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| **论文题目** | Performance and Reading Time of Automated Breast US with or without Computer-aided Detection | | |
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| **文章方向**  **（定位、路由等）** | **CAD、**automated breast(AB) **US、**breast cancer | **文章类型（理论、应用、模拟）** | 应用 |
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| **会议或者期刊名称** | Radiology 2019 | | |
| **作者所属研究团队**  **研究主页** | - | | |
| **摘要（中英和英文）** | **Background:**Computer-aided detection (CAD) systems may be used to help radiologists interpret automated breast (AB) US im-ages. However, the optimal use of CAD with AB US has, to the knowledge of the authors, not been determined.  **Purpose:**To compare the performance and reading time of different readers by using AB US CAD system to detect breast cancer in different reading modes.  **Materials and Methods:**In this retrospective study, 1485 AB US images (282 with malignant lesions, 695 with benign lesions, and 508 healthy) in 1452 women (mean age, 43.7 years; age range, 19–82 years) including 529 (36.4%) women who were asymptom-atic were collected between 2016 and 2017. A CAD system was used to interpret the images. Three novice readers with 1–3 years of US experience and three experienced readers with 5–10 years of US experience were assigned to read AB US images without CAD, at a second reading (after the reader completed a full unaided interpretation), and at concurrent reading (use of CAD at the start of the assessment). Diagnostic performances and reading times were compared by using analysis of variance.  **Results:**For all readers, the mean area under the receiver operating characteristic curve improved from 0.88 (95% confidence in-terval [CI]: 0.85, 0.91) at without-CAD mode to 0.91 (95% CI: 0.89, 0.92; P, .001) at the second-reading mode and 0.90 (95% CI: 0.89, 0.92; P = .002) at the concurrent-reading mode. The mean sensitivity of novice readers in women who were asymptom-atic improved from 67% (95% CI: 63%, 74%) at without-CAD mode to 88% (95% CI: 84%, 89%) at both the second-reading mode and the concurrent-reading mode (P = .003). Compared with the without-CAD and second-reading modes, the mean read-ing time per volume of concurrent reading was 16 seconds (95% CI: 11, 22; P, .001) and 27 seconds (95% CI: 21, 32; P,.001) shorter, respectively.  **Conclusion:**Computer-aided detection (CAD) was helpful for novice readers to improve cancer detection at automated breast US in women who were asymptomatic. CAD was more efficient when used concurrently for all readers. | | |
| **解决的问题** | Both the second-reading mode and concurrent-reading mode have the potential to improve novice readers’ performance for breast cancer screening on automated breast US images.  验证了使用CAD（计算机辅助系统）可以帮助医生解释乳腺超声图像（AB US），节省诊断时间。 | | |
| **解决问题面临的挑战或困难** | - | | |
| **解决问题创新点、大体思路和方法** | 创新点：将CAD应用到乳腺超声图像的判读上  大体思路和方法：原始数据来自2016年2月至2017年2月在中国西北某三级护理中心连续接受AB - US检查的所有女性，在其中筛选了1452名的检查图像用于研究。实验组医生分为三组，分别为：新手医生组、经验丰富医生组、新手医生和经验丰富医生组；实验组也分为三组，分别为：使用非CAD模式诊断、使用CAD中的second-reading模式诊断、使用CAD中的concurrent-reading模式诊断。两组医生在进行实验前都使用30张非研究集图像做了模拟训练，最后得出结论：使用CAD辅助医生观察AB US并做诊断可以在保证诊断效果的同时节省诊断时间。 | | |
| **启示** | **CAD主要是使用一组人工神经网络学习特征训练模型实现图像的自动判读，而深度学习本质上是深度神经网络，那如果将深度学习应用于超声图像的判读上，是不是也能够得到比较好的效果？** | | |