深度学习在联合超声和钼靶检查乳腺癌中的应用

Title: The application of deep learning combination with X-ray mammography and ultrasound in the breast carcinoma examination

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摘要: 目的：探讨深度学习在乳腺良恶性病变鉴别中的意义。方法：对100例乳腺疾病患者的X线钼靶及超声检查的数据用反向传播神经网络进行深度学习分析，随机选择50例样本作为训练样本，组成训练集，其余样本组成测试集。建立神经网络诊断模型，分析神经网络模型的诊断结果。结果：100例患者中，手术与病理证实乳腺恶性病变62例，乳腺良性肿瘤或肿瘤样病变38例，钼靶X线诊断的特异度、敏感度及诊断正确率分别为89.5%、87.1%和88.0%；B超诊断的特异度、敏感度及诊断正确率分别为86.8%、83.9%和85.0%。X线钼靶和B超无明显差异。而深度学习的神经网络的特异度为95.5%，敏感度为96.4%，总的正确率为96.0%，明显高于X线钼靶和B超，差异有高度统计学意义。结论：结合X线钼靶和B超检查的深度学习在判断乳腺良恶性病变性质方面有一定的应用价值。

Abstract: Objective：To discuss the performance of deep learning in differential diagnosis of breast benign and malignant lesions on X-ray mammography and ultrasound imaging data.Methods：100 cases of mammary gland disease in patients with X-ray mammography and ultrasound data using back propagation neural network were analyzed，and the random samples of 50 cases as the training sample，composition training set，the rest of sample test set.The model of artificial neural network was established and the diagnostic results of the model was analysed.Results：100 cases of patients，breast malignant lesions were proved by surgery and pathology in 62 cases，other 38 cases were breast benign tumors or tumor-like lesions.The specific degrees，the sensitivity and accuracy are 89.5%，87.1% and 88.0% respectively in X-ray mammography，and 86.8%，83.9% and 85.0% in ultrasonography.By comparison，the specific degrees，the sensitivity and accuracy are 95.5%，96.4% and 96.0% respectively in neural networks，which was significantly higher than X-ray mammography and ultrasonography，which was highly significant difference.No obvious difference was found between X-ray mammography and ultrasonography.Conclusion：Deep learning based on the artificial neural network combined with X-ray mammography and ultrasonography has certain application value in differential diagnosis of breast benign and malignant lesions.

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更新日期/Last Update: 2018-11-30