e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
( Peer-Reviewed, Open Access, Fully Refereed International Journal )
Volume:05/Issue:10/October-2023 Impact Factor- 7.868 www.irjmets.com

# SAFEGUARDING ROAD TRAVEL: CUTTING EDGE ROAD SIGN DETECTION IN ADAS

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## ABSTRACT

The abstract discusses the significance of road sign detection in ensuring the safety of drivers, vehicles, and pedestrians. This feature, integrated into the Advanced Driver Assistance System (ADAS), uses deep learning algorithms to efficiently detect and notify drivers about road signs. The paper proposes two models: Hybrid-TSR for traffic sign recognition and Hybrid-SRD for semantic road detection. These models utilize a combination of pre-trained 2D and shallow 3D convolutional neural networks, enhancing accuracy and reducing complexity in real-time processing solutions. The study addresses critical challenges in computer vision for intelligent transport systems, aiming to enhance road safety through advanced technology

**Keywords:** Advanced Driver Assistance System (ADAS), Road Sign Detection, Region-Based Convolutional Neural Networks (R-CNN), Deep Learning.

## I. INTRODUCTION

In the context of autonomous driving, road sign detection is vital for ensuring the safety of both passengers and pedestrians. Advanced systems now rely on neural networks, enhancing detection accuracy. However, global variations in road sign designs pose a challenge, requiring adaptable algorithms.

Accurate detection is not enough; the system must also precisely locate signs to interpret their relevance to the vehicle's position. This knowledge enables autonomous vehicles to make informed decisions based on specific road signs, like adjusting speed or changing lanes. Challenges arise due to the sizes of signs in the real world and the complexities of managing a database containing sign information.

Addressing these issues is fundamental for autonomous vehicles to respond effectively to diverse road environments, ensuring a safer and more reliable driving experience.

## II. METHODOLOGY

For formulating the research, we use the “road-sign-detection” from Kaggle and perform data preprocessing on that dataset. The dataset was then split into two segments— namely, a training set and a testing set. This partition allocated 80% of the data for model training, while the remaining 20% served as a robust evaluation set, allowing for an effective assessment of each model's generalization capabilities. The aim of our research is to detect the traffic signs on the road.

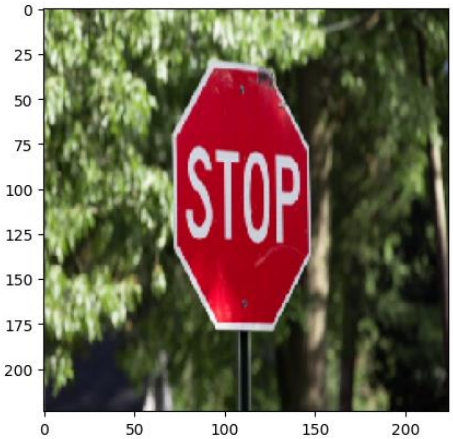


**Figure 1:** 3D view of building.

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## III. RESULTS AND DISCUSSION

As mentioned before after setting up the experiments and training the models on the dataset the following are the results.

**Classification accuracy** is a metric that summarizes the performance of a classification model as the number of correct predictions divided by the total number of predictions.

