SKIMP: Artificial Intelligence- Convolutional Neural Network (CNN) Portable Skin Cancer Detection Device With Skin Cancer Notifier Python-Based Program

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Skin cancer is a common yet curable disease if diagnosed early. This study developed SKIMP, a portable artificial intelligence-based diagnostic device, to facilitate early detection of skin cancer. SKIMP, using a CNN trained on HAM10000 dataset, detects and classifies benign and malignant skin lesions. The device comprises of Raspberry Pi 4 model B, wide-angle Pi camera, dermatoscope, and a Python-based skin cancer notifier program. Accuracy, precision, and recall were checked through test data. External validation was tested with twenty-nine (29) web images for different skin lesions. Cropped image preprocessing reduced noise, focusing on the lesion region to enhance classification accuracy. The CNN model showed a test accuracy of 74.74% while improving to 93.10% during external validation with real-world image data. Deployment on human participants demonstrated the system's low-latency performance (490ms/step) and its potential for practical application in underserved areas. There are few limitations of dataset imbalance and overfitting that is addressed by oversampling and preprocessing methods, improving the model's validity and applicability. SKIMP fills technological gaps in dermatological care and is a low-cost, accessible solution for underserved areas. This study emphasize the potential of AI-powered diagnostic devices in enhancing healthcare accessibility and reducing skin cancer-related mortality.

Awards Won: