

Skin Lesion Classification using Deep Learning

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In **Skin Lesion Classification using Deep Learning**, Skin lesion classification remains a critical challenge due to class imbalances and the need for high diagnostic accuracy. This study implements an integrated framework combining data augmentation, with the implementation of different deep learning architectures and also robust feature extraction, and hybrid classification techniques to address these challenges.

To overcome the imbalanced datasets, synthetic images are generated with the help of CGANs and combined with real images to improve minority class representation. Tested with different models such as InceptionV3, ResNet50, ResNet101, and custom CNNs and also used hybrid approaches combination of CNN for features extraction and trained with machine learning algorithms like Random Forest and Adaboost Classification for the experiments to improve the classification result with the help of metrics like confusion matrices and accuracy scores.

The final result demonstrates that the Hybrid CNN with Adaboost achieves the highest F1 score while the Custom CNN attains the highest accuracy (72%). The hybrid Random Forest-CNN approach almost matches the performance of the results of the Hybrid CNN with AdaBoost, both outperforming standalone classical Random Forest and also with Random Forest imbalance models. These findings validate the effectiveness of GAN-based augmentation, hybrid classification with preprocessing techniques, and Custom CNN providing a clinically reliable solution for skin lesion diagnosis by developing a highly accurate model.

References:

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