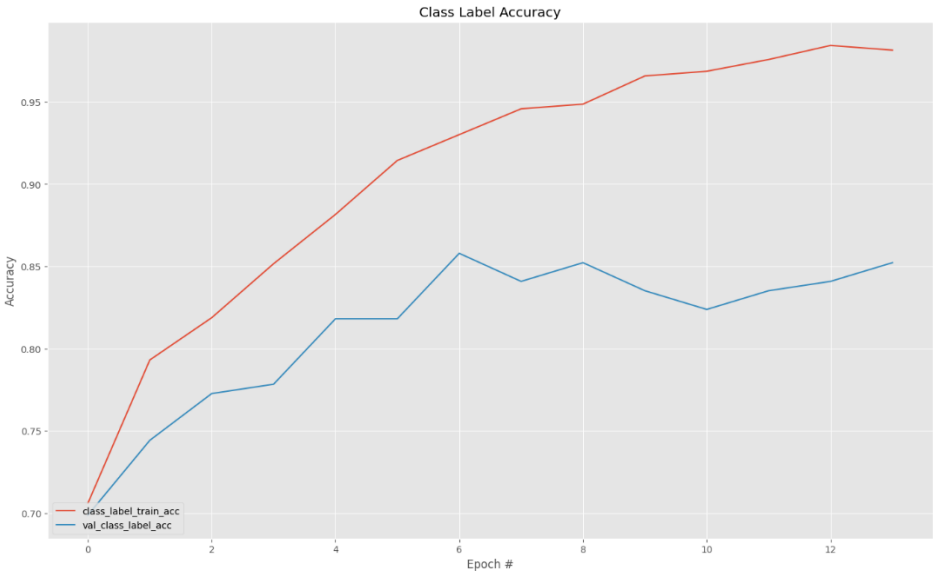


**Figure 2:** Class Label Accuracy

**Bounding Box Accuracy (BBA)** is the measure of the performance of a detection model in terms of how accurately it predicts the defect's bounding box compared to the label's bounding box.

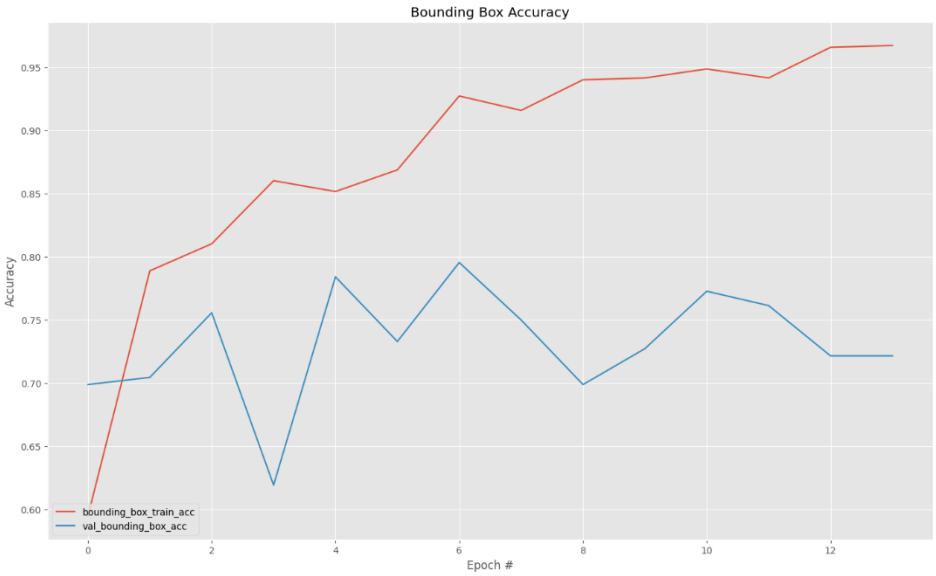


**Figure 3:** Bounding Box Accuracy

In the below images model has detected the signs and given the following outputs:

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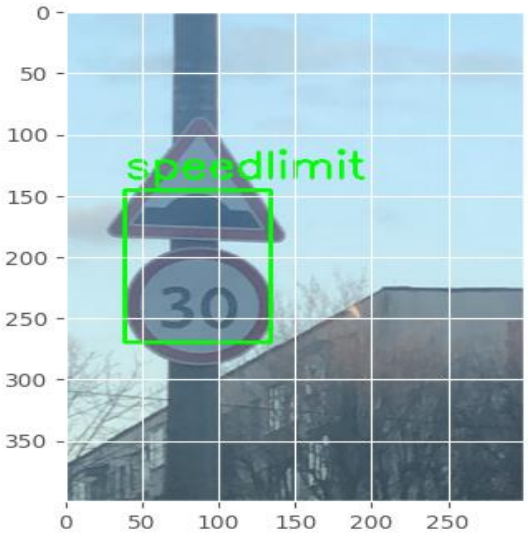


**Figure 4:** Model had detecting speed limit


**Figure 5:** Model had detecting Traffic Light

## IV. CONCLUSION

In this research paper, we are detecting the Traffic Signs for the ADAS (Advanced Driving Assistance System). Due to the high epoch rate and clean dataset, the model is overfitting and the overfitting can be reduced[1], [2] using different datasets and epoch values. This research can be further extended as we can use this model in ADAS after detecting the signs the vehicle will control its speed limits automatically.

## V. REFERENCES

[1] A. Moujahid et al., "Machine Learning Techniques in ADAS: A Review," in 2018 International Conference on Advances in Computing and Communication Engineering (ICACCE), Paris: IEEE, Jun. 2018, pp. 235–242. doi: 10.1109/ICACCE.2018.8441758.

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