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Violation of Traffic Rules and Detection of Sign Boards

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Abstract— Today's society has seen a sharp rise in the number of accidents caused by drivers failing to pay attention to traffic signals and regulations. Road accidents are increasing daily as the number of automobiles rises. By using synthesis data for training, which are produced from photos of road traffic signs, we are able to overcome the challenges of traffic sign identification and decrease violations of traffic laws by identifying triple-riding, no-helmet, and accidents, which vary for different nations and locations. This technique is used to create a database of synthetic images that may be used in conjunction with a convolution neural network (CNN) to identify traffic signs, triple riding, no helmet use, and accidents in a variety of view lighting situations. As a result, there will be fewer accidents, and the vehicle operator will be able to concentrate more on continuing to drive but instead of checking each individual road sign. Also, simplifies the process to recognize triple driving, accidents, but also incidents when a helmet was not used.

Keywords- Helmet detection, traffic sign board detection, accident detection, triple riding detection, object detection

I. INTRODUCTION

Accordance to a study by the World Health Organization titled "The Global status Updated Manuscripts Received on December 5, 2019 statement on road safety 2018," 50 million people worldwide suffer injuries and Every year, 1.35 million individuals perish from road accidents. It is almost difficult to conceive that walkers, bikers, and motorcyclists all bear an equal share of this load. This research said that in order to preserve lives, a thorough plan of action must be put in place. In practically every nation, two-wheelers are a highly common means of transportation. Yet, because there is less protection, there is a considerable danger associated. The rider of a two-wheeler gets flung from the vehicle in the event of an accident because of a quick deceleration. The velocity of the head stops when it collides with an item, but the motion of the brain is maintained by the mass of the brain until the object strikes the interior region of the skull. This kind of brain injury may occasionally prove deadly.

Helmets save lives in these situations. Helmets decrease the likelihood that the skull will slow down, which lowers head motion to nearly nothing. When time passes, the helmet comes to a stop after the helmet's cushion has absorbed the impact of the accident. Moreover, it disperses the force of the hit across a wider region, protecting the skull from serious wounds. Most significantly, it serves as a mechanical shield between the rider's head and whatever it is they come into touch with.

If a complete helmet of excellent quality is worn, injuries can be reduced. The purpose of traffic regulations is to instill a feeling of discipline so that the danger of fatalities and serious injuries can be greatly reduced. Nevertheless, these laws are not strictly followed. Thus, effective and practical methods must be developed to solve these issues. To reduce the risk connected with riding a motorcycle, it is universally advised that motorcyclists wear helmets. The fact that India ranks first when it comes to fatalities from traffic accidents is concerning. The expert study suggests that this increase may be caused by rapid

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urbanization, a lack of use of seat belts, helmets, and other safety devices when driving. India agreed to cut the number of fatalities from traffic accidents in half by 2020 when it signed the Brazilian Statement on Road Safety in 2015.

Due to the importance of wearing a helmet, governments have declared It is forbidden to pedal a motorcycle without a safety helmet, and active surveillance techniques are used to catch violators. Current video surveillance-based techniques, however, are passive and heavily reliant on human labor. Due to the participation of people, whose efficiency declines over time, such systems are typically impractical. Automation of this procedure will greatly minimize the requirement for human resources while ensuring reliable and effective monitoring of these breaches.

This work has recently been successfully completed using CNN, R-CNN, LBP, HoG, HaaR characteristics, etc. Nevertheless, the above-mentioned efforts have limitations in terms of effectiveness, precision, or how quickly objects may be identified and categorized.

II. LITERATURE SURVEY

In many domains, it is necessary to recognise and track the target item while dealing with occlusions and other difficulties. Numerous scholars have explored various ways in object tracking (Almeida and Guting 2004, Hsiao-Ping Tsai 2011, Nicolas Papadakis and Aurelie Bugeau 2010). The nature of the approaches is heavily influenced by the application domain. Several of the research projects that led to the planned investigation into the subject of object detection and tracking are displayed below.

