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Establishment of a preliminary US AI diagnosis model which can effectively distinguish benign and malignant uterine cavity and endometrial lesions

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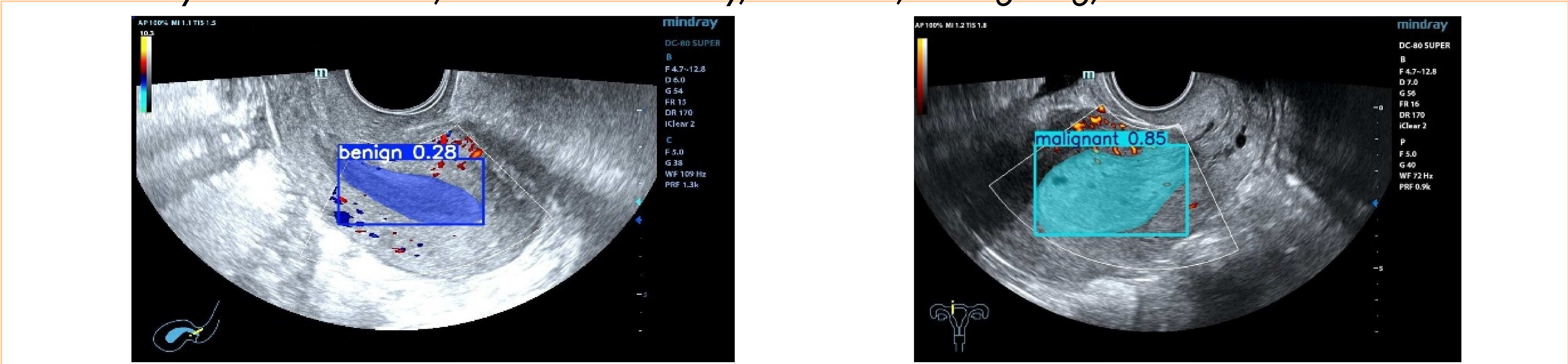
Objectives

To develop a preliminary ultrasonic artificial intelligence diagnosis model which can quickly and effectively distinguish benign and malignant uterine cavity and endometrial lesions.

Methods

More than 2000 ultrasound (US) images of uterine and endometrial lesions were collected (the ratio of benign and malignant images was about 6 : 4, and all patient privacy information was hidden in the US images). All US images with intrauterine devices or with measurements or images with various marks that do not meet the requirements were eliminated. Three sonographers with more than 5 years of clinical experience manually labeled the lesions in all eligible US images, and an US expert with 20 years of clinical experience reviewed and corrected all labeled images.

The marked US images were divided into training set and verification set according to the ratio of 8 : 2. Then, AI modeling and verification were carried out.



Results

The diagnostic sensitivity, specificity, accuracy and AUC of our initial AI model were 76.7%, 87.4%, 82.7% and 0.821, respectively. For the morphological segmentation task, Our AI model delivered a Dice coefficient of 0.6878 (95% CI : 0.6650–0.7106) and an IoU of 0.5699 (95% CI: 0.5466–0.5932), reflecting a strong capability in delineating segmentation regions.

Conclusion

Our AI model initially developed has good diagnostic efficacy, it can be used as an auxiliary method for training and image quality evaluation of primary doctors. However, our AI model has been preliminarily established and its performance is not stable enough, and the results may be overfitting, which has not been verified externally. In the later stage, more cases need to be added to improve the diagnostic efficiency and stability of the model, and external verification needs to be carried out and the diagnostic efficiency needs to be compared with that of different seniority sonographers.

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