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Based on Weighted Low-Rank Matrix Restoration on Thyroid Nodule Ultrasound Images

Editorial
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Editorial

Thyroid-related diseases have one of the highest incidences of nodular diseases in the adult population. In recent years, the incidence has had an obvious upward trend, and the older the population is, the higher the incidence is. However, if the disease can be found earlier, thyroid cancer is highly likely to be cured. With the rapid development of computer science and medical imaging technology, computer-aided diagnosis technology based on various imaging techniques has been continuously developing, and deep learning algorithms have been gradually applied to imaging analysis. Therefore, this study proposes an improved image segmentation model (F-U-net) based on the U-Net network framework and analyzes the simulation experiment of this model.

From the experimental results of the optimizer selection, the cross-merge ratio of the training set under the Adam optimizer starts to converge after five iterations, and the final cross-merge ratio is stable at 91.5%, which is significantly better than the BGD optimizer and the Momentum optimizer. Therefore, this study selects the Adam optimizer to train the segmentation model. From the experimental results of segmentation structure selection, the cross-merge ratio of the training set under the deep segmentation network structure starts to converge after 10 iterations, and the final cross-merge ratio is stable at 86.9%, which is better than that of the symmetric segmentation network structure, indicating that the deep segmentation network structure adopted in this study has certain advantages. From the experimental results of the segmentation level, the data cross. The merge ratio under the initial segmentation image is 0.233 and starts to converge after five iterations until it is stable at 0.875, which is better than that of the original image and ROI image. This shows that the nodule segmentation of thyroid ultrasound images layer by layer can effectively improve the convergence speed of gradient descent and the accuracy of final nodule segmentation.

My conclusion in this study, an improved image segmentation model (F-U-net) based on the U-net network framework was proposed, and simulation experiment analysis of the model (optimizer selection experiment, segmentation structure selection experiment, segmentation level experiment, loss function verification experiment, and segmentation model comparison experiment) was carried out. With the label results of patient samples as the gold standard, the diagnostic value of the model for benign and malignant thyroid nodules was analyzed. The results showed that the image segmentation model F-U-net designed based on the deep learning U-net network structure in this study had good segmentation performance of thyroid nodules, which can improve the segmentation effect of ultrasound images on benign and malignant thyroid nodules and had good clinical promotion value. This study still has some shortcomings to be improved upon. There are few data samples of thyroid ultrasound images. The deep learning model needs further training. In addition, the model is not applied in the clinical ultrasound image diagnosis of thyroid nodules. It is necessary to collect much patient data in the subsequent study and analyze the operation efficiency and accuracy of this model in the actual diagnosis to better adapt to the application of clinical ultrasound imaging technology. In addition, the F-U-net image seg- men-

tation model is also considered to be applied to the imaging diagnosis of other diseases to confirm the universality and application value of this model. In conclusion, the results of this study provide a scientific theoretical basis for the application of deep learning technology in the imaging diagnosis of thyroid nodules.