IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 5, June 2023

# Improving Traffic Sign Recognition with Machine Learning and Deep Learning for Dynamic and Weather-Variable Environments

**Sivananda Lahari Reddy Elicherla[1] and V. Ravindra Reddy[2]**
[1]Sr.Software Engineer, ANZ Operations and Technology, Bengaluru
[2] Research Scholar, Department of Computer Science and Technology, S. K. University, Ananthapuramu

**Abstract:** *Traffic sign recognition plays a critical role in the development of autonomous vehicles and intelligent transportation systems, especially in dynamic and weather-variable environments. This paper explores the application of machine learning (ML) and deep learning (DL) techniques to improve traffic sign recognition systems capable of handling challenging weather conditions such as rain, fog, snow, and low-light scenarios. By utilizing convolutional neural networks (CNNs) and other advanced ML models, we aim to enhance the robustness and accuracy of traffic sign detection under diverse environmental challenges. The proposed framework incorporates data augmentation techniques, weather-specific training datasets, and real-time adaptive models to address the variability in image quality caused by weather disruptions. Our experimental results show that deep learning models outperform traditional methods, achieving higher detection accuracy and faster processing times even under extreme weather conditions. The study demonstrates that ML and DL-based systems can effectively adapt to dynamic environments, offering significant improvements in road safety and autonomous driving technologies. Additionally, the paper discusses the importance of continuous learning and model refinement to ensure that the recognition system remains effective as weather patterns evolve..*

**Keywords:** Deep Learning, traffic Sign Recognition, Convolutional Neural Networks (CNN), Weather-Resilient Detection, Data Augmentation