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SURVEILLANCE SYSTEM FOR MONITORING BIKE RIDERS WITHOUT HELMET AND TRIPLE RIDERS USING MATLAB

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Abstract-As the ratio of motorcycles to people in India continues to rise. Without a helmet, a motorcyclist's risk of dying is 2.5 times that of someone wearing one. While the provided video observation based system has the potential to be rather effective, it still relies heavily on human assistance, the efficiency of which decreases with time and is further impacted by the presence of bias. The authors of this research want to find a solution to this conundrum by developing an algorithm to identify cyclists who are and are not wearing helmets. Video of traffic in a public area is used as training data, with the system able to identify vehicles and pedestrians. This paper suggests a system that would operate by tracking the whereabouts of various riders who go on a journey without helmets. The suggested technique uses a support vector machine (SVM) model, which is a consistent form of SVM model, the leading methodology for object differentiating, to identify cyclists from the outset, and to then differentiate between those wearing and those not wearing helmets. If there are more than two riders, the binary picture is vertically projected for a count. In many nations, the number of people injured or killed on motorcycles has increased dramatically over the years. More than 37 million people in India ride motorcycles. That's why it's crucial to have a system that can automatically identify whether a helmet is being worn or when a rider is taking three seats.Therefore, a Machine learning based approach is used to develop a unique object identification model that can identify motorcyclists. If the cyclists were found to be without helmets and to be travelling in groups of three or more, then the appropriate action must be taken. This study presents a method in which several riders go on a journey while without wearing protective headgear. The proposed method begins with recognising bikers using a consistent SVM model, the cutting-edge methodology for object distinguishing, which in turn aids in differentiating between helmeted and unhelmeted riders as well as between solo and group rides, before sending an SMS via GSM module to the appropriate authorities..

Keywords:SVM, Human Assistance, RFID, GSM, Arduino.

1. INTRODUCTION

It's possible that bikes may become a widely used mode of transportation worldwide. However, the lack of safety measures is a significant danger. Riders may considerably reduce the risks involved by using a protective helmet. Many traffic accidents include bicycles. Though careless and erratic driving is usually at blame, head injuries are usually the fatal outcome of street accidents. It's disheartening that there have been so many biker-related incidents recently due to a lack of protective headgear. Approximately 35% to 40% of fatalities in Delhi in 2018 were attributed to motorcyclists "not wearing helmets" or "poor quality helmets," according to the Delhi Police Department's annual report (published in 2019). These days, video surveillance based systems are a crucial piece of equipment to monitor any potentially illegal or violent behaviour in the modern day. In light of the current climate, there is a growing need to develop a reliable and user-friendly professional system for detecting whether or not motorcycle riders are wearing helmets, without requiring the presence of a human observer. AI seems to be a potential technique for achieving this automated recognition of motorcycling helmet wear. Numerous street health-related discovery projects have benefited from the use of AI, which has resulted in improved accuracy and reliability for general identification. Over the last several decades, smart observation in power substations has widely used certain forgery canny tactics including PC vision and AI with increasing development. Not only will this help you avoid those boring, time-consuming, constantly-increasing tasks, but it will also warn you of any potential dangers, such as malfunctioning office equipment or criminal behaviour on the part of your colleagues, before they happen. The outlines of fast cars are not readily apparent in recordings of rush hour traffic captured by surveillance cameras. Therefore, it may be challenging task to locate fast motorcycles in continually observing video. Bikes come in a wide range of styles, colours, and sizes, which may make the identification process difficult. An effective mechanism is needed to identify these scofflaws. Although, the video as a whole Strategies based on surveillance are inert and need substantial human intervention. Generally speaking, such systems are an unrealistic expression of appreciation for the efforts of individuals, whose value declines with time. Automation of this process is appealing because it reduces the need for humans to do the checks necessary to ensure that violations are being thoroughly and reliably investigated. It's worth noting that a growing number of countries are adopting systems that include surveillance cameras at public access points. By leveraging a shared framework, the reaction to identifying offenders is also economically sensible. Programs that can keep an eye on things efficiently by documenting their state, where they are, and in what sequence they will be moved are called "programmed observation systems.

However, in order to get any kind of scheduled arrangements, a small number of obstacles needed to be overcome with:

1. Real-time Implementation: Trying to get a lot of information out in a short amount of time might be challenging. It's obvious that in order to achieve the goal of real-time implementation, applications must do tasks like partitioning, highlight extraction, classification, and the like, all of which need a large amount of data to be quickly produced.

2. Occlusion: Most of the time in the actual world, interesting items are partially obscured by other moving objects. It is challenging to divide and classify items that are so patently clear.

