

# Detection of Two wheeler Driver Safety Using Machine Learning

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***Abstract: The most common type of transportation in India is two-wheeler, where the number of accidents are increasing day-by-day. In general, these accidents have occurred due to riding a motorcycle without a helmet. It is very difficult to monitor each and every rider whether they are wearing a helmet or not, by a human labor, where as an electronic detection system can do the same kind of work without any human effort. Image processing is a solution for this kind of problem where there are many advancements in recent times. This works with extracting the features and identifying the objects which resides in the images which are taken out from the video surveillance as multiple frames. Convolutional Neural Networks (CNN) or Deep learning techniques are used for image or pattern identification along with Visual Geometry Group (VGG) which is mainly used for object detection. If a bike rider is found travelling without a helmet, the image of the number plate of the bike is captured. The number plate is checked with the databases and penalty will be issued. The system uses pure machine learning algorithm for image processing. Identification of the motorcycle can be done in five steps: image capturing, pre-processing of image, finding the errors, image recognition, and feature extraction.***

***Keyword: Machine Learning, Convolutional Neural Network (CNN), Visual Geometry Group, Image Processing.***

## **1. Introduction**

Bike is a very crucial mode of transport in almost every part of the nation. While riding the bike, bikers must be very careful as it is a tough and risky job. To that the risk of bike riding, use of helmet is suggested for the bike riders. By recognizing the purpose of this helmet, the government made this a criminal crime of driving a bike without a helmet and introduced manual methods to locate the violators. Nonetheless, there are current approaches focused on video surveillance that are passive and require the significance of human support. Generally speaking,

programs become infeasible owing to the presence of human processes, the performance of which declines in long term. Additionally, this method's automation is very reliable for desirable and robustness monitoring of such violation because it will significantly reduce the amount of human resources needed. Helmet detection is a crucial, yet challenging vision task. It's a critical part in many applications like traffic surveillance. Our proposed method work is as follows, Pre-processing, Feature Extraction and classification. We demonstrate our proposed work by using surveillance traffic videos. Finally, our system must rate whether or not the individual wears a helmet. In terms of robustness and reliability, our approach is better than the existing algorithms. Also, several countries are implementing systems involving surveillance cameras in public places. Therefore, the solution to identify violators using the prevalent system is cost-effective in addition. However, other problems have to be resolved if these automated approaches are to be implemented.

## 2. Literature Survey

Two wheeler is an incredibly common mode of transportation in almost every part of the world. Owing to less safety though, the risk involved is high. Using the helmet to reduce the danger involved is highly beneficial for the bikers. Governments, promoting the use of helmets, have seen so as a punishable offence to ride a bike without a helmet and have introduced systematic methods to apprehend rapists. Any current video-based monitoring technologies, though, are more passive and need significant human assistance. In fact, these devices are rather infallible due to human intervention, so the performance declines over a long period of time. Automation of this system is extremely effective for efficient and beneficial control of these breaches, since it greatly decreases human capital needs. Furthermore, several nations implement schemes containing public security devices. And the strategy for identifying violators utilizing current equipment is therefore cost-effective.

The effective structure of this tracking program would be useful as well as predictive for properties such as the output in real-time, fine tuning and robustness of the abrupt shifts. Bearing in mind the limitations of the property and the necessary solutions, we have suggested a solution for automated detection of bikers without the helmet, utilizing this stream from the current surveillance cameras, which will also operate in real-time.

In 2016 Kunal Dahiya suggested an automatic detection method for bike- without helmets using real- surveillance images. The proposed method approach which uses subtraction and segmentation of background objects to detect bikers from the surveillance video. This then decides whether or not the biker uses the helmet through the visual features and the binary classifier. Video surveillance related mechanism is passive and requires significant human assistance. Regardless of the need for specialized equipment, it is not an effective solution. They also provide a consolidated method for reporting violations that helps increase the reliability of the proposed method. To check the process, we supported the performance comparison of the three widely used feature representations, namely local binary patterns (LBP), scale-invariant feature transformation (SIFT), and gradient-oriented histogram (HOG).[1]

In 2014 Dinesh Singh suggested a Visual Big Data Analytics project in Smart City for traffic management. The technology such as traffic management camera monitoring in smart cities has to evaluate a very significant number of hours and days of video recordings to find individuals who do not obey the laws and regulations and break traffic law. This conventional perception of computer science is incapable of processing such a vast volume of real-time produced visual data. The article, we have suggested a system for the visual data analysis for the purpose of automated identification of bikers without a helmet in city traffic. We also address issues including immersive big data analytics for tracking traffic data on a city scale and identifying possibilities for potential study. Environmental factors such as shifting lighting, clouds, moving tree branches and other abrupt adjustments render it impossible to recover and refresh the context in continuous frames.[2]

D.Archana proposed an Extended Mission on in 2017. Developments are being produced in bicycle systems to have a safe ride focused on IOT Insights technologies that render machines more practical in their way of thinking and making choices. Mishap may be a particular, unpredicted external incident that unexpectedly arises with no obvious or considered trigger but stamped result. The report reflects on approaches that can be modified to maintain protection when cycling, given the increasing number of bicycle riders and the amount of mishaps that occur per year. Diversion in driver attention is the primary cause of such collisions. Wearing safety cap now is mandatory. Yet, the laws tend to be violated. It is not a skilled arrangement because of the need of dedicated equipment which makes it difficult to recover and rebuild foundations from the unceasing stream of outlines. Conventional machine vision approaches.[3].

