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HELMET DETECTION AND LICENSE PLATE RECOGNITION

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Abstract- Nowadays, road accidents are one of the major causes that lead to human death. Motorbike accidents can cause severe injuries. The helmet is important for every motorcyclist. However, many fail to conform to the law of wearing helmets. Here is the software using CNN, to recognize the motorbike drivers who are not obeying the helmet law. The system consists of motorbike detection, helmet vs no helmet classification, and motorbike license plate recognition. The motorbikes are scanned using the feature vector HOG. Once the motorbike is detected, by CNN, it identifies whether the motorcyclist is wearing a helmet or not. If the motorcyclist is identified as not having a helmet, then the license plate of the motorcycle is detected using Tesseract OCR.

Keywords: Helmet Detection, Convolutional Neural Network, Tesseract OCR, License Plate Extraction

1. INTRODUCTION

All over the globe, around 1.35 million lives are lost each year, 50 million people are getting injured due to road accidents, according to a report titled "The Global status report on road safety in the year 2018" released by the world health organization. It is very hard to imagine that this burden is unevenly bare by motorcyclists, cyclists, and pedestrians. This report noted that a complete action plan has to be set up in order to save lives. The worrying fact is that India ranks number one as far as road crash deaths are considered. Quick urbanization, avoiding helmets, seat belts, and other safety measures while driving are some of the reasons behind this trend according to an analysis done by experts. In the year 2015 India signed Brasilia Declaration on Road Safety, where India committed to reduce road crash deaths to 50 percent by 2020. Policymakers first have to acknowledge the problems that persist in India before halving road crash deaths. When a two-wheeler meets with an accident, due to a sudden announcement, the rider is thrown away from the vehicle. for supposing the head strikes an object, the motion of the head becomes zero, but with its own mass brain continues to be in motion until the object hits the inner part of the skull. Sometimes this type of head injury may be deadly in nature. In such times helmet acts as a life savior. The helmet reduces the chances of the skull getting slow down hence sets the motion of the head to almost zero. The pillow inside the helmet absorbs the impact of collision and as time passes head comes to a halt. It also spreads the impact to a larger area, thus protecting the head from severe injuries.

1.1 LITERATURE REVIEW

Circle arc detection technique supported Hough remodel. They applied it to find the presence of helmet that did not offer correct result.

Combination of image process and Optical Character Recognition to find vehicle variety plate underneath totally different background however it's worked on static i.e. non-moving I mages in Malaysia.

1.2 SCOPE OF THE PROPOSED WORK

In this project, we are detecting whether a two-wheeler rider wearing a helmet or not if he is not wearing a helmet then we are extracting the number plate of that two-wheeler. To extract the number plate we have the YOLO CNN model with some train and test images and if you want to add some other images then send those images to us so we can include those images in the YOLO model with annotation to extract the number plate of those new images.

1.3 Methodology

In this study, a Non-Helmet Rider noticing system is built which attempts to satisfy the automation of detecting the traffic violation of not wearing a helmet and extracting the vehicles' license plate number. The main concept involved in Object Detection using Deep Learning at three steps. The objects detected are person, motorcycle at first step using YOLOv2, detecting helmet at a second step using YOLOv3, recognizing license plate at the last step using YOLOv2. Then the license plate registration number is takeout using OCR (Optical Character Recognition). All these techniques are put through to prearrange conditions and constraints, especially the license plate number extraction part. Seeing that this work takes video as its input, the speed of execution is crucial. We have used above said procedure to build a holistic system for both helmet and license plate number extraction.

1.4 Data Set

Proper and large dataset is required for all classification research during the training and the testing phase. uploading dataset called 'dataset.txt' after uploading dataset.

2. PROPOSED SYSTEM

The proposed methodology for feature extraction using LBP based hybrid descriptor, HOG and Hough transform descriptors. Whereas absorbed grey level co-occurrence matrix along with LBP for feature extraction. YOLOv2 and COCO dataset can be worked to detect different types of objects and classify them accordingly The intended object are motorcycle, motorcyclists, pedestrians and workers. Helmet and tyre colour exhibits different characteristics, this can be used to detect motorbikes. Introduced a method to identify two-wheeler accidents using a microcontroller and accelerometer. Most of the time pedestrians are the real victims of road accidents, their safety is essential. Introduce a method to classify pedestrians using SVM based on the histogram of oriented gradient features (HOG). The last step involves helmet detection. Colour based and circles Hough transform is used to recognize helmet and HOG descriptors can also be used for helmet detection. Colour feature recognition is another option. Exploit colour space transformation and colour feature discrimination for detecting the helmet. GLCM statistical features and Back-Propagation artificial neural network is used to detect helmet more effectively. helmet detection system involves following steps

such as a group of the dataset, moving object detection, background subtraction, object classification using neural networks and extraction of license plate number if the rider is not wearing a helmet. Rattapoom Waranusast et al used a KNN classifier for moving object extraction and classification. Here the head is classified as wearing a helmet or not based on various features obtained from the segmented head region moving objects can be detected using adaptive background subtraction. ViBe background modelling algorithm can also be applied to detect moving objects. The Canny edge detection algorithm is used to get segmented moving objects.

