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Detection of Non-Helmet Riders and License Plate Recognition

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ABSTRACT

Motorcycles have always been the primary mode of transport in developing countries. In recent years, there has been a speedy increase in motorcycle accidents owing to the fact that majority of the motor bicyclist fail to wear helmet that makes it an ever-present danger.

Here, to detect the motorcyclists who are violating the helmet laws, a system using Deep Learning and convolutional neural network is implemented where license plate of the motorcycle is detected using OCR if rider fails to wear helmet.

INTRODUCTION

All over the world 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 2018" released by world health organization. It is very hard to imagine that this burden is unevenly borne by motorcyclists, cyclists and pedestrians. This report noted that a comprehensive action plan has to be set up in order to save lives. Worrying fact is that India ranks number one as far as road crash deaths are considered. Rapid urbanization, avoiding helmets, seat belts and other safety measures while driving are some of the reasons behind this trend according to analysis done by experts. In 2015 India signed Brasilia Declaration on Road Safety, where India committed to reduce road crash deaths to 50 percent by 2020. Policy makers first have to acknowledge the problems that persist in India before halving road crash deaths. When a two-wheeler meets with an accident, due of sudden deceleration, the rider is thrown away from the vehicle. If head strikes any object, motion of the head becomes zero, but with its own mass brain continues to be in motion until the object hits inner part of the skull. Sometimes this type of head injury may be fatal in nature. In such times helmet acts as life savior. Helmet reduces the chances of skull getting decelerated, hence sets the motion of the head to almost zero. Cushion 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 safeguarding the head from severe injuries.

LITERATURE SURVEY

- Circle arc detection method based on Hough Transform. They applied it to detect the presence of helmet which failed to give accurate result.
- Combination of image processing and (OCR) Optical Character Recognition to detect vehicle number plate under different background but it has worked on static i.e. non - moving images in Malaysia.

METHODOLOGY

In this research work, a Non-Helmet Rider detection system is built which attempts to satisfy the automation of detecting the traffic violation of not wearing helmet and extracting the vehicles' license plate number. The main principle involved is Object Detection using

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Deep Learning at three levels. The objects detected are person, motorcycle/moped at first level using YOLOv2, helmet at second level using YOLOv3, License plate at the last level using YOLOv2. Then the license plate registration number is extracted using OCR (Optical Character Recognition). All these techniques are subjected to predefined conditions and constraints, especially the license plate number extraction part. Since, this work takes video as its input, the speed of execution is crucial. We have used above said methodologies to build a holistic system for both helmet detection and license plate number extraction.

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.

EXISTING MODEL

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 and time as the traffic violations frequently and the number of people using motorcycles is increasing day-by-day. What if there is a system, which would automatically look for traffic violation of not wearing helmet while riding motorcycle/moped and if so, would automatically extract the vehicles' license plate number. Recent research have successfully done this work based on CNN, R-CNN, LBP, HoG, HaaR features,etc. But these works are limited with respect to efficiency, accuracy or the speed with which object detection and classification is done. In this research work, a Non-Helmet Rider detection system is built which attempts to satisfy the automation of detecting the traffic violation of not wearing helmet and extracting the vehicles' license plate number. The main principle involved is Object Detection using Deep Learning at three levels. More importantly it acts as a mechanical barrier between head and object to which the rider came into contact. Injuries can be minimized if a good quality full helmet is used. Traffic rules are there to bring a sense of discipline, so that the risk of deaths and injuries can be minimized significantly. However strict adherence to these laws is absent in reality. Hence efficient and feasible techniques have to be created to overcome these problems. Manual surveillance of traffic using CCTV is an existing methodology.

PROPOSED MODEL

The proposed a methodology for feature extraction using LBP based hybrid descriptor, HOG and Hough transform descriptors. Whereas Xinhua Jiang et al. incorporated grey level co-occurrence matrix along with LBP for feature extraction. YOLOv2 and COCO dataset can be employed 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 exploited to detect motorbikes . proposed a method to identify two wheeler accidents using a microcontroller and accelerometer. Most of the time pedestrians are the real victims for road accidents, their safety is essential. Jie Li et al. The proposed a method to classify pedestrians using SVM based on histogram of oriented gradient features (HOG). The last step involves helmet detection. Colour based and circle Hough transform is used to detect helmet and HOG descriptors can also be used for helmet detection . Colour feature recognition is another option . deployed 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 collection of dataset, moving object detection, background subtraction, object classification using neural networks

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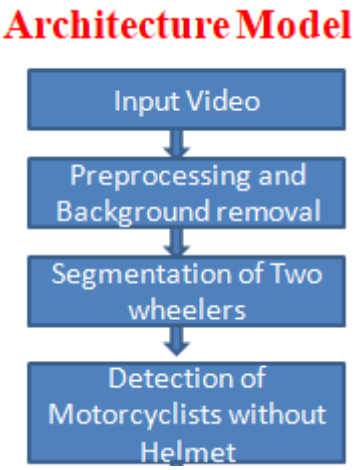
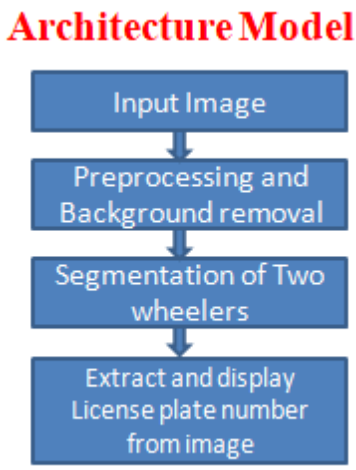
and extraction of licence plate number if the rider is not wearing helmet. Rattapoom Waranusast et al. used KNN classifier for moving object extraction and classification. Here the head is classified as wearing helmet or not based on various features obtained from the segmented head region Moving objects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

ARCHITECTURE





MODULES DESCRIPTION

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.

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.

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

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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. Matplotlib

Comprehensive 2D/3D plotting

5. Results

Home Page

Uploading Image

Detecting Motor Bike and Person

Detecting Helmet and Extracting Number Plate

Uploading Video

Detecting Helmet from Video

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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, then the license plate number of that motorcycle is extracted 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 rider is not wearing 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 is achieved satisfactorily.

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