In 2016 Rongbaoshen proposed a framework called an innovative edge-dependent license plate area technique as one of the main measures in the license plate recognition process, location precision is an coordinated effect on the influence of license plate recognition. In this article, a permit number juggling administrator centered license plate area approach was introduced for the plate picture under various foundations and glaring situations. We illustrate our proposed work using recordings of observational activity. Finally, to compare all edge-based strategies, more comparable databases are required.[4].

In 2017, Sarbjit Kaur proposed a framework under Picture Handling, called An Programmed Protective Cap Confirmation Framework. The Programmed Head Protector Recognition System is a machine vision and image processing software program that takes pictures of vehicles as an input picture and extracts their number plate from the whole vehicle picture, displaying the number plate details in text.. The ANPR system essentially consists of 4 phases. Vehicle Image and Pre-Processing Acquisition, Extraction of the number plate region, Division of character and identification of character. The overall accuracy and efficiency of the entire ANPR process depends on the number plate extraction stage as character division and character recognition stages are both based on the yield of this stage. Encouraging the accuracy of the Number Plate Extraction stage relies on the picture condition of the vehicle being collected. Higher the standard of caught vehicle input picture would be more chances of extraction of valid vehicle number plate region.[5].

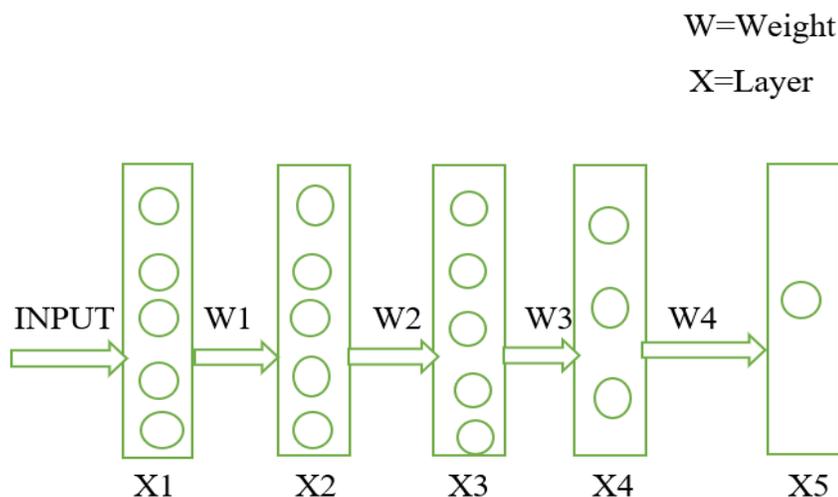
In 2017 Vishnu has proposed a framework called Location of Motorcyclists without Head protector in Recordings utilizing Convolutionary neural structure cruisers are fair and a daily

mode of transportation, there has been a rapid increase in bike mishaps due to the fact that most motorcyclists do not wear a head guard which makes it an ever-present frequent danger to cruiser travel. Much of the fatalities in mishaps was attributed to injury within the brain during the final couple of a long period by themselves. Because of this wearing protective cap is needed as per the rules of operation, breach of which attracts heavy fines. In show disdain toward, a huge number of motorcyclists don't comply the run the show. Directly, all major cities have sent extensive video recognition arrangements to keep a watchful eye on a wide range of hazards [6].

### 3. Proposed system

#### Deep Learning

Deep learning is a subset and an integral part of artificial neural networks-based machine learning methods. There are specific profound learning algorithms such as deep networks of values, artificial neural networks and convolutionary neural networks that are used in the field such as speech recognition, audio recognition, natural language processing, medical image analysis etc., where they got excess results compared to living beings. Recognition and extraction of digital image patterns using convoluted neural networks to detect bikers who do not have a helmet. Pre-processing image step to ROI extraction. Single shot multi box detector is used for helmet detection. Threshold Segmentation: If  $I(i,j) < T$  (Fixed constant) converts each pixel with a black pixel .If  $I(i,j) > T$  (Fixed constant) converts each pixel with a white pixel. The results show the bikers without helmet are high in the classification.



**Figure 1:** Network structure of Deep Learning

Helmet detection and classification using reference images, Feature descriptors, and neural networks faster analyzing techniques are used for image analysis. Nesting minimal Filtering

algorithm is used where it uses  $F(2 \times 2, 3 \times 3)$  uses  $4 \times 4 = 16$  multiplications, whereas standard algorithm uses 36 multiplications. The algorithm complexity is reduced.

