, the **Convolutional Neural Networks (CNN) and YOLOv3** are trained with Helmet Detection datasets. The aim of this thesis includes the following objectives:
- **Gather the proper datasets required for training** and perform data preprocessing.
- Training the models using YOLOv3 and Convolutional Neural Networks (CNN) algorithms with training datasets.
- Testing the models using the test data set and recording the prediction results. Calculating the accuracy of the algorithms that detects the helmets and license plates of motorcycles.

FUTURE SCOPE

- Though the results obtained satisfied the research goal but the research can be expanded further. Till now we have detected whether the **riders are wearing helmets or not**, we can implement a similar system which stores the license plate details of the motorcycles.
- If riders do not wear the helmets and use the database details **we can send an e-challan or warning message** to the riders. And also, in ourthesis we have limited to only one **performance metric i.e., accuracy**, we can expand this thesis further by including more performance metrics, which gives us a more efficient algorithm

LITERATURE SURVEY

- **Title: "Real-Time License Plate Detection for Non-Helmeted Motorcyclists Using YOLO“**
- **Work:** This paper presents a real-time license plate detection system specifically designed for non-helmeted motorcyclists. The authors propose a method that utilizes the YOLO (You Only Look Once) algorithm to detect and localize license plates in real-time video streams. The system aims to enhance enforcement efforts related to non-helmeted motorcyclists by automating the process of license plate detection.
- **Observation:** The paper acknowledges the importance of enforcing helmet-wearing regulations for motorcyclists and the challenges faced by law enforcement agencies in identifying non-helmeted individuals. The authors describe their approach, which involves training a YOLO model on a dataset of non-helmeted motorcyclist images, allowing it to accurately detect and localize license plates in real-time. The paper discusses the performance evaluation of their system, including detection accuracy and processing speed. The results indicate the potential of their method to assist law enforcement in identifying non-compliant motorcyclists.

LITERATURE SURVEY

- **Title: "Automatic Number Plate Recognition Using Deep Learning“**
- **Work:** This paper focuses on the application of deep learning techniques for automatic number plate recognition (ANPR). The authors present a method that utilizes deep learning algorithms to accurately detect and recognize number plates in images or video frames. The system aims to automate the process of number plate recognition, which has various applications in traffic monitoring, law enforcement, and parking management.
- **Observation:** The paper acknowledges the growing need for efficient and accurate number plate recognition systems in various domains. The authors highlight the limitations of traditional approaches and propose the use of deep learning as a promising solution. They discuss the advantages of deep learning algorithms, such as convolutional neural networks (CNNs), in handling complex patterns and variations in number plate images. The paper provides insights into the potential benefits and challenges of implementing deep learning-based ANPR systems.

EXISTING SYSTEM

- The Existing **system is using SVM algorithm**,It is used for detecting people's wearing helmat or not.
- The Existing system monitors the traffic violations primarily through CCTV recordings, where the traffic police have to look into the frame where the traffic violation is happening, zoom into the license plate in case rider is not wearing helmet.
- But this **requires lot of manpower** , time and **not properly accurate**.For non helmet riders manual fine method is used this may take time and can’t fine many people’s.

DISADVANTAGES

- Initial **investments are so high**.
- Need more amount of manpower for existing system.
- Camera costs are high and accuracy depands on open camera quality,range.
- **Lack of weather condition** to identify the vechile such as rainy time.

