

Analyzing the Advantages and Disadvantages of Artificial Intelligence in Breast Cancer Detection

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Overview

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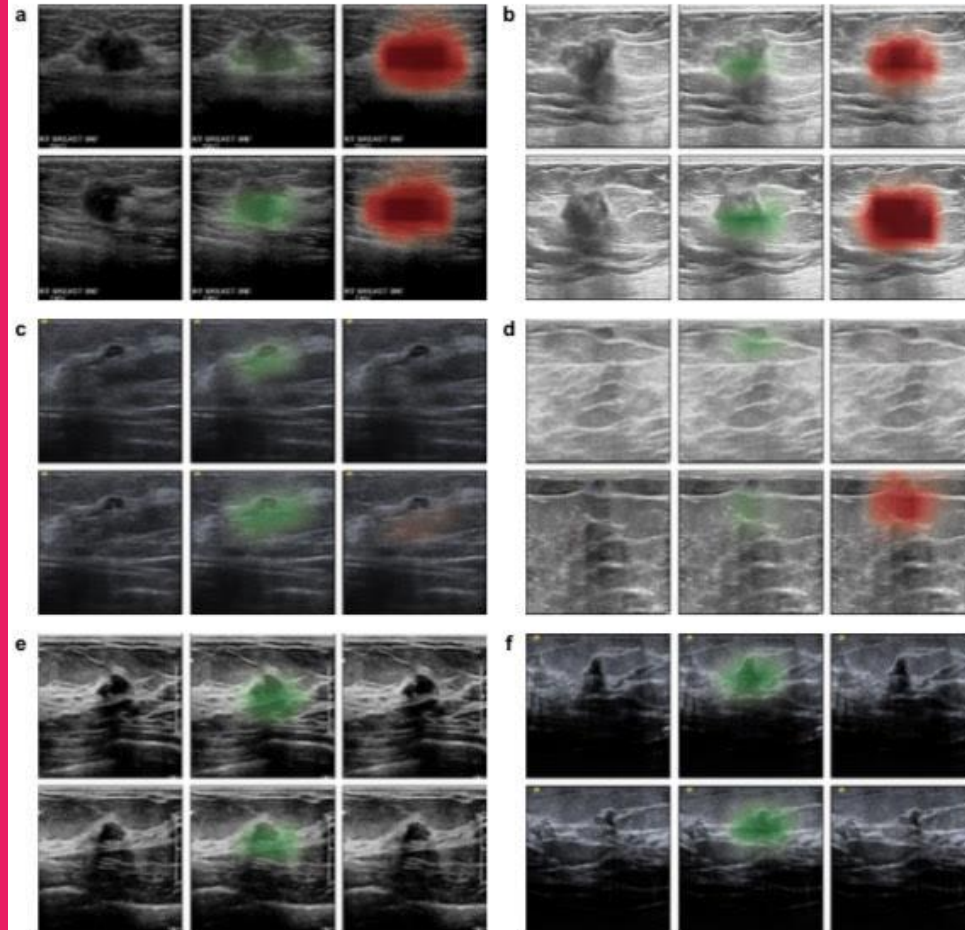
Motivation

The motivation behind this particular project is to bring awareness to false-positive breast cancer diagnosis. Women often face the devastating news of having such disease, but African American women particularly have faced far more deaths than any other race pertaining to breast cancer. With the help of Artificial Intelligence pairing with radiologists, the early detection can increase and false-positive diagnosis of breast cancer can decrease.

