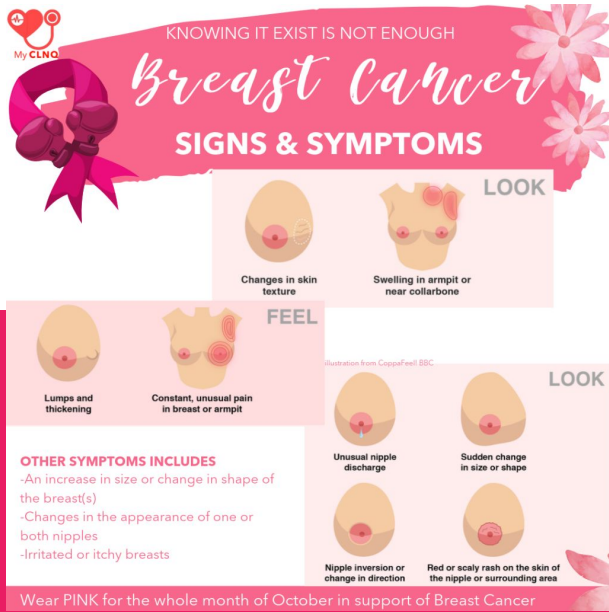


Analyzing the Advantages and Disadvantages of Artificial Intelligence in Breast Cancer Detection



RonDaisja Dunn
NSF FG-LSMAP REU Data Science and AI Across the Alliance
Albany State University





Overview

- ❖ Project's Motivation
 - ❖ Models
- ❖ Results from Literature Review
 - ❖ Conclusion
- ❖ Takeaways from the REU Experience

Motivation

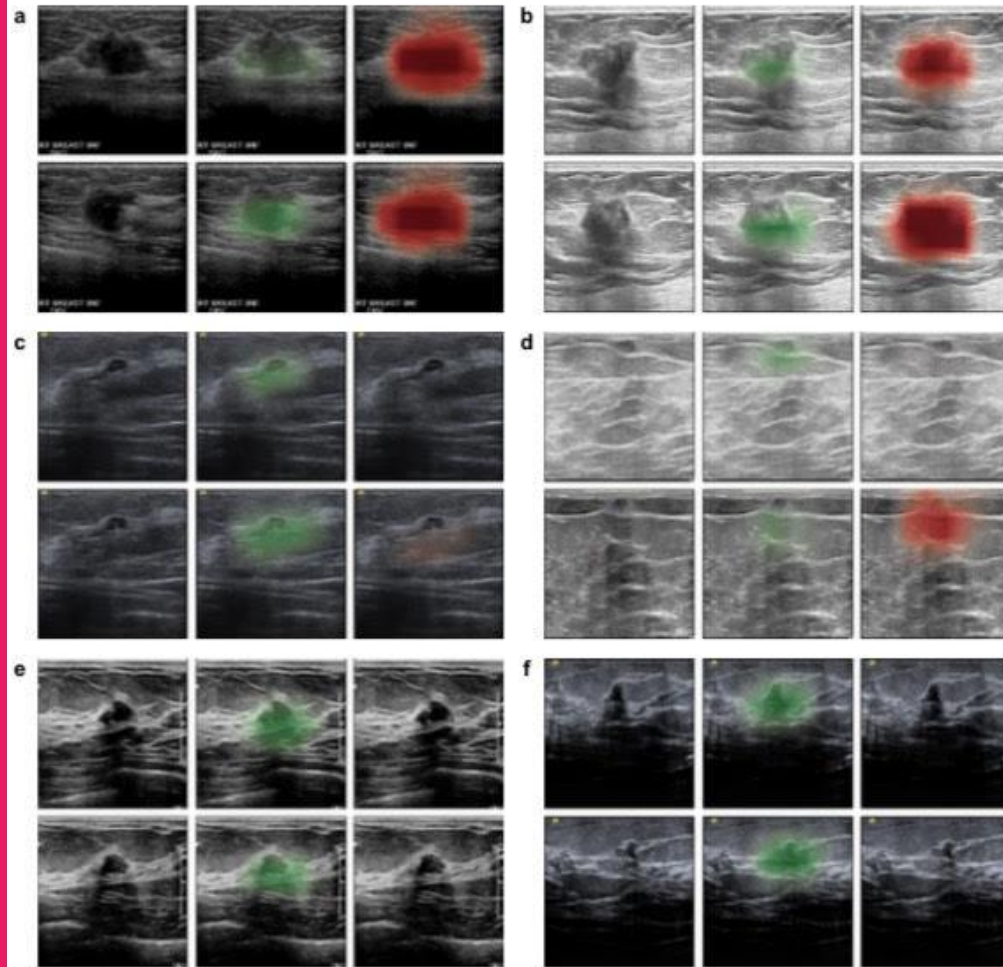


The motivation behind this particular project is to bring awareness to false-positive breast cancer diagnosis. Women often face the devastating news of having such disease, but African American women particularly have faced far more deaths than any other race pertaining to breast cancer. With the help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

