

## ABSTRACT

Manual analysis of skin texture is often subjective and inconsistent, which complicates standardization in dermatological diagnosis. This research aims to develop an objective and accurate automated classification system to categorize skin texture images into 'soft', 'normal', and 'rough' classes. The proposed methodology integrates computer vision techniques with deep learning. Specifically, each skin image is processed using the Canny edge detector to extract edge maps, which represent texture density. This study conducted systematic experiments with various Canny threshold values to find the most effective optimal parameters.

The results indicate that a Canny threshold of (50, 100) provided the best feature separability and directly resulted in the highest model performance. Using these optimal parameters, the Convolutional Neural Network (CNN) model achieved a statistical accuracy of 98.45% on the structured test data. The confusion matrix confirmed the model's ability to flawlessly classify the 'soft' class. Furthermore, a functional prototype of the tool was validated through field testing involving 15 participants (300 samples), where it achieved a real-world accuracy of 85.67% when compared to conventional measurement tools. This dual validation success demonstrates that the developed system is not only theoretically accurate but also reliable for practical application.

**Keywords:** Skin Texture Classification, Canny Edge Detection, Deep Learning, Convolutional Neural Network (CNN), Transfer Learning, Computer Vision