

# **Segmentation of hyperspectral images of skin neoplasms using convolutional neural networks**

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Malignant melanoma is considered as one of the most dangerous types of skin cancer, therefore, diagnosis for this disease must be made in the early stages. The examinations are usually performed by physicians, but evolving optical diagnostic techniques, for example, hyperspectral imaging, can be used as ancillary methods. Hyperspectral images are a three-dimensional data set consisting of a sequence of two-dimensional images obtained at specific wavelengths.

The steps of preprocessing, segmentation, post-processing and feature extraction are applied before diagnosing a neoplasm using such images. Each step is important, but the segmentation step stands out because a failed segmentation approach plays a fundamental role in the accuracy of the neoplasm classification and diagnosis result. Segmentation methods can be based on the classical approach, i.e., self-selection of functions for segmentation, as well as those based on the application of deep learning techniques. The second approach is used in this research.

A neural network of U-net architecture was used for the neoplasm segmentation task. The training sample size was 327 images. For the test sample, 20 images were selected. The segmentation result was evaluated using two metrics – accuracy and Jaccard's index. The obtained accuracy is 99% and the Jaccard index showed a result of 62%. Segmentation improves the accuracy of neoplasm classification and diagnosis.