North South University
Department of Electrical and Computer Engineering

Senior Design Project

Vehicle Identification and Counting System Using Machine Learning

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Faculty Advisor

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Fall, 2021

DECLARATION

We hereby declare that this Senior Design Project named " Vehicle Identification and Counting System Using Machine Learning" is done by Md. Shahrior Gohor, ID #1610824042, B.M Tanvir Hossain, ID#1611687042 of the Department of Electrical and Computer Engineering, North South University. Under the supervision of Dr. Atiqur Rahman. Associate Professor of the Department of Electrical and Computer Engineering, North South University. We further secure that this Senior Design Project report has not been submitted either in whole or part for any Degree in any university earlier. We further undertake to identify the university against any loss or damage arising from breach of the preceding obligation. The report has been firmly written with full originality. Any text reproduced or rephrased in the report from anywhere has been properly referenced.

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APPROVAL

Md. Shahrior Gohor (ID # 1610824042) and B.M Tanvir Hossain (ID # 1611687042) from Electrical and Computer Engineering Department of North South University, have worked on the Senior Design Project titled "Vehicle Identification and Counting System Using Machine Learning" under the supervision of Dr. Atiqur Rahman in partial fulfillment of the requirement for the degree of Bachelor of Science in Computer Science and Engineering and has been accepted as satisfactory.

Supervisor's Signature

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Chairman's Signature

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Dr. Rajesh Palit
Professor & Chair
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ACKNOWLEDGEMENTS

By kindness of the Almighty we have successfully completed our capstone senior design project entitled “Vehicle Identification and Counting System Using Machine Learning.”

Our deep gratitude goes first to my faculty advisor Dr. Atiqur Rahman, who expertly guided us in our senior design project throughout the whole CSE/EEE499A and CSE/EEE499B. His guidance helped us in all type of research, writings and completing the project.

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ABSTRACT

In the realm of road management, the significance of intelligent vehicle recognition and counting has grown immensely. However, this task is made inherently challenging by the wide variety of vehicle sizes and shapes on the road, which directly influences the accuracy of vehicle counting. To tackle this challenge, we present a robust vision-based vehicle recognition and counting system that employs the Yolo machine learning method. In the context of intelligent road traffic management and control, accurate vehicle identification and comprehensive statistics in road monitoring video sequences are paramount. The proliferation of traffic surveillance cameras has resulted in a vast reservoir of traffic video footage for analysis. An elevated viewing angle is necessary to achieve a broader view of the road surface. But at this increased viewing angle, the size of vehicles varies significantly, and the accuracy of detecting smaller objects situated farther from the road diminishes. In light of these formidable challenges posed by diverse camera conditions, addressing and surmount these obstacles effectively is crucial. In this study, we propose a promising approach for vehicle detection that goes beyond mere identification. The findings from our system serve as a foundational component for multi-object tracking and vehicle counting. Our vision-based approach, utilizing the Yolo machine learning method, is tailored to accommodate the dynamic nature of road traffic. By continuously improving the accuracy of vehicle recognition and counting, we contribute to more intelligent road traffic management and control. The insights gained from this system offer valuable data for traffic analysis and decision-making, ultimately leading to safer and more efficient roadways.

Keywords— machine learning, vehicle identification, counting, darknet, yolo v3 model, dataset, image annotation