The majority of detection and classification of objects techniques up until recently relied on feature extraction techniques like Haar, HOG, binarization patterns (LBP), the scale-invariant feature transform (SIFT), or sped up robust features (SURF), followed by classifiers like support vector machine (SVM), random forests, or AdaBoost. In order to distinguish between motorcycle riders who are wearing helmets and those who are not, Silva et al. [1] extract features utilizing histograms of oriented gradient (HOG), LBP, in addition to the wavelet transform (WT). To create seven unique feature sets, they use a wide range of basic selected features, such as HOG+LBP+WT.

K. Dahiya et al. developed helmet recognition from surveillance footage in [5,] using an SVM classifier to distinguish between motorcyclists and non-motorcyclists and another Support vector machine (svm) to distinguish between helmet and no helmet. Three frequently used characteristics - HOG, SIFT, and LBP - were incorporated for each classifier, and their performance was compared to that of the other two features. They determined that the HOG descriptor contributed to the best performance.

C. Vishnu et al. introduced a classification method for convolutional neural Networks (CNNs) in [6]. In many cases, CNNs that conduct both appropriate feature extraction as well as classification have surpassed previously dominant approaches in recent years. Recent advancements in graphics processing units (GPUs), as well as the availability of additional training examples for neural network models to learn, have enabled remarkable accuracy in the domains of computer vision systems, processing natural languages, and speech recognition. CNNs are now used in all cutting-edge approaches for object recognition, digital image processing, feature categorisation, and object segmentation. Consider the strategies employed in the ImageNet big-scale visual recognition challenge [2].

For the licence plate detection and character extraction method, Li and Shen [3] employ a complex convolutional neural network with long-short term memory (LSTM). They employ two techniques for recognition and segmentation. [4] shown that using CNNs for textual detection and identification improves on existing approaches significantly.

With near real-time performance (25 fps on HD photos), the YOLOv3 algorithm can recognise objects (traffic participants) accurately in a range of driving situations
Fully CNN [7] and a method for post-processing neural network outputs make up the YOLO v3 algorithm. CNNs are a unique neural network architecture designed specifically for interpreting grid-like data structure. The distinguishing characteristic of CNNs that is significant for object recognition is parameter sharing. In CNN architecture, every component of the kernel is utilised at every point of the input, in contrast to fully convolutional systems, in which each weighted parameter is only ever used once. This results in the learning of a single set of parameters rather than a different set for each location.

Since that Retina Net’s training duration is longer than that of YOLOv3, the YOLOv3 AP does show an exchange among both speed and accuracy when utilising YOLO. YOLOv3 is the best alternative for methods that are able to be trained with big datasets since it can be used to recognize objects with an accuracy that is comparable to that of Retina Net when utilising a larger dataset. This can be seen in popular detection methods like the urban transportation system, where a lot of data may be utilized to train the model because there are a lot of photos of various cars. With specialized models where obtaining huge datasets might be challenging, YOLOv3 might not be the best option.