3. IMPLEMENTATION

3.1 Architecture

For detecting helmet and recognizing license plate. The whole process consists of five steps. For detection of the helmet, we first insert the photo of the motorcyclist and in the next step, we process the video and remove the background. The third step involves the segmentation of two-wheelers. Next step the system detects persons without a helmet. In the last step, we detect the license plate and display the license plate number from the image.

3.2 Introduction to UML

The united modeling language permits the software engineer to express an inspection model using the modeling symbols that are governed by a set of semantic, exposition, and pragmatic rules. A UML system composes using five different views that describe the system from a different viewpoint. UML is specifically constructed through two separate domains they are:

- UML Analysis modeling focuses on the user model and structural model views of the system.

- UML design modeling, which focuses on the observable modeling, implementation modeling, and environmental model views. In software engineering, a class diagram in the integrated Modeling Language (UML) is a type of stable structure diagram that describes the constitution of a system by showing the system's classes, their allocation, operations (or methods), and the relationships among the classes. It explains which class contains information.

3.2.1 Class Diagram:

To framework, a structure the most important feature is to capture the dynamic behaviour. Dynamic behaviour means the behaviour of the device when it is running/operating.

Only static conduct is not sufficient to model a system rather dynamic behaviour is more important than static conduct. In UML, there are five diagrams available to plan the dynamic nature and a use case diagram is one of them. Now as we have to talk about the use case diagram is greater in nature, there should be some internal or external factors for making the connection.

These interior and exterior agents are known as actors. Use case diagrams consist of actors, use cases and their connections. The diagram is used to model the system/subsystem of an implementation. A single-use case diagram captures a particular performance of a system.

In consequence to model the entire system, a number of use case diagrams are used.

3.2.2 Use case Diagram

A use case diagram in the Unified Modeling Language (UML) is a type of behavioral diagram explained by and generate from a Use-case analysis. Its motive is to attending a graphical overview of the feature provided by a system in terms of actors, their goals (represented as use cases), and any dependencies between those use cases. The main cause of a use case diagram is to show what system functions are performed for which actor. The Roles of the actors in the system can be represented.

3.2.3 Sequence Diagram

A sequence diagram in Unified Modeling Language (UML) is a kind of interaction diagram that shows how procedures work with one another and in what order. It constructs a Message Sequence Chart. Sequence diagrams are occasionally called event diagrams, event scenarios, and timing diagrams

4. MODULES DESCRIPTION

4.1. Tensor flow

Tensor Flow is a free and open-source software library for data flow and different programming across a scope of works. It is an iconography math library and is also used for machine learning use such as neural networks. It is used for both investigations and manufacturing at Google. It was published under the Apache 2.0 open-source license on November 9, 2015.

4.2. Num py

Numpy is a general-purpose array processing package. It provides a high-efficiency multidimensional array of object and tools for employed with these arrays.

It is the basic package for scientific computing with Python. It contains various characters including these important ones:

- A powerful N-dimensional array object
- Sophisticated (broadcasting) functions
- Tools for integrating C/C++ and Fortran code
- Useful linear algebra, Fourier transform, and random number potential

Besides its obvious scientific uses, NumPy can also be used as an efficient multi-dimensional container of generic data. Arbitrary data types can be defined using NumPy which allows NumPy to perfect and quickly integrate with a wide variety of databases.

4.3. pandas

Pandas is an open-source Python library providing effective data operation and analysis tool using its powerful data structures. Python was majorly used for data decrypt and preparation. It had a very little donation to data analysis. Pandas solved this problem. Using Pandas, we can accomplish five classical steps in the alter and analysis of data, regardless of the origin of data load, prepare, manipulate, model, and analyze. Python with Pandas is used in a lot of fields including education and business sectors including finance, economics, statistics, analytics, etc.

4.4. Matplotlib

Comprehensive 2D/3D plotting

5. RESULTS

6. CONCLUSION

A Non-Helmet Rider Detection system is developed where a video file is taken as input. If the motorcycle rider in the video footage is not wearing helmet while riding the motorcycle, and then here we are uploading an image to identify the license plate number of that motorcycle is extracted from image and displayed. Object detection principle with YOLO architecture is used for motorcycle, person, helmet and license plate detection. OCR is used for license plate number extraction if the rider is not wearing a helmet. Not only the characters are extracted, but also the frame from which it is also extracted so that it can be used for other purposes. All the objectives of the project are achieved satisfactorily.

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