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World Dermatologist Summit and Skin Care Expo

October 30-31, 2017 | Toronto, Canada

Application-driven no-reference quality assessment for dermoscopy images with multiple distortions

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Dermoscopy is a noninvasive diagnostic technique which is useful in diagnosis of many skin diseases. In recent years, dermoscopy technology has been developing towards network platforms, and more non-clinical physicians have chance to capture and upload dermoscopy images into remote diagnosis systems. Unfortunately, this process can easily lead to poor image quality (arising from for example hair, blur and uneven illumination) which can adversely influence consequent automatic image analysis results on potential lesion objects. The purpose of this study is to deploy an algorithm that can automatically assess the quality of dermoscopy images. Such an algorithm could be used to direct image recapture or correction. We describe an application-driven No-Reference (NR) Image Quality Assessment (IQA) model for dermoscopy images affected by possibly multiple distortions. For this purpose, we created a multiple distortion dataset of dermoscopy images impaired by varying degrees of blur and uneven illumination. The basis of this model is two single distortion IQA metrics that are sensitive to blur and uneven illumination, respectively. The outputs of these two metrics are combined to predict the quality of multiply distorted dermoscopy images using a fuzzy neural network. Unlike traditional IQA algorithms, which use human subjective score as ground truth, here ground truth is driven by the application, and generated according to the degree of influence of the distortions on lesion analysis. The experimental results reveal that the proposed model delivers accurate and stable quality prediction results for dermoscopy images impaired by multiple distortions.

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