— — —

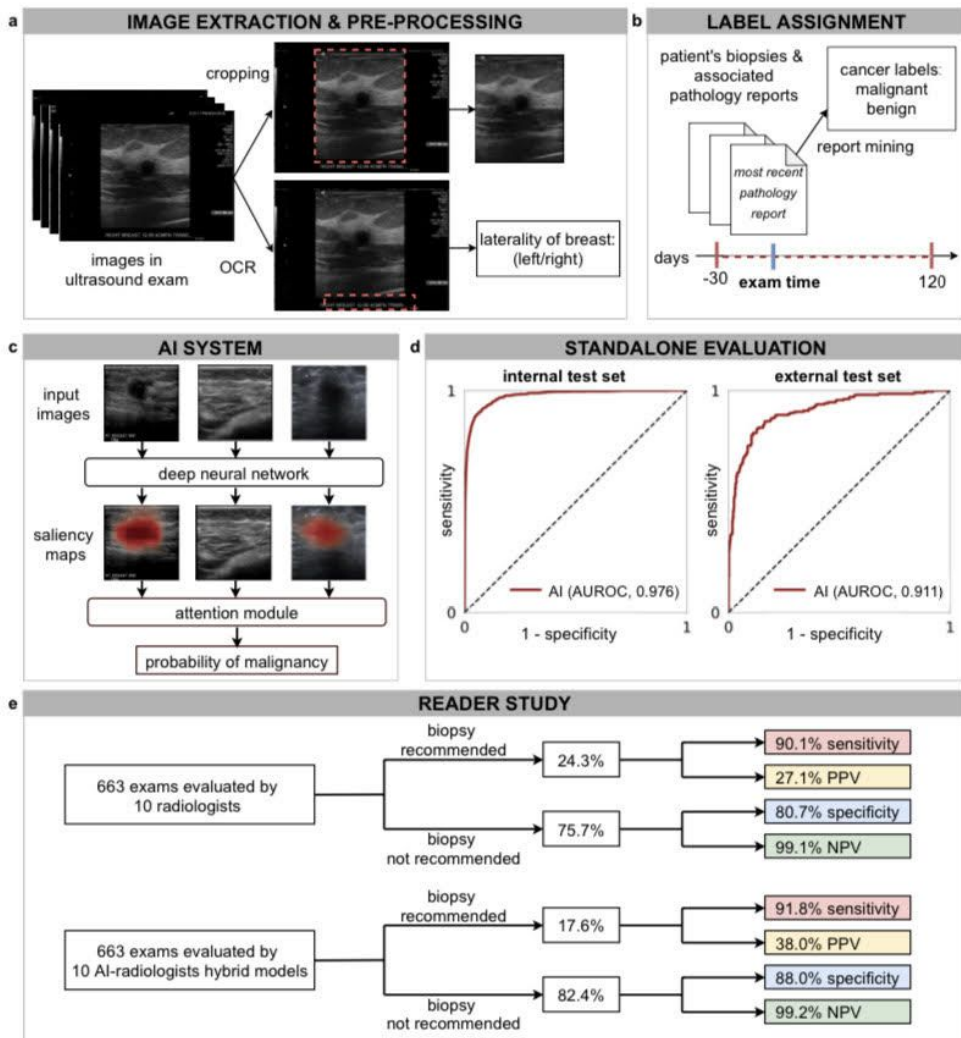
Model #1

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.



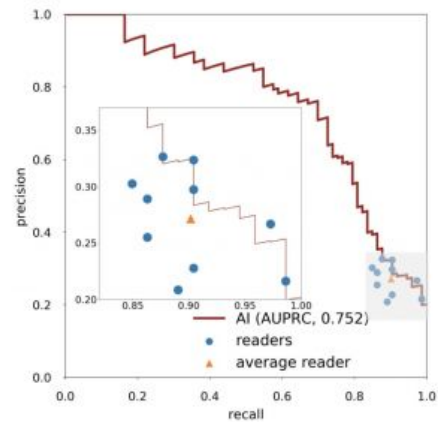
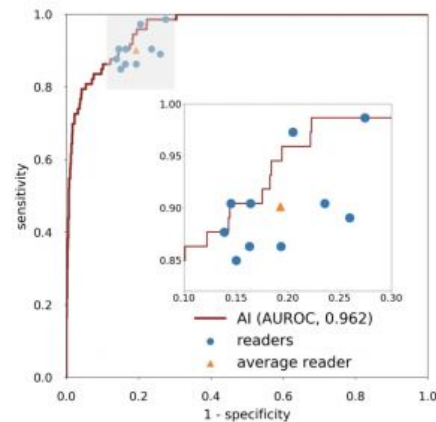
Model #2

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 rates.



Conclusion



According to the findings of the reader survey, the main advantage of AI in breast cancer detection is that such teamwork between AI systems and radiologists increases diagnosis accuracy and decreases false positive biopsies for all 10 radiologists. The disadvantage of AI in breast cancer detection is that AI is still relatively new and isn't completely error-free. This research indicated that integrating the Artificial intelligence system's predictions enhanced the performance of all readers.

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, Visual 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.

Acknowledgments

Thank you to the extremely intellectual, informative, patient and courteous instructors of the Research Experience for Undergraduates Program.

Carlos Theran (REU Instructor), Yohn Jairo Parra (REU Instructor), Gregor von Laszewski (REU Instructor), Victor Adankai (Graduate Student), REU Peers, Florida Agricultural & Mechanical University, and Albany State University.