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Detection of Non-Helmet Riders and License Plate Number

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ABSTRACT---

One of the leading causes of road accidents that result in fatalities nowadays. Among them, motorcycling accidents are common and can cause severe injuries. A motorcycle rider's helmet is one of the most important components of safety. But many people choose to ignore the recommendation to wear a helmet. Here, a system using Yolov4 and image analysis is implemented to detect motorbike riders who are not wearing helmets. The system incorporates motorbike identification, a classification of helmet use vs no helmet use, and recognition of motorcycle licence plates. Motorcycles are recognised using the feature vector HOG. Once the motorcycle has been identified by Yolov4, it is possible to determine whether or not the rider is wearing a helmet. If an unprotected rider is observed, the motorcycle's licence plate is picked up.

I. Introduction

Traffic accidents are one of the primary causes of mortality among humans. Motorcycle accidents are increasing quickly as a result of the fact that most motorcyclists do not wear helmets, rendering them a continual risk. In recent years, brain injuries have become the primary cause of accidents. As a result, wearing a helmet is required by transportation laws. The bulk of motorcycle riders, however, never follow the law. In many locations, a monitoring network is employed to keep tabs on riders who flout helmet laws. A human input, however, will be necessary for such a device. According to recent polls, longer monitoring periods and other factors render human interventions ineffective.

1.1 Introduction of Project Area/Domain

one of the leading causes of human mortality in automobile accidents. Motorcycle accidents are increasing quickly as a result of the fact that most motorcyclists do not wear helmets, rendering them a continual risk. In recent years, brain injuries have become the primary cause of accidents. As a result, wearing a helmet is required by transportation legislation. The bulk of motorcycle riders, however, never follow the law. In many locations, a monitoring network is employed to keep tabs on riders who flout helmet laws. A human input, however, will be necessary for such a device. According to recent polls, longer monitoring periods and other factors render human interventions ineffective. due to monitoring mistakes committed by a human.

1.2 Existing System

problem Helmet With numerous systems already in use, license plate recognition is frequently regarded as a problem that has been addressed. However, the current methods or systems only perform well in a limited number of predetermined circumstances. For instance, some systems demand highly developed video capture hardware, potentially coupled with IR strobe lights, or pictures captured with minimal image distortion due to changes in view. It is still a difficult job to identify helmets and license plates in an open setting, despite the fact that many stated findings are excellent and even have flawless accuracy on their test datasets.

1.3 Proposed System

In this study, we test out two different helmet styles and license plates. It is simple to extend the system to identify different license plates and helmet kinds in other parts of the globe. Our primary efforts are:

1) For each letter on a license plate, we suggest an automated way to determine the principle of helmet recognition and visual words. Each primary visual word is distinguished by a local description as well as a few additional geometry hints.

2) We offer a practical method to precisely identify the picture patch holding the license plate based on visual matching with primary visual words.

1.4 Objectives of the Project

The primary goal of this application is to use monitoring technology on buses. It also assists in displaying the number of passengers inside the bus on the display device, which is a mobile phone. The use of cell phones is expanding quickly in today's technological environment; they are the primary means of inter-person contact and will always be necessary. Having a cell phone will make our lives easy because people have always desired a better and simpler existence so they can work on things with ease. We cannot avoid communication because it is a necessary component of everyday living. Modernizations in areas like radio frequency and internet growth have made it simple to use apps on mobile phones. During working hours, the suggested system will put a display device on the buses to enable real-time transit surveillance. The server will receive the occupancy count and monitoring information and handle it before sending it to the bus passengers. The precision of the buses will be greatly improved by this real-time monitoring tool.

A real-time monitoring application is created between the pupils and the bus driver in the suggested system. With the help of this application, students can check the bus arrival times for specific locations and determine whether there are any open spots or not based on the bus's capacity. Additionally, the driver of the bus will physically input the addresses of the bus and the occupancy count into the application. So, the students and staff members can access this information through the application and be able to reach the college on time.

1. To upload the occupancy counts of the commuting vehicles to the cloud.

2. To upload the GPS location of the vehicle periodically

3. To display the buses occupancy to the stakeholders thru an app or website

4. To report the bus’s locations on a Relative Location chart

5. upload the bus details through the admin module.