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III. METHODOLOGY

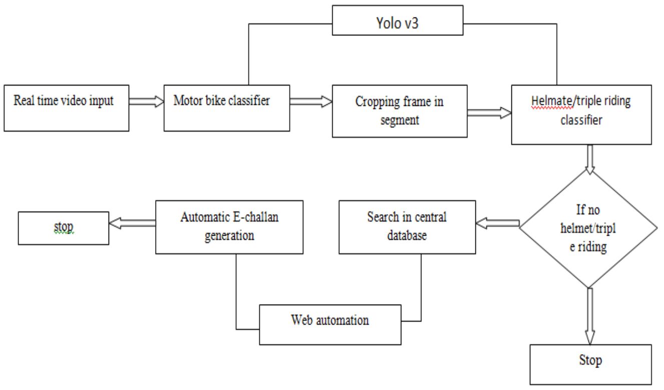

Figure 1. Flowchart for the helmet and triple riding

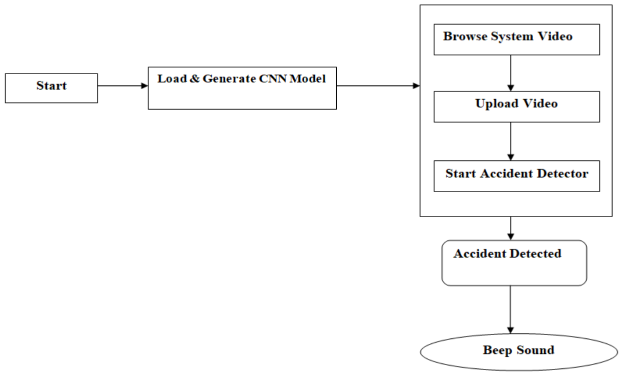

Figure 2. Flowchart for accident detection

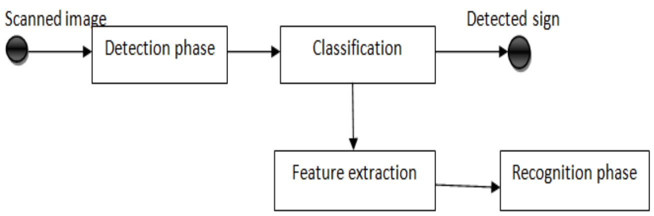

Figure 3. Traffic Sign Board Detection

All figures, tables, etc. must have a caption, centre-justified in 11 pt. Times New Roman. Captions precede tables but follow figures. Tables and figures must appear as close to their point of reference as satisfactory formatting of the final document permits.

A. *Object Detection*

Import the necessary libraries and establish our current operating system, we will utilize a pre-trained model specifically designed for using learned detection of objects from the COCO data information since we want to accomplish object detection quickly and easily.

B. *Image Object Detection*

The images object detection system is accomplished by first give the filename and the directory for the load picture as well as the filename and the directory for the result image. The image taken from identical directory as the Scripting language will be used as the input image In the meantime, the traffic monitoring result will be stored within the identical directory in a file

You could assume that the outcome of the object recognition is cluttered in some way if you utilize the default value that was demonstrated in the code above, with many grid cell overlapping one another. To minimize the background noise in the forecast result, you may modify the object detection model so that it only shows the items that are actually essential to you. Let's take that picture up and use it as example. Let's say that I simply would like the item detection to anticipate the motorcycle and people. We must invoke the Custom Objects method in order to do this. Then, we provide the argument with the identity of the objects we would like the system to recognize.

Next, we can use the detectCustomObjectsFromImage function to begin developing the object detection system. The location and title of our input picture, together with the name and path of our output image, are all passed along with our custom variable. By discarding the predictions with probabilities below a predetermined threshold value, we may further reduce the clutter. If you wish to disregard forecasts with probabilities lower than 70%. The detectCustomObjectsFromImage method's minimum -percentage -probability parameter might be added to achieve this.

C. *Video Object Detection*

The image feature detection system we previously constructed can be used to generate a video object recognition system using Image AI. Three lines will only need to be modified. The library is the first item we need to import. Thus, we must import VideoObjectDetection in place of Object Detection. import VideoObjectDetection from imageai. Detection The instantiation of the object recognition class is the second modification that has to be made.

After creating the system for object identification, we should do the final and subsequent corrections. We used the detectObjectsFromImage function in our earlier code. Use detectObjectsFromVideo instead if you wish to identify objects in a movie. It is apparent that the parameter that must be passed into this function is unchanged from the previous one. The location to our film directory and the video's filename must be specified first. Second, we also need to give the output video's filename and directory.

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We can slightly adjust our film object detection system in the same way that we did with our image feature detection system. Selecting the beginning for the probability rate that ought to be presented and the items we wish to detect are also options.

Let's assume that we just want our visual object detection system to be able to recognize humans and bicycles. Moreover, we intend to only display detections with probability values greater than 70%. To achieve this, we must first create a variable to hold the things we wish to monitor. Using our bespoke objects, we can then build our detection of videoobjectssystem.

We use the function detectCustomObjectsFromVideo to do this. We supply our attribute variable, the location and designation of our both output and input videos, the frame rate in seconds, also the minimal beginning for probability price, as parameters to this method

IV. TECNOLOGIES

A. Convolutional Neural Network (CNN)

The convolutional neural network is then used to process the grayscale picture. Python is used to implement the CNN. The accompanying photograph, which depicts a speed restriction sign (60 kmph), has been transformed to grayscale and given to CNN. After passing through all of CNN's layers, which are completely linked, the results are compared to those in the information details, as well as the audio result is then provided. Each symbol in the data collection has a unique value. The inspected picture additionally has a specific value when imaging is complete. Image processing is set to a beginning. When the convolutional neural network result exceeds the predetermined threshold, it produces results that are closer to those found in the given dataset.

