Shodhshauryam, International Scientific Refereed Research Journal
Available online at : www.shisrrj.com
OPEN ACCESS
© 2024 SHISRRJ | Volume 7 | Issue 2
ISSN : 2581-6306
doi : https://doi.org/10.32628/SHISRRJ

Triple Ride Detection

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Article Info

Article History
Received : 02 April 2024
Published : 14 April 2024

Publication Issue :
March-April-2024
Volume 7, Issue 2

Page Number : 526-530

ABSTRACT

Traffic law violations are a typical occurrence in a country with a large population like India. Accidents brought on by these infractions result in significant losses in terms of life and property. Because bikes are used so often, there are also more bike-related accidents than there are with other types of vehicles.

Strict adherence to the law and ongoing traffic monitoring are required in order to reduce the number of accidents and traffic volumes. Finding the Triple Riding is the main goal of this endeavor. The YOLO (You Only Look Once) algorithm, which is based on deconvolutional neural networks, is used to identify triple riders. The algorithm determines if a vehicle violates rules by classifying it as a rule-breach vehicle or not in order to detect the amount of people riding bikes. The data is gathered by the traffic signal surveillance cameras, which serve as the data gathering center.

Keywords: Mishaps, Strict enforcement, Monitoring, Triple Riding, Deconvolutional neural network, YOLO algorithm, Detection, Surveillance cameras, Traffic signals, Data analysis

I. INTRODUCTION

According to a "World Health Organization research titled "The Global status Revised Manuscript Received on December 05, 2019 report on road safety 2018," 1.35 million people worldwide lose their lives and 50 million suffer injuries as a result of traffic accidents each year. It is almost difficult to assume that bicycles, pedestrians, and motorcyclists are bearing this burden in equal measure. According to this research, in order to save lives, a thorough action plan needs to be established.

Almost every nation has a relatively common kind of transportation: the two-wheeler. However, because there is little protection, there is a greater risk. The rider of a two-wheeler gets flung from the vehicle in an accident caused by an abrupt deceleration.

Most of the accidents are happening by not following the traffic rules like triple ride, helmetless driving and many more. So, we
come up with an idea to detect triple ride using CNN in python.

II.LITERATURE REVIEW

Examining the literature on Triple Ride Detection

The issue of traffic violations, particularly triple riding on bikes, poses significant challenges in densely populated countries like India, leading to a high rate of accidents and associated loss of life and property. These systems leverage surveillance cameras at traffic signals to continuously monitor and identify instances of triple riding. By utilizing tools like NumPy for mathematical computations and CV2 for image detection, these algorithms can effectively classify vehicles based on rule compliance. He goal of this study is to lower the number of accidents and traffic congestion by providing a robust method for detecting and penalizing triple riding, thereby enhancing road safety and regulatory enforcement.

An Overview of the python with machine learning

countries such as India. Leveraging the power of machine learning, specifically Deconvolutional neural networks, the system is designed to analyze surveillance footage captured by traffic cameras in real-time. Through the integration of YOLO algorithm, the system can efficiently detect and classify instances of triple riding, enabling authorities to identify rule-breaching vehicles accurately. Python serves as the primary programming language for implementing the machine learning models, with libraries such as NumPy facilitating mathematical computations, and CV2 enabling image detection functionalities. By combining these technologies, the project offers a comprehensive solution for continuous monitoring and enforcement of traffic regulations, ultimately contributing to enhanced road safety and reduced accident rates. The application of Python, coupled with machine learning and YOLO algorithm, underscores the potential of technological innovations in tackling complex societal challenges like traffic management and safety.

III. METHODOLOGY

Approach

The methodology for the aforementioned project involves several key steps to effectively implement the Deconvolutional neural network-based YOLO algorithm for detecting triple riding violations. Initially, a comprehensive dataset comprising images captured by surveillance cameras at traffic signals is gathered. To improve the consistency and quality of the photographs, preprocessing techniques are used. The YOLO algorithm is therefore
trained using the dataset to recognize and classify vehicles, particularly focusing on identifying instances of triple riding. This involves fine-tuning the model parameters and optimizing its performance through iterative training processes. Post-training, the algorithm is deployed in real-time using CV2 for image detection and NumPy for mathematical calculations. The system then utilizes polygonal techniques to accurately delineate regions of interest within the images, facilitating precise detection of triple riding violations.

Implementation

The methodology for implementing the aforementioned project involves several key steps. Initially, a dataset comprising images captured by surveillance cameras at traffic signals is compiled, ensuring diversity in lighting conditions, weather,

and traffic scenarios. These images are then preprocessed to enhance their quality and facilitate effective analysis. Subsequently, the Deconvolutional neural network-based YOLO algorithm is trained using the preprocessed dataset to accurately detect and classify vehicles, with a specific focus on identifying instances of triple riding. The algorithm is fine-tuned iteratively to optimize its performance in distinguishing between rule-compliant and rule-breaching vehicles. To enhance the accuracy of triple riding detection, polygonal regions of interest are defined around the identified vehicles, enabling precise localization of occupants. Finally, the implemented system undergoes rigorous testing and validation using real-world traffic data to assess its effectiveness and reliability in practical scenarios. This methodology aims to provide a robust solution for automating the detection and enforcement of traffic violations, particularly triple riding, thereby contributing to improved road safety and regulatory compliance.