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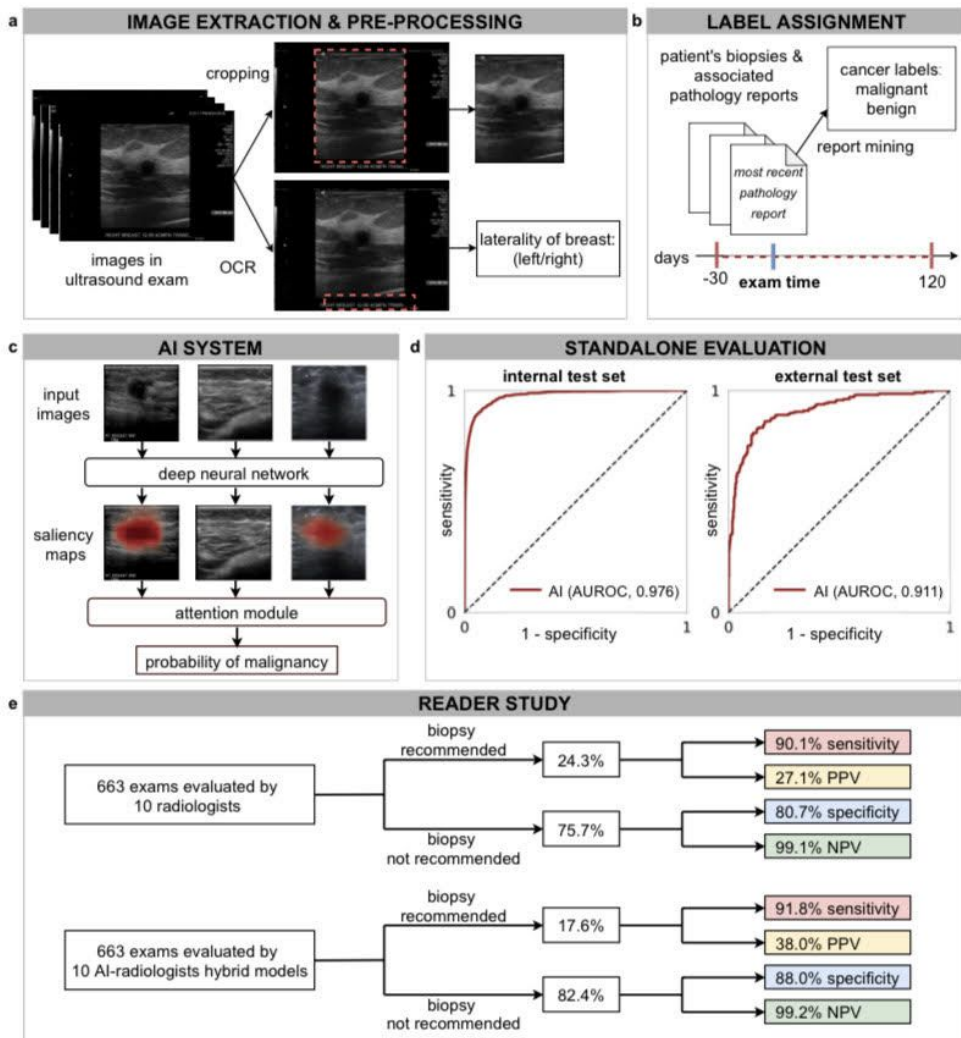
Model #1

Figure 1. Analysis of saliency maps on a qualitative level- This figure displays the sagittal and transverse views of the lesion (left) and the AI's saliency maps indicating the anticipated sites of benign (center) and malignant (right) findings in each of the six instances (a-f) from the reader study.



Model #2

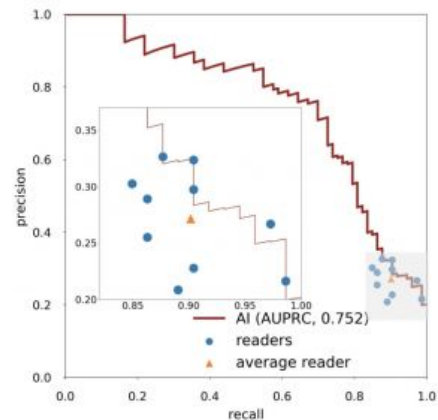
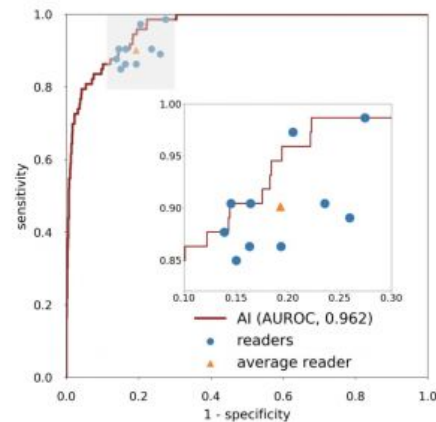
Figure 2. The probabilistic forecasts of each hybrid model were randomly divided to fit the reader's sensitivity. The dichotomization of the AI's predictions matches the sensitivity of the average radiologists. Readers' AUROC, AUPRC, specificity, and PPV improve as a result of the collaboration between AI and readers, whereas biopsy rates decrease.



Results

The AI system was shown to perform comparably to board-certified breast radiologists in the reader study subgroup. In this reader research, the AI system detected tumors with the same sensitivity as radiologists, but with greater specificity, a higher PPV, and a lower biopsy rate

Figure 3. A hybrid AI-radiologist model reduced false positive rates of malignancy by 37.4 percent, according to the findings. This indicates that the number of requested biopsies would be reduced by 27.8% while keeping the same degree of sensitivity as radiologists.



Conclusion

According to the findings of the reader survey, such teamwork between AI systems and radiologists increases diagnosis accuracy and decreases false positive biopsies for all 10 radiologists. This research indicated that integrating the Artificial intelligence system's predictions enhanced the performance of all readers.

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Takeaways from the REU Experience

This REU Experience has been nothing short of informative and amazing! The instructors of this program helped my peers and I understand and utilize programs such as: Python, R Studio, NanoHub, Github, Machine Learning techniques, Google Collab, data analysis, and many more! The guest lecturers, consistent recordings of lectures, and the learning modules using real world data was such an eye opener! This particular program has broadened my knowledge of Artificial Intelligence collectively.

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