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| Title | An Interpretable Skin Cancer Classification Using Optimized Convolutional Neural Network for a Smart Healthcare System | | |
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| Abstract |  |
| Skin cancer is a prevalent form of malignancy globally, and its early and accurate diagnosis is critical for patient survival. Clinical evaluation of skin lesions is essential, but it faces challenges such as long waiting times and subjective interpretations. Deep learning techniques have been developed to tackle these challenges and assist dermatologists in making more accurate diagnoses. Prompt treatment of skin cancer is vital to prevent its progression and potentially life-threatening consequences. The use of deep learning algorithms can improve the speed and accuracy of diagnosis, leading to earlier detection and treatment. Additionally, it can reduce the workload for healthcare professionals, allowing them to concentrate on more complex cases. The goal of this study was to develop reliable deep learning (DL) prediction models for skin cancer classification; (i) deal with a typical severe class imbalance problem, which arises because the skin-affected patients’ class is significantly smaller than the healthy class; and (ii) interpret the model output to better understand the decision-making mechanism (iii) Propose an End-to-End smart healthcare system through an android application. In a comparison examination with six well-known classifiers, the effectiveness of the proposed DL technique was explored in terms of metrics relating to both generalization capability and classification accuracy. A study used the HAM10000 dataset and an optimized CNN to identify the seven forms of skin cancer. The model was trained using two optimization functions (Adam and RMSprop) and three activation functions (Relu, Swish, and Tanh). Furthermore, an XAI-based skin lesion classification system was developed, incorporating Grad-CAM and Grad-CAM++ to explain the model’s decisions. This system can help doctors make informed skin cancer diagnoses in their early stages, with an 82% classification accuracy and 0.47% loss accuracy. | |