A Precise, Portable, Non-Invasive Melanoma Detection Device Using Image-Based Deep Learning Approach

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Melanoma is the most common of all skin cancers, and Malignant Melanoma (MM) has the greatest mortality rate and highest potential of dissemination. MM can be cured if detected early but left untreated, it poses a significant risk as it can metastasize to other organs. The prognosis of patients with metastatic MM is grim, with a 5-years survival rate between 5-19%. MM can go undetected in many impoverished rural areas in the US and worldwide. This project aimed to develop a portable and precise device that can take an image of a mole and conclude if it is “Malignant” or “Benign.” The device developed is a small tablet with a camera that runs on a Jetson Nano 4GB and utilizes deep learning and an optimized inference system for diagnosis. It uses a deep learning model, which was trained and evaluated on thousands of mole images. The device was tested on 50 images and an accuracy of 98% was achieved. It allows people in rural and impoverished areas where dermatologists are not available to have timely detection of MM, leading to an effective and life-saving prognosis. Furthermore, providers with minimal training can use this device. The device can potentially impact the health of millions around the world due to its low-cost, easy-to-use, non-invasive, and efficient approach to detecting MM. Judiciously used, it can be widely distributed in community clinics which will help in timely detection and periodic screening for the in-time treatment of MM, which will save lives.

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