1.5 Organization of Project

1) Introduction

The first chapter gives an introduction to the area and the domain that is being used in the paper.

2) Literature Survey

The second chapter focuses on a literature review that aims at a survey of different issues related to the existing topics along with that it also acts as a basis for achieving current knowledge.

3) Related Work

The third chapter highlights the modules in which the paper is being divided thus making the implementation easier in order to accomplish the aim of the paper.

4) Design

The fourth chapter highlights the design issues related to the system along with the actual design of various modules in the form of UML diagrams.

5) Implementation

The fifth chapter focuses on the implementation of modules which are described in Chapter-4 along with the technology used to accomplish the aim of the paper.

6) Screens &Test case Reports

The sixth chapter focuses on the results and the reports obtained from the paper.

7) Conclusion and Future Scope

The seventh chapter highlights the conclusion of the paper along with the scope of the paper in the future.

II. LITERATURE SURVEY

In September 2012, J. Chiverton published "Helmet presence classification with motorcycle detection and Tracking" in IET Intelligent Transport Systems, vol. 6, no. 3.

A motorbike rider must wear a helmet for protection, yet requiring helmet use is a labour- and time-intensive task. In order to automatically classify and monitor motorbike riders who wear helmets or not, a system is described and put to the test. The system uses support vector machines that have been trained on histograms acquired from head region image data of motorbike riders, and it uses both static images and individual image frames from video data. The trained classifier is put into a surveillance system that automatically distinguishes motorbike riders from video footage using backdrop removal. The heads of the motorcyclists are separated and categorized using the trained classifier. Each motorcycle rider creates their own set of tracks, which are groups of places in close proximity to one another. The mean of the results from each classifier is then used to classify the recordings as a whole. Tests show that the system can accurately determine whether a biker is wearing a helmet on a still photograph. Tests on the monitoring system further demonstrate the validity and applicability of the categorization approach.

R. Silva, K. Aires, T. Santos, K. Abdala, R. Veras and A. Soares, "Automatic detection of motorcyclists without a helmet," 2013 XXXIX Latin American Computing Conference (CLEI), Naiguata, 2013, pp.

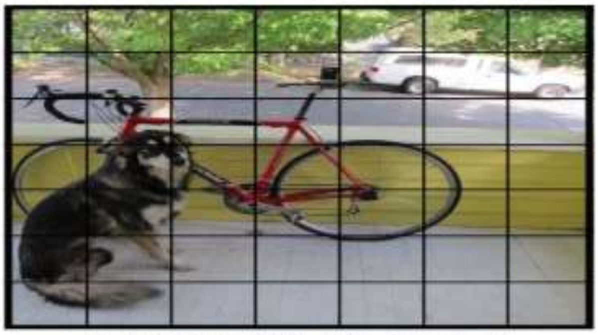
III. RELATED WORK

MODULES

You Only Look Once, or YOLO, is a well-liked real-time object recognition approach. By performing categorization and prediction of bounding boxes for viewed items using a single neural network, YOLO streamlines what was previously a multi-step process. It may therefore operate substantially faster than two distinct neural networks that are used to recognise and categorise things independently because it has been extensively improved for detection performance. It accomplishes this by modifying popular photo classifiers so they may be used for the regression job of identifying item bounding boxes. Only YOLOv1, the initial iteration of this design, will be covered in this paper. Even though subsequent generations incorporate a number of improvements, the design's core concept remains the same. Because it can process photos at a rate of 45 frames per second, which is quicker than real-time object identification, YOLOv1, sometimes known as just YOLO, is a wonderful option for apps that need real-time detection. You Only Look Once is an allusion to the fact that it never scans an image in its entirety, allowing it to remember the context of any things that are recognised. Compared to R-CNNs, which independently analyse various portions of the image, this results in a lower rate of false-positive detections. Furthermore, YOLO has the ability to generalise representations of a variety of things, expanding the number of different situations in which it may be applied. After learning more about YOLO in general, let's take a closer look at how it actually works.

