

## **Abstract**

# **Vehicle Speed Estimation Using Combination of Convolution Neural Network and ByteTrack Object Tracking**

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Accurate speed estimation is crucial for traffic management, law enforcement, and autonomous driving systems. The traditional method requires a lot of infrastructure just to start with the speed detection process. With existing speed estimation system based on computer vision still has problems with inconsistent estimation and low detection accuracy. This research focuses on improving the system's accuracy and consistency. This research implements vehicle speed estimation using computer vision with YOLOv10 and ByteTrack, utilizing the BrnoCompSpeed dataset. The proposed method involves the YOLO framework to be used to identify vehicles, while ByteTrack keeps track of all objects that have been detected and the collected data to be used in the speed estimation process. The results demonstrate the potential improvement that this approach brings to the table, with a focus on improving detection precision and tracking reliability for better estimation results. With the highest-performing model managing to produce an MAE of 3.497 and a standard deviation of 5.268, the system can be further developed to be deployed and tested in a real-world scenario.

**Keyword:** Intelligent Traffic Management, Computer Vision Algorithms, Vehicle Speed Estimation, You Only Look Once, Machine Learning