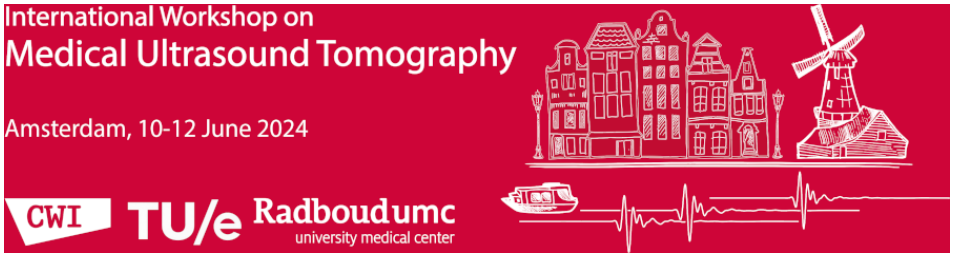

Contribution ID: **3** Type: **not specified**

Automatic tumor detection based on optimized YOLOv5 in breast ultrasound tomography

Monday, June 10, 2024 4:20 PM (1h 40m)

Breast cancer has surpassed lung cancer as the leading cause of global cancer incidence in 2020. Traditional handheld 2D ultrasound imaging is one of the major imaging tools for breast cancer screening in China. Compared with the traditional method, ultrasound tomography (UST) provides three-dimensional reproducible images of higher quality, simplifying and standardizing the image acquisition process. As a result, UST is a potential imaging technique for the early detection of breast cancer. This study aims for developing a deep learning method to automatically detect breast cancer from UST images, free radiologists from the incomprehensible three-dimensional data. Breast ultrasound tomography imaging system developed in HUST(Huazhong University of Science and Technology, Wuhan, China) with a scanning slice interval of 2 mm has scanned 40 patients with either benign or malignant breast tumor to get 3D data, each patient with about 30 2D slices with a size of 2048×2048. A dataset including 279 pairs of images and labels from 40 patients is established. An optimized YOLOv5-based method is proposed to detect breast tumors. In order to incorporate 3D context information efficiently, the target images containing tumors with their two neighbouring slices are grouped into one pseudo 3D image for the training. Manually labeling bounding boxes for the tumor on the center slice in each pseudo image are used as labels. The dataset is randomly divided into training (80% of patients) and test (20% of patients). The evalutation results on the testing dataset show that, the proposed method is able to yield detection recall, precision, and mAP (mean Average Precision) of 71.6%, 55.6%, and 57.1%, respectively, implying that the proposed method can potentially serve as a preliminary helper for doctors to automatically locate tumor on breast UCT images.

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Presenter: XIE, Gaoxiang

Session Classification: Poster Session, Lab Tours & Reception

Track Classification: poster presentations