



Breast ultrasound lesions recognition: end-to-end deep learning approaches.

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Abstract

Multistage processing of automated **breast ultrasound** lesions recognition is dependent on the performance of prior stages. To improve the current state of the art, we propose the use of end-to-end deep learning approaches using fully convolutional networks (FCNs), namely FCN-AlexNet, FCN-32s, FCN-16s, and FCN-8s for semantic segmentation of **breast** lesions. We use pretrained models based on ImageNet and transfer learning to overcome the issue of data deficiency. We evaluate our results on two datasets, which consist of a total of 113 malignant and 356 benign lesions. To assess the performance, we conduct fivefold cross validation using the following split: 70% for training data, 10% for validation data, and 20% testing data. The results showed that our proposed method performed better on benign lesions, with a top "mean Dice" score of 0.7626 with FCN-16s, when compared with the malignant lesions with a top mean Dice score of 0.5484 with FCN-8s. When considering the number of images with Dice score >0.5 , 89.6% of the benign lesions were successfully segmented and correctly recognised, whereas 60.6% of the malignant lesions were successfully segmented and correctly recognized. We conclude the paper by addressing the future challenges of the work.

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