3. Direction of Motion: When seen from an unusual perspective, most three-dimensional objects take on a whole new look. To a large extent, the accuracy of classifiers is tied to the features they use, and these features in turn rely on the edges available. It's wise to evaluate a motorcyclist's appearance from the frontal profile.

4. Temporal variations in Conditions: It's possible that after some time has passed, a number of changes, such as brightness, shadows, and so on, will come about in the immediate environment. Transient or pervasive shifts might detonate the intricate complexity of projects like background modelling.

5. Quality of Video Feed: CCTV cameras often record poor quality footage. It's similarly tangled in low mild, inclemency, and other such situations. Inconveniences like this make already challenging tasks like categorization, segmentation, and monitoring more so. As mentioned in the introduction, a successful framework for a

reconnaissance application will have desirable qualities such as real-time global execution, granular tweaking, and robustness in the face of unexpected change. Keeping these difficult conditions and desirable qualities in mind, propose a method for automatic recognition of motorcyclists wearing helmets using feed from existing safety cameras, with implementation that works in real time.

The most popular method-based video statement is receptive and needs substantial human intervention. Automation of this process is very desirable since it reduces the need for human labour and encourages more proactive reporting of this violation. Existing methods include using specialised sensors integrated into the motorcycle's design to detect the wearer's headgear. However, convincing everyone to install sensors on already-in-use motorcycles is unfeasible. In a similar vein, there is no guarantee that the sensors are accurate or trustworthy. Furthermore, video processing-based architectures often incur extremely high computational costs. The pricey nature of the technology used in its construction makes any attempts to mass-produce it impractical.

2. METHODOLOGY:

SVM classifier is one of the machine learning methods we use in our suggested approach, which also makes use of image processing. These algorithms were used to train photos that fell into one of three categories: Normal (i.e., without breaking any regulations), Triple riders (i.e., riding three people at once without a helmet), and People (i.e., not wearing a helmet). The classification of pictures is performed using the input photos and the learned dataset. Classification, regression, and the identification of outliers are all possible with the help of support vector machines (SVMs), which are a family of supervised learning techniques. However, the majority of its applications may be found in Machine Learning, namely Classification issues. Essentially, the hyper plane in a support vector machine (SVM) model is a representation of the many classes. In order to reduce the error as much as possible, SVM will create the hyper plane in an iterative fashion. The SVM algorithm's objective is to find the optimal line or decision boundary that divides n-dimensional space into classes, making it simple to assign the new data point to the right category in the future. The optimal decision boundary is referred to as a hyperplane.

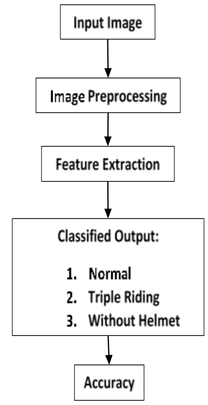

Fig1: BLOCK DIAGRAM OF PROPOSED TECHNIQUE

3. PROPOSED WORK

The proposed block diagram for the surveillance system for monitoring bike riders without helmets and triple riders using matlab software is shown in below fig2

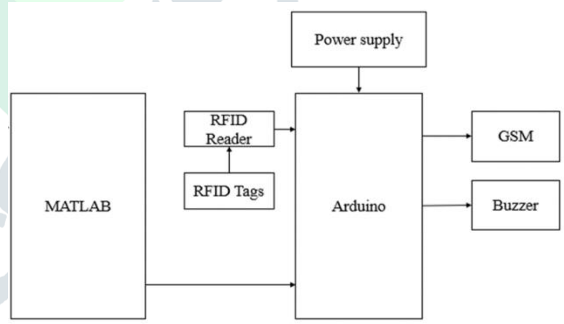

Fig2: PROPOSED BLOCK DIAGRAM

The project's brains are represented by the block diagram up top; it's made up of software and hardware components that work together to track cyclists in real time. Matlab receives a surveillance video and an algorithm, processes it using an object identification approach, and sends the findings to the arduino, which acts as a microcontroller and directs the rest of the hardware. These two modules crashing into one other would make for an ideal surveillance setup for keeping tabs on helmetless cyclists and three-up riders. A basic summary of the block diagram's components will be shown above

Let’s see about the working and operation of the proposed system surveillance system for monitoring bike riders without helmets and triple riders

- For starters, the suggested system relies heavily on the matlab programme, wherein a custom-written, machine-learning-based algorithm called ansvm is used. The programme requires an input picture for the identification of helmetless cyclists and triple riders when run on the Matlab software.
- The picture is analysed after being entered, and the algorithm determines whether or not the rider is using triples or wearing a helmet, as well as providing a typical indication for those who are not in violation in the matlab software's output message box.
- These signals are then sent to the microcontroller Arduino UNO, which has previously been programmed in python; the python code specifies a series of operations for the rest of the embedded components to carry out; the microcontroller sends the results of the classification to a 16x2 LCD.
- AndA buzzer will sound if the motorcyclist in the photo is breaking the law in any way, such as by failing to wear a helmet or by engaging in dangerous practises like triple riding; if the RFID cards containing information about the vehicle, such as its licence plate, have been scanned, the RFID scanner will send that data to an Arduino, which will then send it to a GSM module, which will then send the violation and licence plate to the mobile phones of the appropriate authorities.
- Finally, the appropriate authorities or department heads may intervene to prevent further rule violations and impose appropriate punishments on those who do so.

