ABSTRACT

Melanoma spreads through metastasis, and therefore it has been proven to be very fatal. Statistical evidence has revealed that the majority of deaths resulting from skin cancer are as a result of melanoma. Further investigations have shown that the survival rates in patients depend on the stage of the cancer; early detection and intervention of melanoma implicates higher chances of cure. Clinical diagnosis and prognosis of melanoma are challenging since the processes are prone to misdiagnosis and inaccuracies due to doctors’ subjectivity. Malignant melanomas are asymmetrical, have irregular borders, notched edges, and color variations, so analyzing the shape, color, and texture of the skin lesion is important for melanoma early detection and prevention. This work proposes the two major components of a noninvasive real-time automated skin lesion analysis system for melanoma early detection and prevention. The first component is a real-time alert to help users prevent skin burn caused by sunlight; a novel equation to compute the time for skin to burn is thereby introduced. The second component is an automated image analysis module which contains image acquisition, hair detection and exclusion, lesion segmentation, feature extraction, and classification. The proposed system uses PH2 Dermoscopy image database from Pedro Hispano Hospital for development and testing purposes. The image database contains a total of 200 dermoscopy images of lesions, including benign, atypical, and melanoma cases. The experimental results show that the proposed system is efficient, achieving classification of the benign, atypical and melanoma images with accuracy of 96.3%, 95.7% and 97.3%, respectively.