

KNEE OSTEOARTHRITIS CLASSIFICATIONS IN THERMAL IMAGES

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Osteoarthritis is a degenerative joint disease that affects millions of people worldwide. Early detection and diagnosis of osteoarthritis is critical for effective treatment and management of the disease. In recent years, thermal imaging has emerged as a promising non-invasive technique for detecting osteoarthritis. However, existing techniques for osteoarthritis detection in thermal images suffer from several limitations, such as low accuracy, limited generalizability, and lack of interpretability. To address these challenges, we propose a novel approach for osteoarthritis detection in thermal images using the hybrid ResNet-SqueezeNet model deep learning architecture. The proposed approach involves pre-processing the thermal images to enhance their features, followed by segmentation to extract the region of interest. The segmented region is then fed into the hybrid ResNet-SqueezeNet model which is trained to classify the thermal image as normal or abnormal based on the presence of osteoarthritis. We evaluated the performance of the proposed approach on a dataset of thermal images collected from patients with osteoarthritis and healthy controls. Our results show that the proposed approach achieved an accuracy of 91%, sensitivity of 93%, specificity of 89%, and an AUC of 0.93, outperforming several state-of-the-art approaches. We also conducted extensive experiments to investigate the impact of different pre-processing techniques and hyperparameters on the performance of the hybrid SqueezeNet model. Moreover, we conducted a detailed analysis of the learned features and identified the regions of the thermal image that were most important for osteoarthritis detection. The proposed approach can be used as a reliable and non-invasive tool for early detection and diagnosis of osteoarthritis, assisting clinicians in providing timely and effective treatment to patients.