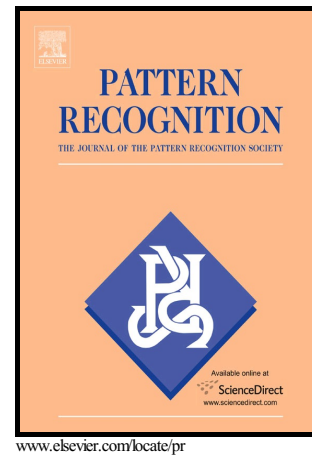


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A Simple Weighted Thresholding Method for the Segmentation of Pigmented Skin Lesions in Macroscopic Images

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Abstract

This work proposes a simple and yet effective thresholding method to segment pigmented skin lesions in macroscopic photographs automatically. Segmentation is one of the first steps in computer-aided diagnosis of skin cancers. Therefore, an accurate segmentation may play an important clinical role. We develop an algorithm that searches for a thin rectangular-shaped region near the image borders that is likely to contain mostly skin pixels. Segmentation is obtained by adapting Otsu's thresholding method by combining independent threshold estimates computed from histograms of different parts of a new intensity image designed to discriminate lesions from background skin. The proposed approach exploits the fact that the object of interest is approximately centered in the input photograph. A cross-diagonal sampling scheme helps to balance the size of the classes when the area of the lesion and the area of the surrounding skin are very different. A post-processing stage that includes morphological filtering and a weighted scheme to select the most salient object follows. The experimental results suggest that the method potentially can be used successfully to segment atypical nevi and melanomas in lesions with a highly heterogeneous background skin. The proposed algorithm is of interest for use in clinical settings as part of a CAD system.

Keywords: Segmentation, Thresholding, Pigmented skin lesions, Melanoma, Computer-aided diagnosis.

1. Introduction

The World Health Organization estimates between 2 and 3 million non-melanoma skin cancers and 132,000 melanoma skin cancers occur globally each year. One in every three cancers diagnosed is a skin cancer, and the global incidence of melanoma continues to rise ¹. Early detection is of paramount importance for melanoma treatment. At this stage, the prognosis for the patient is excellent as it can be cured by simple excision. However, melanoma detection in early stages is difficult because they resemble common

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¹<http://www.who.int/uv/faq/skincancer/en/index1.html>, accessed May 2015.

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