

Meta-Heuristic Feature and Deep Learning Based Skin Diseases Diagnosis

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of**

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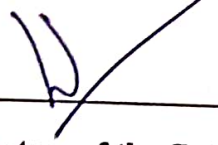


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Abstract

Abstract— Skin cancer is a major global health concern, with melanoma representing its most aggressive type. Traditional diagnostic methods relying on dermoscopic inspection are time-intensive and prone to human error. To address these challenges, this research proposes a Modified Image-based Deep Spiking Neural Network (MIDSNN) framework for automated detection and classification of skin lesions.

The model incorporates a robust preprocessing pipeline for noise reduction and contrast normalization, followed by feature extraction using Co-occurrence Matrix (CCM) and histogram descriptors. A Genetic Algorithm (GA) is used for metaheuristic optimization of feature selection and model parameters. The extracted features are processed through the MIDSNN, which mimics the temporal dynamics of biological neurons to improve learning and classification efficiency.

Experiments conducted on HAM10000 and ISIC 2019 datasets show that MIDSNN outperforms baseline models such as CNN, SVM, and hybrid ensembles, achieving 22.19% higher accuracy and a 21% improvement in F-measure. The model demonstrates strong resilience to dataset imbalance, lighting variation, and lesion complexity, highlighting its applicability in clinical dermatology.

This work presents a scalable and interpretable solution for early skin cancer detection and provides a foundation for future expansion into color image compression, video-based lesion monitoring, and integrated CAD applications.

Keywords— Skin lesion classification, MIDSNN, genetic algorithm, deep learning, medical imaging, dermatology.