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An Improvement of the Performance of Polar-Space-Trained DuAT Models for the Segmentation of Dermoscopic Images

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Abstract

Malignant melanoma is a type of skin cancer, which has a very high fatality rate if not diagnosed and treated in its early stages. This has created an incentive for the design of systems for its automated diagnosis, using dermoscopic images of skin lesions. One of the steps in such systems would be the segmentation of the dermoscopic image, so that the lesion is separated from the healthy skin tissue surrounding it. In the recent years, with the prolific usage and research on neural networks and deep learning methods, many new deep-learning-based methods have emerged that aim to improve the performance and the validity of automatically generated segmentation masks. This work explores the possible areas of improvement upon earlier methods, such as the Dual Aggregate Transformer method and analysis in polar space, by using spatial encodings and novel loss functions. Furthermore, the discrepancies between the results in polar and cartesian spaces are examined. It is shown in this work that the dice score for the generated segmentation mask can increase by 0.0059 points by using polar coordinates, and by a further 0.0017 points by using the mixed loss function. Furthermore, we can see an increase of 0.0152 points by comparing the results with what the previous studies have achieved in the polar space.

Keywords: Medical Image Segmentation, Deep Learning, Neural Networks

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