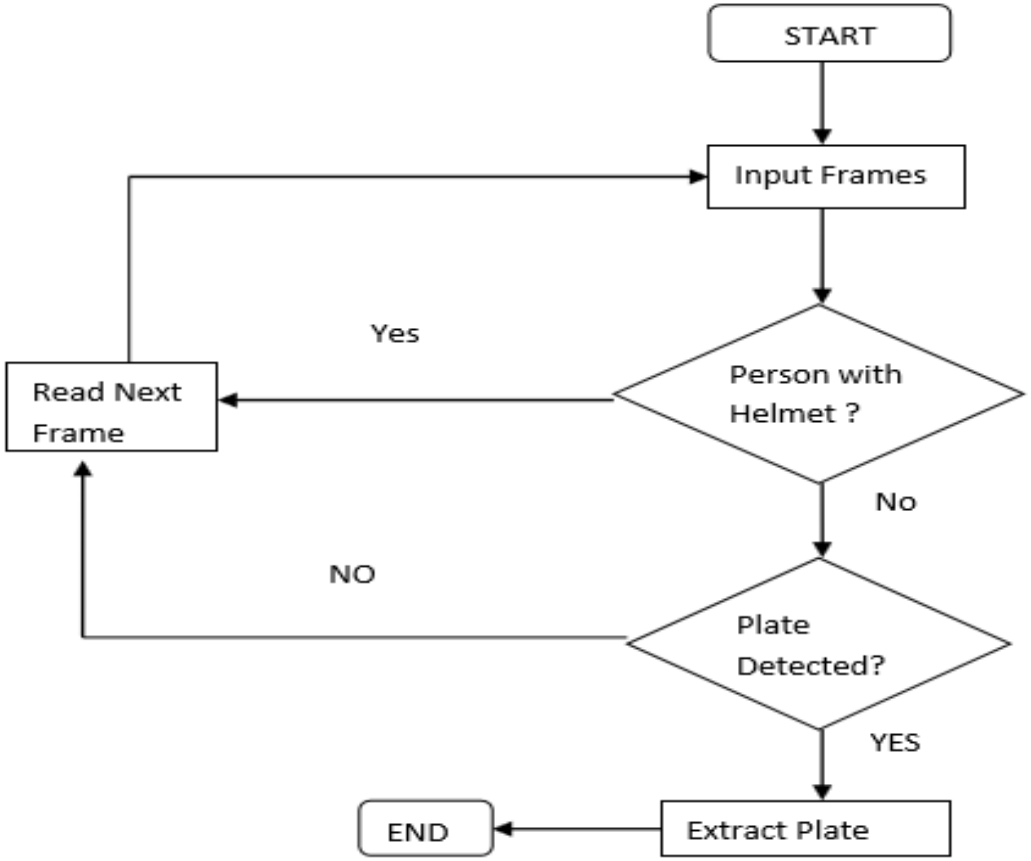
PROPOSED SYSTEM

- The annotated images are given as input to **YOLOv3 model** to train for the custom classes. The weights generated after training are used to load the model.Once this is done, an video is given as input. From this we obtain the Information regarding person riding motorbike.
- If the person is not wearing a helmet, then we can **easily extract the other class information** of the rider. This can be used to extract the license plate. Once the helmetless rider is detected, the associated person class is detected.
- This is done by finding whether the co-ordinates of the no helmet class lie inside the person class or not. In our project fine system is introduced direct image **capture in realtime** and message sent **to our telegram**.

ADVANTAGES

- Our system **reduce manpower** and makes easier.
- Accuratly detect the people who not wearing helmat.
- Accuracy 90% number plate and 92% helmet detectioning.
- In our project fine system is introduced direct image **capture in realtime** and message sent to our telegram.