Characteristics

The proposed project leverages advanced technological tools such as OLO (You Only Look Once) algorithms based on deconvolutional neural networks. for the detection of triple riding, a prevalent traffic violation in densely populated countries like India. Key characteristics of this project include its focus on enhancing road safety by identifying and penalizing instances of triple riding, which is a significant contributor to accidents and loss of life and property. The system utilizes surveillance cameras installed at traffic signals for continuous monitoring and classification of vehicles based on rule adherence. Moreover, by employing NumPy for mathematical computations and CV2 for image detection, the project ensures efficient and accurate identification of rule-breaching vehicles without the need for repetitive manual intervention. This approach not only aids in reducing accident rates but also contributes to the effective enforcement of traffic regulations, ultimately leading to improved traffic management and safety on roads.

Data Preprocessing

In preparation for implementing the Deconvolutional neural network-based YOLO algorithm for triple riding detection in traffic surveillance, rigorous data preprocessing is imperative. Initially, raw image data captured by surveillance cameras at traffic signals is collected and subjected to resizing and normalization processes to ensure uniformity in image dimensions and pixel values. Subsequently, the images undergo augmentation techniques such as rotation, flipping, and brightness adjustment to enhance the diversity and robustness of the dataset. Moreover, to mitigate class imbalance issues, oversampling or under sampling strategies may be employed. Additionally, the dataset is annotated meticulously, marking regions of interest corresponding to bikes and riders, utilizing polygonal representations. Through this comprehensive preprocessing pipeline, the input data is refined and optimized, facilitating the subsequent stages of algorithm development and evaluation.

IV.EXPERIMENTAL SETUP

Programming Language:

Python as the primary programming language for its extensive ecosystem and support for deep learning libraries.

Deep Learning Frameworks:

NumPy: A Python numerical computing library that supports big, multi-dimensional arrays and matrices and offers a number of mathematical functions to effectively work with larger arrays.

OpenCV (cv2): An open-source software library for computer vision and machine learning that offers tools for tasks including object detection, facial recognition, and picture segmentation. It is mostly focused on real-time image processing.

Polygon: A geometric library in Python used for handling geometric shapes and operations, including point sets, polygons, and geometric transformations.

Machine learning Algorithms:

A real-time object detection technique called YOLO (You Only Look Once) divides images into a grid of cells after processing them in a single pass.

surveillance, autonomous driving, and image recognition tasks.

V.ANALYSIS

Triple ride detection Implication

The deployment of Deconvolutional neural network-based YOLO algorithms for detecting triple riding on bikes holds significant implications for enhancing road safety and traffic management in densely populated regions like India. By leveraging surveillance cameras at traffic signals, this technology enables real-time monitoring and identification of rule violations, particularly instances of triple riding. The implementation of such systems facilitates more effective enforcement of traffic regulations, thereby deterring risky behaviours and reducing the incidence of accidents associated with overcrowded bikes. Moreover, by utilizing tools like NumPy and CV2, this approach offers a computationally efficient and accurate method for classification and detection tasks. Ultimately, the successful integration of these algorithms into existing traffic management systems can contribute to a safer and more orderly transportation environment, leading to improved public safety and reduced economic costs associated with road accidents.

Benefits and Drawbacks

The utilization of Deconvolutional neural network-based YOLO algorithms for detecting triple riding on bikes offers several benefits. Firstly, it enables efficient monitoring of traffic violations, particularly in densely populated areas, thereby potentially reducing the incidence of accidents and associated loss of life and property. Additionally, the use of surveillance cameras at traffic signals offers a scalable and affordable remedy for continuous monitoring and enforcement of traffic laws. Moreover, by leveraging tools like NumPy and CV2, the system can achieve accurate and real-time detection of rule breaches, facilitating timely intervention by law enforcement authorities. However, there are also some drawbacks to consider. Implementation of such sophisticated systems may require significant initial investment in infrastructure and technology, which could be a barrier for widespread adoption, particularly in resource-constrained regions. Additionally, there may be concerns regarding privacy and data

security associated with the continuous monitoring of public spaces using surveillance cameras. Furthermore, the effectiveness of the system may be limited by factors such as poor visibility due to adverse weather conditions or obscured camera angles, potentially leading to false positives or missed violations.

VII.CONCLUSION

In conclusion, the implementation of a Deconvolutional neural network-based YOLO algorithm for detecting triple riding on bikes holds promise in addressing the prevalent issue of traffic violations in highly populated countries like India. By leveraging surveillance cameras and advanced computational tools like NumPy and CV2, this research offers a viable solution for continuous monitoring and enforcement of traffic rules, particularly regarding bike riders. The system's ability to classify vehicles based on rule adherence contributes to enhanced road safety and regulatory enforcement, thereby potentially reducing the frequency of accidents and associated loss of life and property. Moving forward, further refinement and deployment of such technologies could significantly contribute to mitigating the challenges posed by traffic violations and improving overall traffic management strategies.

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