Dermadiagnosis: a smartphone interface for efficiently diagnosing melanoma in clinical and non-clinical settings

Anurag Gottipati

Johns Hopkins University, USA

Statement of the Problem: One of the greatest risks associated with indiscriminate amounts of UV light exposure is the chance of developing skin cancer. With 9,500 newly diagnosed cases of skin cancer appearing in the United States every day, skin cancer is the most common cancer in both the United States and across the globe. Unfortunately, the incidence rate of melanoma - the deadliest and most aggressive form of skin cancer - has annually increased at a 44% rate over the past decade. Despite the advent of new smartphone technologies for skin condition diagnosis, melanoma's different forms (i.e. irregular pigmented lesions/abnormal moles) make it elusive to both experienced dermatologists and pathologists and existing diagnostic interfaces. The purpose of this study is to describe the development of the "DermaDiagnosis" system, a smartphone app melanoma diagnostic system, and its potential clinical applications. Methodology & Theoretical Orientation: Using MIT App Inventor's framework, a deep learning convolutional neural network (CNN) with three 3x5 filters using the Adam optimizer (efficiently processes large datasets with noisy gradients) was developed. Model robustness was enhanced by using 20 epochs and a 75% training data fraction; the model was trained on 1440 benign and 1197 malignant melanoma images. Translated into an Android smartphone app, chances of malignancy are quantified by a percentage using the phone camera. Findings: Testing with 360 benign and 300 malignant melanoma images revealed the system had an 80% accuracy rate in accurately recognizing benign/malignant pigmented lesions. Despite melanoma's various manifestations, DermaDiagnosis was able to differentiate between normal and abnormal lesions with significant confidence. Conclusion & Significance: As the incidence of melanoma continues to rise, medical technology must adapt to reducing disparities in skin care access and early diagnosis. As a means of achieving this goal, DermaDiagnosis offers clinicians a free and efficient solution.

e: anurag.gottipati@gmail.com