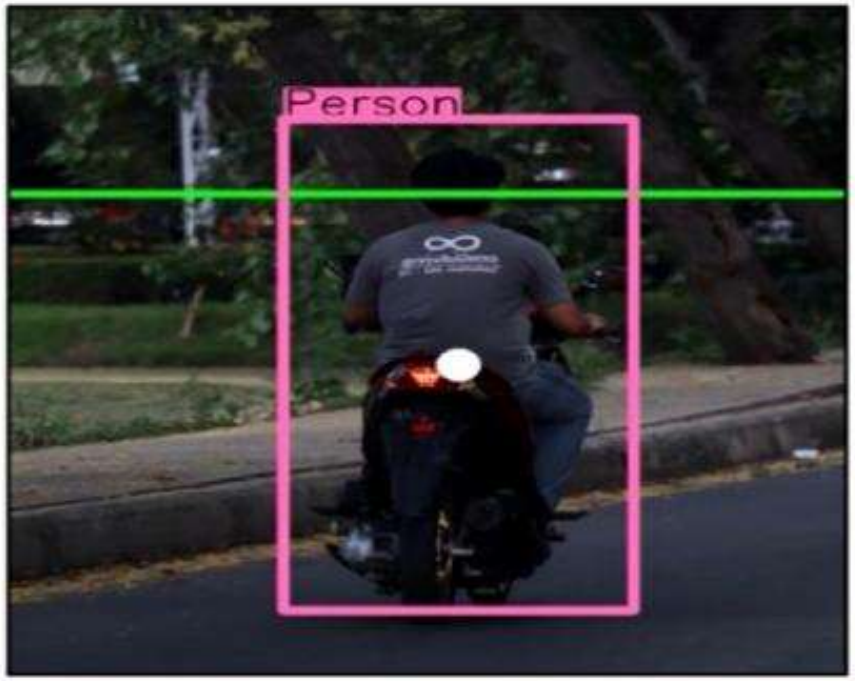
ARCHITECTURE



MODULES

- Image processing
- Segmentation
- Extraction

IMAGE PROCESSING



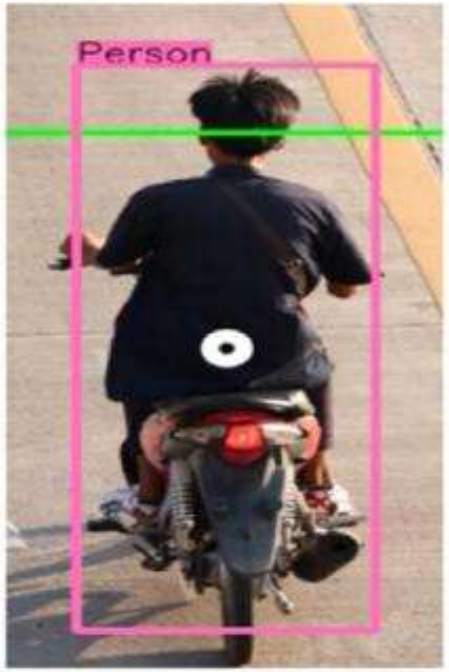


IMAGE PROCESSING

- Image preprocessing is a crucial step before training the model. The datasets that are collected and downloaded in the previous step are now extracted and all the images in the dataset are brought into one format. If any unusual format is found then they are converted to the usual format. Here '.png' and '.jpg' format is taken for training the model. For the YOLOv3 '.txt' format is preferred. Here by using the LabelImg tool, the images are all labelled with height, width and centre of the point of the images and the values are all stored in a '.txt' file for YOLOv3 .
- Now the datasets are categorized into two classes. First, categorize the **Helmet Detection dataset** into two classes i.e., a person with a helmet and a person without a helmet. Similarly, categorize the **License Plates dataset** into a motorcycle with a license plate and a motorcycle without a license plate. Then the data is split into 80% as a training dataset and 20% as a testing dataset. For the training of the Classifier,we **need a lot of positive and negative images**. So, the images in the training dataset are separated into positive and negative images for the classifier.

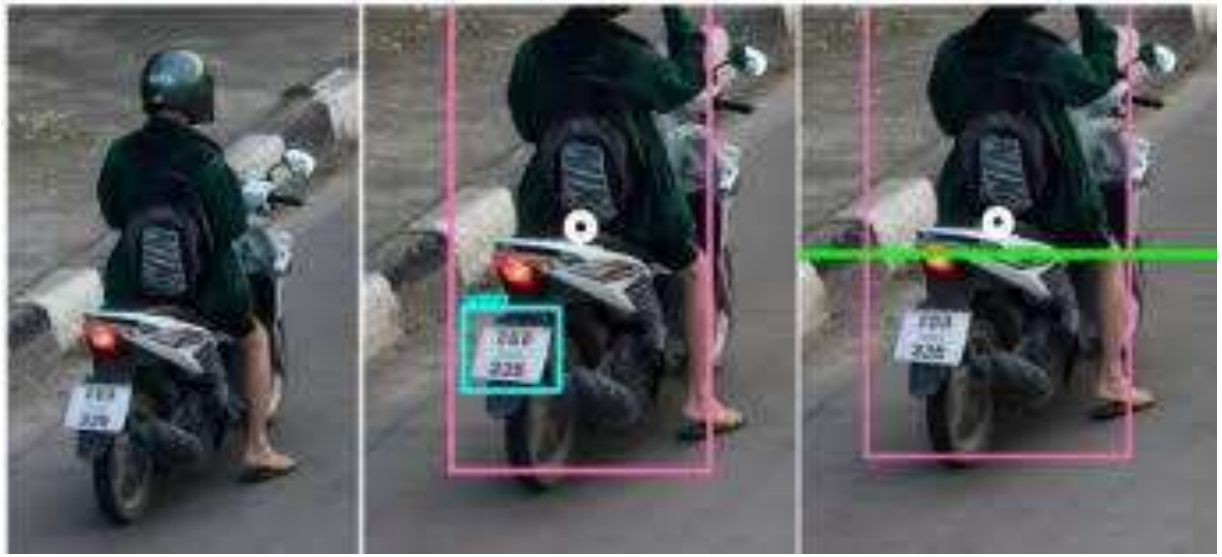
SEGMENTATION

SEGMENTATION

• This way, an original image can be captured and stored. In other words, it should replace each pixel in an image with a black or a white pixel. It is a method of image segmentation. This method works on sorted data in order to smooth it. The **whole data is divided into segments of equal size** and then **various methods are performed to complete the task**. Each segmented is handled separately. One can replace all data in a segment by its mean or boundary values can be used to complete the task.

• Regression: **Here data can be made smooth by fitting it to a regression function**.The regression used may be linear or multiple . Our helmet detection using Yolov3 algorithm is used to detect the people who not wearing helmet .Then automatically extract the number plate. The goal of preprocessing is to make raw data usable by computers. Preprocessing is especially vital for recognizing handwritten documents that are more sensitive to noise. Preprocessing allows obtaining a clean character image to yield better results of image recognition.

EXTRACTIONON



EXTRACTIONON

- Once all the features are extracted, they can be fetched to a neural network (NN) to train it to recognize characters. The noise level on an image should be optimized and areas outside the text removed. A **training dataset and the methods applied to achieve the best output** will depend on a problem .
- The identification of characters heavily depends on the context. The verification of the output requires a human-in-the-loop approach. Who not wearing the helmet they captured and send **message alert (No Helmet) to our telegram bot**. Then , they punished or fined by police officer. The process of segmentation is aimed at grouping characters into meaningful chunks. There can be predefined classes for characters. So, images can be scanned for patterns that match the classes.
- This step means splitting the input data into a set of features, that is, to find essential characteristics that make one or another pattern recognizable. As a result, each character gets classified in a particular class.

REFERENCES

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THANK YOU