We designated a threshold of 0.8. The processing process and image precession will both be faster if the thresholds value is higher. Both the speed and the capacity will be decreased. Python is used to implement CNN utilizing the KERAS information collection file. KERAS is a superior library file that makes use of THEANO or TENSOR FLOW. Deep learning networks are implemented using it.The amount of code lines is decreased by utilizing KERAS. The accuracy rises to 99% when using Keras.

B. Yolo v3

The YOLO v3 approach combines a CNN with a post-processing algorithm to completely handle neural network outputs. CNNs are a unique neural network architecture designed specifically for analyzing grid-like data structure. The distinguishing characteristic of CNNs that is significant for object recognition is parameter sharing. In CNN design, each individual of the kernel utilized every point of the load, in contrast to feed - forward neural networks, in which each weighted parameter is only ever used once. This results in the learning of a single set of parameters rather than a different set for each location. This function is crucial for capturing the entire thing on the road.

The detection makes advantage of the three separate layers. Detection and recognition at three different sizes is used to solve the identification of small items issue that plagued earlier YOLO neural network implementations. The emission tensors from some of those sensor layers have the same durations, widths, as well as heights as with there input information, but intensity is specified as the total of the grid cell characteristics, which include thickness , length and the two-dimensional configuration of the pack (by, bx), with 1 being the probability that box looks like it holds the noticeable element (personal computer), as well as probabilities for every one of the groups.

C. Python

Python's programming language is easy to understand and provides a variety of strong classes. Python also integrates well with other programming languages like C and C++.

The National Research Center of Mathematics and Computer Science in the Netherlands, Guido van Rossum created Python, a high-level interpreted programming language. Version 1.0 was published in 1994, following the 1991 alt. Source newsgroup leak of the prior version.

The 2.x series of versions predominated the market since the release of Python 2.0 in 2000 until December 2008. The development team then published version 3.0, that included a few very modest but significant changes and was not entirely backwards compatible with 2.x versions. There are several similarities between Python 2 & Python 3, and some Python 3 features have been back ported to Python 2. Yet, they are still incompatible in general.

D. Open CV

A collection of programming functions called OpenCV (Open-source computer vision) is primarily focused on real-time computer vision. Under the terms of the open-source BSD license, the library is free to use and cross-platform. The deep learning frameworks Tensor Flow, Torch/PyTorch, and Caffe are supported by OpenCV.

E. Tensor Flow

An open-source software framework called Tensor Flow is used for data - flow development across a variety of activities. It is a conceptual maths library that is also utilized by neural network applications in machine learning. Google uses it in both research and manufacturing. Because of its adaptable

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design, computing may be easily deployed across such variety of systems (CPUs, GPUs, and TPUs), from desktop computers to server clusters to portable and edge devices. Stateful dataflow graphs are used to represent TensorFlow calculations. The actions that these neural networks carry out on multi - dimensional data arrays are where TensorFlow gets its name. Tensors are the name given to these arrays.

F. Keras

Python-based open-source Keras is a neural network library. TensorFlow, Microsoft Cognitive Toolkit, or Theano can all be used as a foundation. It is user-friendly, modular, and extendable Keras that is focused on enabling quick experimenting with deep neural networks. The keras processing image is used to do this. the class Image Data Generator.

The use of flow, this class enables you to create generators of augmented picture batching (and their labels) and define random modifications and normalization working to be performed on given image information throughout coaching (data, labels) These generators, fit generator, evaluate generator, and predict generator, also may utilize a Keras modeling method that accepts data inputs.

