

# Efficient Multiclass Classification of Small Datasets Using a Novel Contrast Based Learning Approach

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**Source:** Recent Advances in Electrical & Electronic Engineering, Volume 18, Issue 9, Nov 2025, p. 1678 - 1695

**DOI:** <https://doi.org/10.2174/0123520965298906241023110601>

**Received:** 12 Aug 2024 **Accepted:** 09 Oct 2024 **Available online:** 26 Dec 2024

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Abstract



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## Introduction

Deep learning models often face challenges in achieving optimal accuracy when classifying multiclass datasets, particularly when the dataset size is limited. This study introduces Contrast Based Learning (CBL), a novel data augmentation technique designed to address data scarcity.

## Methods

CBL innovatively concatenates multiple images and uses contrast learning to generate enriched datasets that exhibit a higher diversity of complex features. By focusing on the contrasts between various images, this method enhances the model's ability to learn nuanced features, thereby improving generalization and reducing overfitting.

## Results

Unlike traditional data augmentation methods, which rely on basic transformations, CBL dynamically concatenates images from different classes, creating complex inputs that provides the model with a more comprehensive training dataset. Experimental results show that CBL significantly improves classification accuracy and outperforms state-of-the-art methods across multiple small-scale multiclass datasets.

## Conclusion

The findings highlight the robustness of CBL in addressing data limitations, demonstrating its potential to advance the classification performance of deep learning models.

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ISIN: 2352-0973

E-ISSN: 2352-0973