DERMOSCOPY AND SKIN IMAGING

# MOBILE DEEP LEARNING FOR AN EFFICIENT DIGITAL DERMOSCOPY IMAGING WORKFLOW

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Introduction: Reflectance confocal microscopy (RCM) use in clinical practice has been shown to further improve early melanoma diagnosis. In several retrospective studies evaluating the accuracy of dermoscopically equivocal lesions with reflectance confocal microscopy, the reader's sensitivity ranged between 85-100% and specificity 44-94%, depending on the patient population. Compared to previously reported methods and technology utilized for skin cancer diagnosis, RCM resulted in a superior combined sensitivity and specificity when applied to dermoscopically equivocal lesions. RCM is an in-vivo non-invasive screening tool that produces virtual biopsies of skin lesions but its proficient and safe use requires hard to obtain expertise.

Objective: RCM may be useful to have an additional tool to aid diagnosis made with images produced by this device.
We propose an approach based on a convolutional neural network to classify skin lesions using the reflectance confocal microscopy (RCM) mosaics.

Methods: The proposed system is based on ResNet, a deep neural network architecture with residual connections between subsequent convolutional layers. We decided to use a relatively shallow architecture with only 16 residual layers to prevent overfitting. The convolutional part of the
autoencoder was pretrained on the ImageNet database. The fine-tuning technique was used to transfer the weights and teach the encoder. The RCM mosaics were augumented using random cropping, affine transform, linear changes of contrast and brightness and random flipping. The dataset consisted of 429 RCM mosaics and was divided into 3 classes: melanoma (167), basal cell carcinoma (116) , and benign naevi (146) t confirmed by histopathological examination. The dataset was divided into training, validation and test sets.

Results: The test set classification accuracy was 87%, higher than the accuracy achieved

by medical, confocal readers.

Conclusions: The proposed classification system can be a useful tool to aided automatic early, non-invasive detection of melanoma.

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