4. RESULTS

Fig3: Input image given to matlab

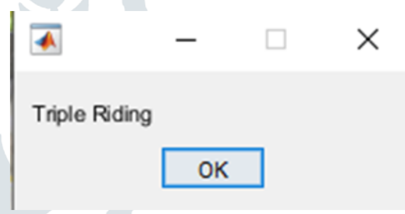

Fig4: Classified image output in message box

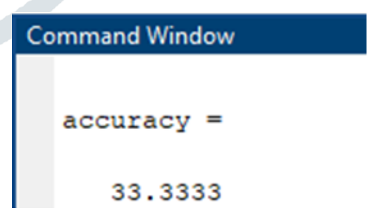

Fig5: Output accuracy of classifier

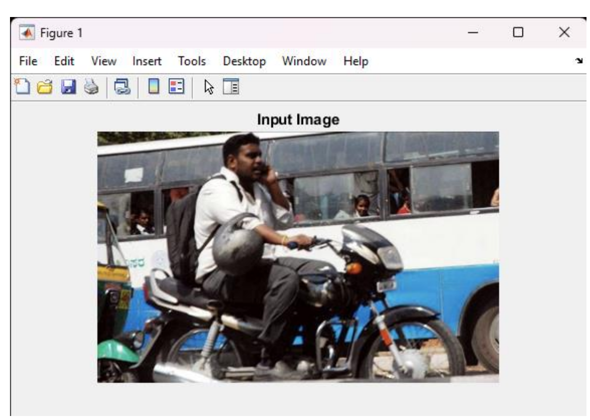

Fig6: Input image given to matlab

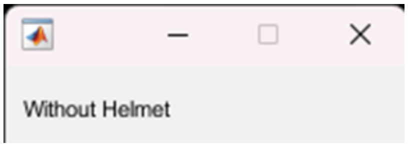

Fig7: Classified image output in message box

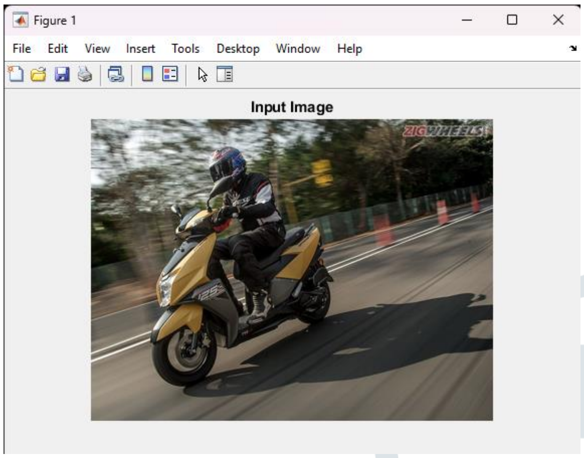

Fig8: Input image given to matlab

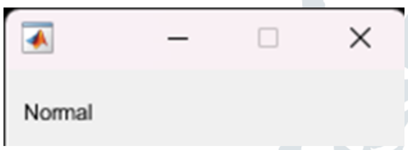

Fig9: Classified image output in messagebox

5. CONCLUSION

We built a machine learning model to recognise riders on three bikes at once or without helmets and tested it on public Google pictures. Based on the information in the dataset, we generate labels and features. We have successfully identified the presence of a rule breaker in the supplied input picture by using the provided labels and images. The input picture is classified by SVM as either a triple rider or a rider without a helmet. If you compare our strategy to the others, you'll see that it excels. To handle objects in real time, object detection works very well. The goal is to properly organise and pinpoint all item types. Used machine learning to identify motorcyclists without helmets and riders sharing a vehicle. Applied in any area where traffic control is in place. Facilitate productivity and safety on the workplace.

FUTURE SCOPE

The long-term goal of this system is to reduce accident rates and speed up the delivery of effective emergency remedies. We'll be taking plenty of measurements to see how fast things react. Current car technology is modernised and safety features are enhanced by this system. To make use of the positioning framework when there is no ambient light, night-vision cameras are typically used. In the future, the system will be able to recall more positive and negative instances for requests, which will increase its speculative power. The same holds true when collaborating with front-end video capture modules.

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