Segmentation of Skin Lesion Images based on an Active Contour Model

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ABSTRACT

Skin cancer is considered as one of the most common types of cancer in several countries, and its incidence rate has increased in recent years. Therefore, there is a great interest concerning the development of computer-aided diagnosis (CAD) systems to assist the diagnosis of skin lesions in images. However, a common crucial task of these systems is the image segmentation. Hence, a new computational approach to segment pigmented skin lesions in macroscopic images is presented.

The developed approach involves the following steps: 1) image pre-processing, 2) image segmentation and 3) image post-processing. The first step intends to enhance input images corrupted by noise and is based on an anisotropic diffusion filter [2]. The second step is responsible for identifying the lesion presented in the enhanced image by using an active contour model without edges [3]. The third and last step intends to improve the quality of the segmentation result and consists of the post-processing of the segmented region based on morphological filtering. A subjective evaluation was performed to evaluate the obtained results. Hence, the visual assessment by a specialist of the segmented regions classified whether the lesions presented in 408 images were correctly segmented or not. Thus, it was possible to conclude that 96% of the melanocytic nevus images, 93.02% of the seborrheic keratosis images, and 94.23% of the melanoma images were correctly segmented. However, some images with low contrasted boundaries, shadows and reflections were incorrectly segmented. The quality of the borders of the 385 correctly segmented images was also visually evaluated, with 91.43% of the borders classified as having good quality and the remaining ones as having acceptable quality.

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