How does YOLO function?

The concept of segmenting a picture into smaller images is the foundation of YOLO. The picture is divided into a square matrix with the following dimensions:

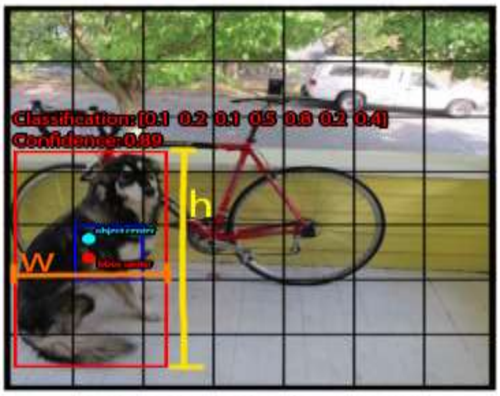


S × S grid on input

The cell that houses an object's core, such as the middle of a dog, is the one responsible for sensing it. Each cell will forecast the B boundary regions and provide a confidence value for each individual box. The system predicts two boundary zones by default for this design. The range of the classification score is "0.0" to "1.0," with "0.0" signifying the lowest confidence level and "1.0" denoting the highest. The confidence score should be "0.0" if there is no object in the cell and "1.0" if the model is completely confident in its prediction. These levels of confidence represent how certain the model is that an item exists in that cell and how accurate the bounding box is. Each of these enclosing areas is composed of five values: x, y, breadth, height, and confidence. The centre of the projected bounding box is shown by the coordinates "(x, y)," and the width and height are percentages of the entire image area. Between the ground truth box, which is the actual bounding box, and the predicted bounding box, the confidence is an IOU. The IOU, or junction Over Union, is the region formed by the union of the identical predicted and ground truth boxes split by the junction of the predicted and ground truth boxes.

S × S grid on input

Each cell also generates bounding frames and confidence ratings while forecasting the object's class. The one-hot vector length for this class forecast is equal to the number of classes in the dataset, C. It is important to remember that each cell only predicts one class, even though it may forecast any number of bounding boxes and confidence ratings for those boxes. Due to a bug, the YOLO algorithm cannot correctly categorise two items belonging to different groups that are present in the same grid cell. Each forecast from a grid cell will have the form C + B * 5, where C is the number of classes and B is the number of anticipated bounding boxes. B is increased by 5 in this case because it contains (x, y, w, h, and confidence) for each box. The entire forecast of the model is a tensor with the form S S (C + B 5), as each image contains S S grid cells.



S × S grid on input

Here is an example of what might happen if the algorithm could only predict one bounding box per cell. The box in this image is identified and bound by the grid cell carrying the dark blue-highlighted cyan dot because it represents the canine's true center, which is shown by the cyan circle labelled "object centre." The bounding area that the cell forecasts is made up of four elements. The (x, y) centre of the bounding box is shown as a red dot, while its breadth and height are shown as orange and yellow markers, respectively. It is important to note that the algorithm predicts the centre of the bounding box, with its widths and heights, rather than the top-left and bottom-right places on corners. In this absurd example, a one-hot represents each of the seven different classes. It is evident that the algorithm is confident in its prediction for the fifth grade from the forecast. The numbers may not be exact representations of any actual values because this is only an illustration to show the type of output that is available. The graphic below displays the outcomes of all the bounding boxes and class forecasts that were actually generated.