**1) Input:** The input is taken as a video through ip cam or webcam and the video is divided into frames, the image from the frames consist of the bikers. The bikers on motorcycles are captured through the frames from the video.

**2) Process:** The input image from the video is processed using the convolutional neural networks, the features from the image are extracted and the features are matched with the reference images. If the features are matched with reference images then the biker without helmet are detected.

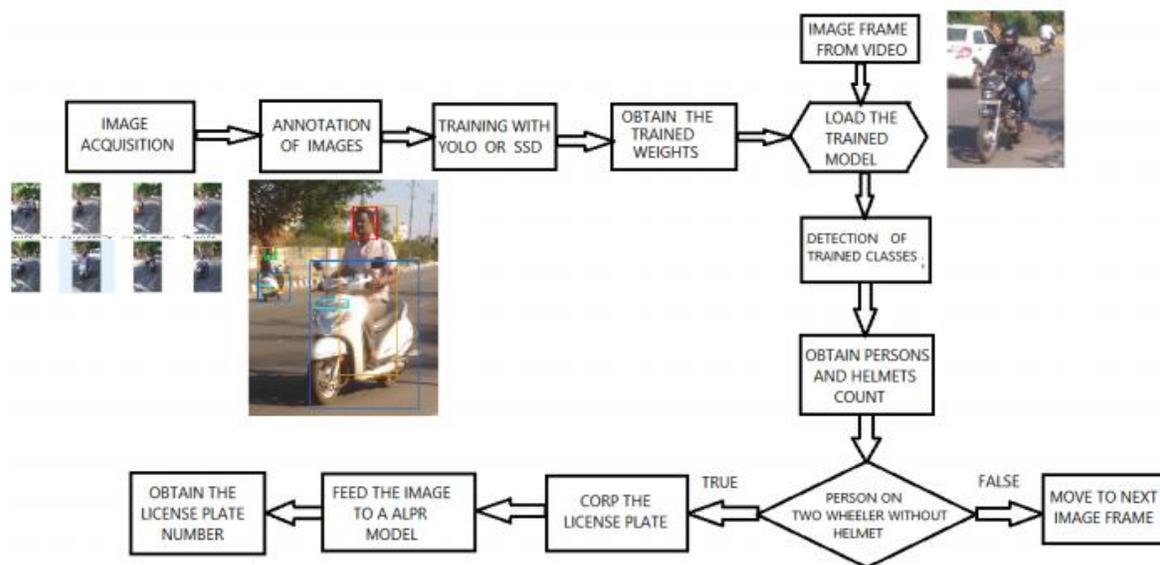
**3) Output:** After the feature matching is done, the output is detected whether the biker is riding with or without helmet and the e-mail is sent to the rider.

#### **4.Experimental Setup**

The identification of objects in an image would likely begin with image processing methods such as noise removal, followed by (low-level) feature extraction to find lines, districts and conceivably areas with certain textures. The clever bit is to translate collections of these shapes as single objects, e.g. cars on a street, boxes on a transport belt or cancerous cells on a magnifying lens slide. One reason this is often an AI issue is that an object can show up exceptionally different when seen from diverse angles or under distinctive lighting. Another issue is choosing what features have a place to what object and which are background or shadows etc.

#### **Methodology**

**Input Image:** The input video has been captured by using either ipcam or webcam, from this it senses the motorcycle. These methods detect the background of the motorcycle and rider from the photograph, then detect a head region of the biker before classifying whether or not this individual wears a helmet. In this paper we proposed using CNN models to solve the biker and helmet identification issue from video surveillance evidence.



**Figure 2:** Proposed Architecture

**Image Classification:** After gathering photos for our training data collection, we split our photos into two groups: one for training data and the other for test data to be included in the classification experiment. This analysis we use CNN templates to check them for picture classification. Both videos are checked and the biker's performance with a helmet and no helmet identification in the video is measured.

**CNN Classifier:** A CNN is a neural network with some (and some other) convolutionary strata. A convolutionary layer has several filters which perform convolutionary operation.

## 5. Results and Discussion

The final step, we equate and conclude with the results of two preceding measures. The precision of the tests would show the efficiency of each methodology in terms of image recognition and error detection. The analysis obtained is recorded in Table I

**Table I: Analysis of Proposed Method**

| Model        | Efficiency | Size of Model (KB) |
|--------------|------------|--------------------|
| VGG - 16     | 78.09 %    | 434,581            |
| VGG - 19     | 79.11 %    | 450,258            |
| V3 Inception | 84.58 %    | 84,447             |

|                 |         |        |
|-----------------|---------|--------|
| MobileNets      | 85.19 % | 15,754 |
| Proposed Method | 87.36   | 11,256 |

## Conclusion

In this paper we have presented a method for identifying traffic law violators who ride a bike without using a helmet. The new program would also help the traffic police in locating these violators in extreme environmental circumstances. The experimental findings reveal, respectively, the precision of bike-rider identification and violation identification. We have also suggested a system under which, if appropriate, it would automatically respond to the new situations with minor tuning.

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