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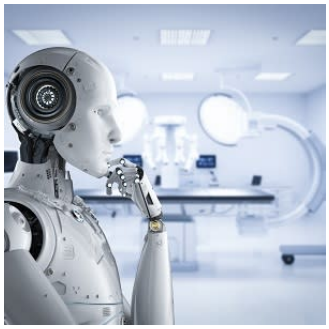
AI System Achieves Radiologist Accuracy in Detecting Breast Cancer from Ultrasound



On 24 September in *Nature Communications*, NYU and NYU Abu Dhabi researchers reported developing an artificial intelligence (AI) system with radiologist-level accuracy for identifying breast cancer in ultrasound.

Ultrasound is a critical tool used along with mammography for breast cancer screening, detection, and characterization. Compared to mammography, its advantages are low cost, lack of ionizing radiation, and real-time image evaluation. Moreover, ultrasound can also detect cancers in dense breast tissue, which is difficult mammographically. This is important because the breast cancer risk increases 4-fold with highly dense breast tissue. Thus, ultrasound often supplements mammography in breast cancer screening and serves as the primary imaging modality in some diagnostic settings.

Radiologists rely on lesion size, shape, margin, echogenicity, posterior acoustic features, and orientation to evaluate breast ultrasound. These features vary significantly across patients. This and intra-reader variability lead to many false-positive findings, which necessitate follow-up imaging and biopsy-based diagnostics. Accuracy may be improved by incorporating automated methods relying on machine learning can reduce some of the subjectivity innate in radiological analysis.

The clinician decision support tool in the report was trained on about 288,000 exams from over 140,000 patients examined between 2012 and 2019 at NYU Langone hospitals. The system was designed to identify malignant breast lesions while reducing the frequency of false-positive findings. The system determines a probability score for malignancy and then highlights associated portions of the ultrasound images leading to the prediction. To assess its accuracy, its performance was compared to that of ten board-certified radiologists, which produced equal performance. However, when radiologists used the tool, their false-positive rates and requested biopsies dropped by 37.3% and 27.8%, respectively, while maintaining the same sensitivity level. Diversity in patient age and breast densities did not affect the reliability of the AI system. This demonstrates that radiologists can significantly improve specificity in breast cancer detection when assisted by AI.

The study's authors add that this "highlights the potential of AI in improving the accuracy, consistency, and efficiency of breast ultrasound diagnosis."

Published on : Thu, 30 Sep 2021