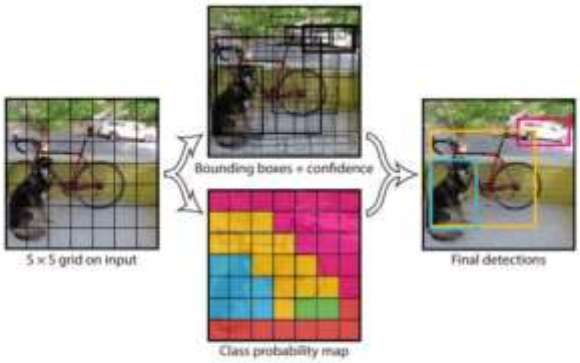
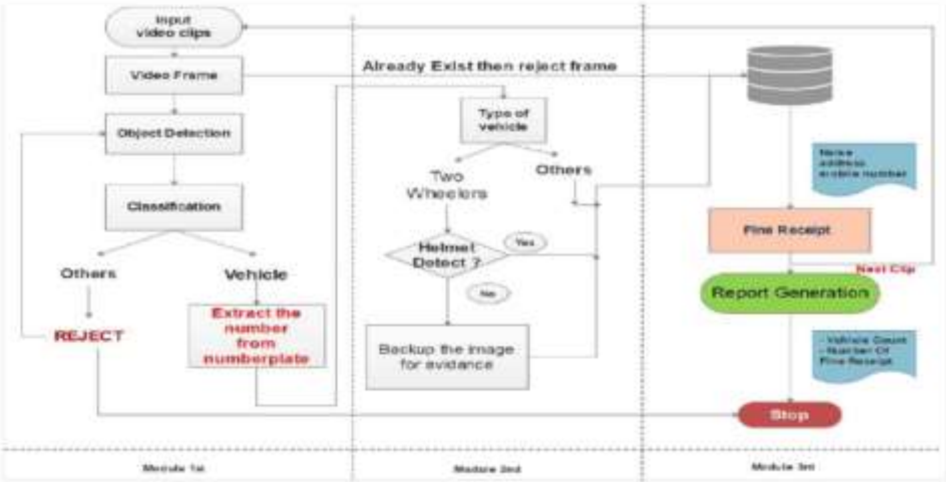


Figure 2: The Model. Our system models detection as a regression problem. It divides the image into an $S \times S$ grid and for each grid cell predicts B bounding boxes, confidence for those boxes, and C class probabilities. These predictions are encoded as an $S \times S \times (B * 5 + C)$ tensor.

DESIGN ARCHITECTURE AND ITS EXPLANATION



IV. TEST CASES REPORTS

Testing Your Code

There are many ways to test your code. In this tutorial, you'll learn the techniques from the most basic steps and work towards advanced methods.

Automated vs. Manual Testing

The good news is, you've probably already created a test without realizing it. Remember when you ran your application and used it for the first time? Did you check the features and experiment using them? That's known as exploratory testing and is a form of manual testing.

Exploratory testing is a form of testing that is done without a plan. In an exploratory test, you're just exploring the application.

To have a complete set of manual tests, all you need to do is make a list of all the features your application has, the different types of input it can accept, and the expected results. Now, every time you make a change to your code, you need to go through every single item on that list and check it.

V. RESULT SCREENS

1 To run the program in the t command prompt

login system

To upload image or a video

After uploading Video Results

Sending challan after Non Helmet Rider capturing

Results of Live Video

VI. CONCLUSION & FUTURE SCOPE

The described framework system detects motorcyclists riding with and without helmet with mean average precision of 90% from the images. The three class labels Helmet, no helmet and license plate of motorcyclists were detected from various observation sites. The model uses sliding window over the whole image to detect the objects. Increasing the dataset may also increase precision and accuracy to detect the objects. The system can also be enhanced by making use of different framework and test the results on data for improving accuracy and by using combination of different algorithms may help to improve accuracy. In any case, just discovery of such motorcyclists isn't adequate for making a move against them, this framework can also be extended and combined with license plate recognition machine system, to detect license plate automatically and store it in the database of the person riding motorcycle without helmet and to automatically send penalty fine to the respective person.

Any system can constantly be enhanced and developed further. Each system examined as part of the literature review has unique properties of its own. All of the systems that have been presented so far are only utilised to convey messages in the event of an accident. There might be a technology like this that only detects alcohol. Numerous modern features are included in this system, along with older features that have been combined into one. When a cyclist has an accident while wearing a helmet, a message will immediately be sent. The two-wheeler is started using an RF transmitter and receiver; if the rider is not wearing a helmet, the bike will not start.

If the driver is intoxicated, the alcohol sensor will detect it and lock the ignition. Power for the system is being produced by the solar sense. When a bike is stolen, its whereabouts may be easily traced.Additionally, it can be used to receive calls using wireless Bluetooth speakers while driving.

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