G. ImageAI

It is a Python library designed to let professionals, research, and learners build software that has both personalities Deep Learning along with Computer Vision capabilities

V. RESULTS ANALYSIS AND DICUSSION

A convolutional neural network is then used to process the grayscale picture. Python is used to implement the CNN. The accompanying photograph, which depicts a speed restriction sign (60 kmph), has been transformed to grayscale and given to CNN. After passing through all of CNN's layers, which are completely linked, the results are compared to those in the computer files and documents and collections of computer data, and the audio result is then provided.

Each symbol in the data collection has a unique value. The inspected picture also has a specific value when image processing is complete. Imaging is set to a threshold. When the CNN result exceeds the predetermined threshold, it produces results that are closer to those found in the given dataset.

We designated a threshold of 0.8. The processing process and image precession will both be faster if the thresholds value is higher. Both the speed and the capacity will be decreased.

The sequential model is the one we employed. In KERAS, there seem to be two models available. They are functional and sequential API. Since it helps the stack successive layers from the beginning to the finish, sequential is an often used term. Functional creates architecture that is more complex. Sequential sequence is absolutely crucial for CNN.

The two-dimensional imaging dataset processing of the incoming photos comes next. The total amount of output channels is specified by the preset word Conv2D. Here, 32 o/p channels were utilized. The kernel filtered to shrink the matrix is represented by the kernel size 5,5. The X,Y axis is represented by strides 1 and 1. Relu method is used to provide the first layer's input, which is essentially the input's size.

The polling layer, which accepts strides and accumulating size as parameters, is defined by max pooling. There is a 2D layer as well. We increased the image's sample size by adding another convolution and pooling layer. The output channels, in this example 32 o/p channels, should be determined by us rather than the geometry of the input picture, which KERAS handles automatically.

The German collection of data's diverse images is broken down into subclasses using a filters and each subclass is given a unique number. While looking for a picture in a subclass, the algorithm will instantly identify the class based on the contour & different thresholds of something like the image or video.

This indicates that the picture may get close to 90% accuracy in intervals of 10 times. The matplotlib file is used to transform and save this plot as numbers. This eventually provides us with values from the dataset to make a comparison.

Figure 4. Traffic Sign Boards

Images captured in actual settings are part of the COCO collection. Given that it includes multi-object labeling, segmented masks annotation, photo labeling, vital recognition, and panoptic segmentation annotations, COCO is a very adaptable and versatile dataset.

We import the essential libraries since, as we previously said, the COCO collection comes with them. The input consists of a number of things. The relevant things will be distinguished from the other objects with the help of the imported libraries, and the identified objects will be assigned identifiers so that they can be accessed later. Use the Coco.GetObjectIds function to get the Identifiers for these various objects.

Figure 5. Bike riders with and without helmets

The Rider To identify a bike rider wearing or not wearing a helmet. We require a number of pictures of bike riders wearing helmets, riding without helmets, 10% of the photos in the dataset will make up the test set I choose to make. setting up YOLO using dataset. We have to make some adjustments in so that we can instruct the YOLO models on the dataset from here on out we have constructed our test and training sets. Photos are sent into the helmet detection model as input. Several erroneous detections were noticed when the helmets detection model was being tested. The individual picture was cropped to only include the upper quarter of the image. This guarantees the elimination of false detection cases and prevents situations when the rider does not put on their helmet while riding and instead holds it in their arm or leaves it on the motorcycle. The triple riding detection system is made up of a core subsystem that handles environment setup, model training, testing, and obtaining precise coordinates for the system-supplied vehicle. demonstrates the suggested system of triple riding.

The system that can recognize an accident based on a live video feed from a Surveillance camera that has been mounted on a roadway. Each frame of a video should be passed through such deep learning convolutional neural network model that has been instructed to distinguish between accident- and non-accident-related video frames. An accident victim may go neglected for a considerable amount of time on routes with extremely little and quick traffic To develop a system that can recognize accidents using a CCTV camera feed that is being broadcast live from a roadway. The goal is to process every frame of a video via deep learning convolutional neural network model that has been trained to categorize video frames into accident- or non-accident-related categories. Convolutional Neural Networks have shown to be a quick and reliable method for classifying photos. In comparison to previous image classification methods, CNN-based image classifiers have achieved accuracy levels of over 95% for relatively smaller datasets. They also need less preparation.

