HIGH-ACCURACY SKIN LESION SEGMENTATION AND SIZE DETERMINATION

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Abstract

Melanoma is one of the most common skin cancers. 5% of all cancer cases that occur in a year are cases of skin cancer and many people die each year by melanoma because of late recognition. Moreover, the number of new cases of melanoma in the United States has been increasing for at least 30 years. Fortunately, this melanoma is highly curable if it is detected early. In order to detect skin lesions, the automated skin lesion segmentation and diagnosis system on the Android system is an outstanding program to use.

In this thesis, there are 4 functionalities, which include: camera data collecting, image processing, feature calculation, and classification. With these processes, an image is captured and is converted to a grey image. After a grey image is created, a skin lesion contour is found by OpenCV functions, cvFindContour() and cvWatershed(). When the contour is found, the features color, shape, and size of the lesion are extracted in order to classify whether the lesion is benign or malignant by using the KNN classifier.

The goals and achievements of this thesis are to implement a function that captures images with the Android using camera properties, improve image segmentation and size estimation based on the previous prototype system on the Android platform with OpenCV. An image can be captured by a capturing function in this thesis and can be saved in a jpg

file and a data xml file, which are used for image processing and camera features. In image processing, the watershed function is used instead of cvThreshold function, which is on the previous prototype system, so that the number for the threshold value is no more needed and the system can find the most method contour instead of finding several contours as it does in the previous system. In size estimation, two methods, which are reference method and camera distance method, are used. Reference method is when the system can estimate the area of a lesion by comparing reference pixels and lesion pixels. Camera distance method is when the system can estimate the area of a lesion according to camera distance properties, which are near, optimal, and far camera distance values. With these two methods, the system can estimate real area of a lesion without rulers instead of counting the number of pixels.

Contour detection is improved to 98%. Reference size estimation and camera focus distance size estimations are 1.04% and 8.23%