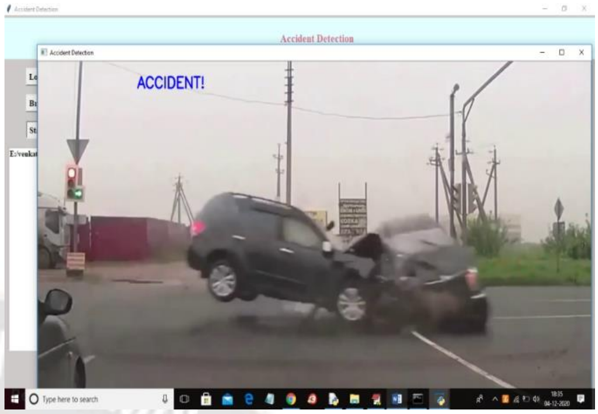

Figure 6: Accident detection using surveillance cameras

CONCLUSION

A video footage is used as the input for a system being developed to detect non-helmeted riders and triple riders. The motorcycle's license plate number is extracted and shown separately in the instances where the rider inside this video clip is not wearing a helmet or is riding with three other people. Motorcycle, person, helmet, and license plate detection all employ the object detection concept with the YOLO architecture. If the rider is riding a triple or is not wearing a helmet, a Google Spreadsheet is utilized to obtain the number plate number. In order to use LP for other things, the characters are removed. The project's goals have all been properly met.

REFERENCES

[1] H. Li and C. Shen, “Reading car license plates using deep convolutional neural networks and LSTMs”, arXiv preprint arXiv:1601.05610, 2016.

[2] C. Vishnu, D. Singh, C. K. Mohan, and S. Babu, "Detection of motorcyclists without helmet in videos using convolutional neural network," 2017 International Joint Conference on Neural Networks (IJCNN).

[3] How to Create a Simple Object Detection System with Python and ImageAI-by Ruben Winastwan.

[4] Wang H, Yu Y, Cai Y, Chen L, Chen X (2018) A vehicle recognition algorithm based on deep transfer learning with a multiple feature subspace distribution. Sensors 18(12):4109.

[5] Verma, R. ., & Sharma, N. . (2023). Impact of Inclusion of Information and Communication Technologies in School Facilities and Effective Learning of Students in Green School. International Journal of Intelligent Systems and Applications in Engineering, 11(2s), 27–34. Retrieved from https://ijisae.org/index.php/IJISAE/article/view/2503

[6] Satya (2018) Deep learning based object detection using YOLOv3 with OpenCV (Python/C++). https://www.learnopencv.com/deep-learning-based-object-detection-using-yolov3-with-opencv-python-c/.

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[7] Raj KD, Chairat A, Timtong V, Dailey MN, Ekpanyapong M (2018) Helmet violation processing using deep learning. In: 2018 International workshop on advanced image technology. IEEE, IWAIT, pp 1–4.

[8] Christopher Thomas, Stephen Wright, Juan Martinez, Alejandro Perez, Luis Rodriguez. Integrating Machine Learning and Decision Science for Intelligent Automation. Kuwait Journal of Machine Learning, 2(4). Retrieved from http://kuwaitjournals.com/index.php/kjml/article/view/213

[9] Redmon (2018) Darknet: open-source neural networks in c. http://pjreddie.com/darknet/.

[10] Redmon J, Divvala S, Girshick R, Farhadi A (2016) You only look once: unified, real-time object detection. In: Proceedings of the IEEE conference on computer vision and pattern recognition, pp 779–788.

[11] Desai M, Khandelwal S, Singh L, Gite S (2016) Automatic helmet detection on public roads. Int J Eng Trends Technol (IJETT) 35:185–188.

[12] E-challan generation – how to send emails using python – smtplib by johan godinho.

[13] Gokhale M, Wagh R, Chaudhari P, Khairnar S, Jadhav S (2018) Iot based e-tracking system for waste management. In: 2018 Fourth international conference on computing communication control and automation (ICCUBEA). IEEE, pp 1–6.

[14] Girish G. Desai, Prashant P. Bartakke, Real-Time Implementation Of Indian License Plate Recognition System IEEE Xplore 2019.