

# PhD Open Days 2020

Poster



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# Medical Imaging Multimodality Annotating Framework



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1.

# Motivation

Why Cancer? Why Medical Imaging?

# Early Detection

Cancer mortality can be reduced if cases are detected and treated early.



2.

## HCI in Healthcare

Diagnostic systems have also been studied under the HCI field.

## HCI in Healthcare

- » Supporting the image search UX through novel UIs [1, 2]
- » Medical imaging technologies to support radiologists [3]
- » Systems that assist radiologists in image interpretation [4, 5]

1 Koutsabasis, P. and Domouzis, C.K., 2016, June. Mid-air browsing and selection in image collections. In Proceedings of the International Working Conference on Advanced Visual Interfaces (pp. 21-27).

2 Lee, B., Srinivasan, A., Stasko, J., Tory, M. and Setlur, V., 2018, May. Multimodal interaction for data visualization. In Proceedings of the 2018 International Conference on Advanced Visual Interfaces (pp. 1-3).

3 Woźniak, P., Romanowski, A., Yantaç, A.E. and Fjeld, M., 2014, October. Notes from the front lines: lessons learnt from designing for improving medical imaging data sharing. In Proceedings of the 8th Nordic Conference on Human-Computer Interaction: Fun, Fast, Foundational (pp. 381-390).

4 Cai, C.J., Winter, S., Steiner, D., Wilcox, L. and Terry, M., 2019. "Hello AI": Uncovering the Onboarding Needs of Medical Practitioners for Human-AI Collaborative Decision-Making. Proceedings of the ACM on Human-computer Interaction, 3 (CSCW), pp.1-24.

5 Oram, L., MacLean, K., Kruchten, P. and Forster, B., 2014, June. Crafting diversity in radiology image stack scrolling: control and annotations. In Proceedings of the 2014 conference on Designing interactive systems (pp. 567-576).

3.

## Medical Imaging

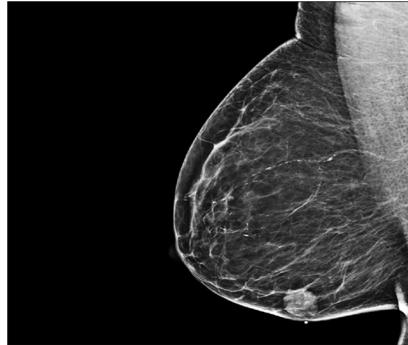
How to improve and support medical imaging?

Machines that can **learn**  
with new **data** from  
clinicians' experience.

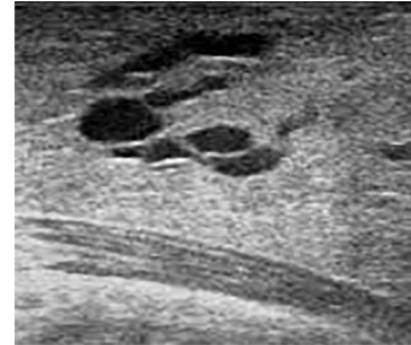


## Multimodality Annotating Framework

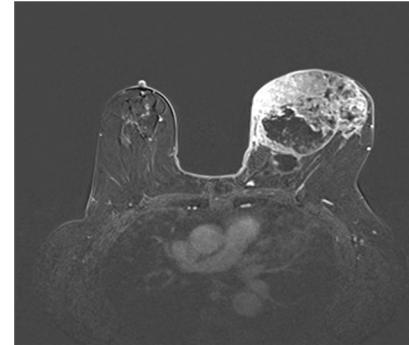
MammoGraphy  
**(MG)**



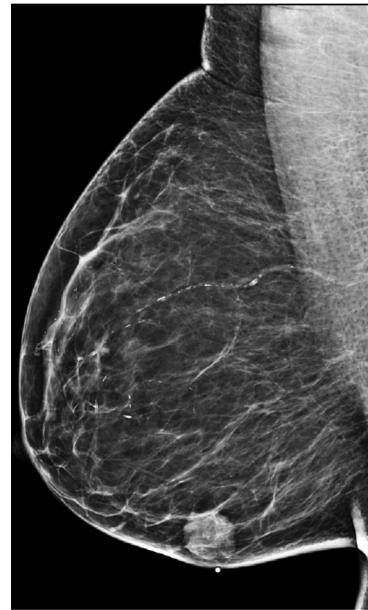
UltraSound  
**(US)**



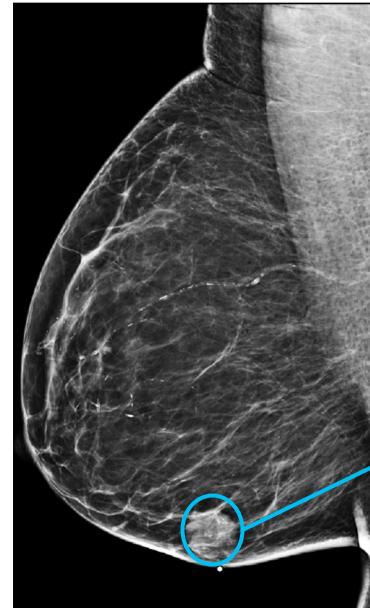
Magnetic Resonance Imaging  
**(MRI)**



## Medical Annotations



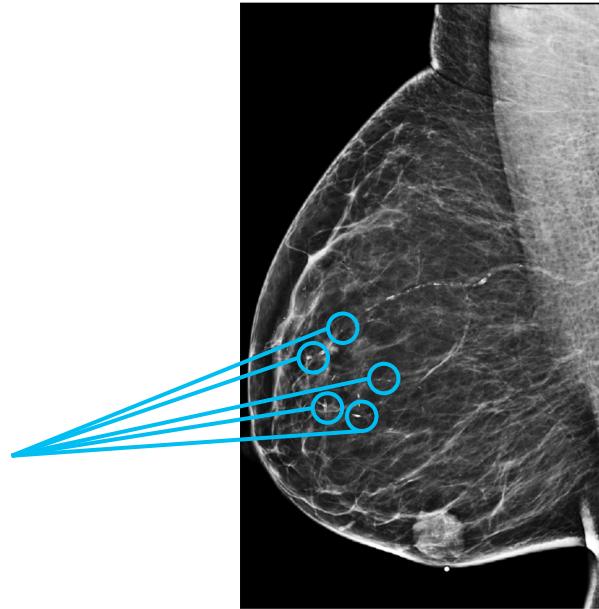
## Medical Annotations



Masses

## Medical Annotations

Microcalcifications

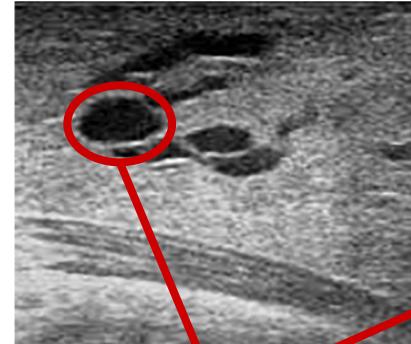


## Multimodality Annotating Framework

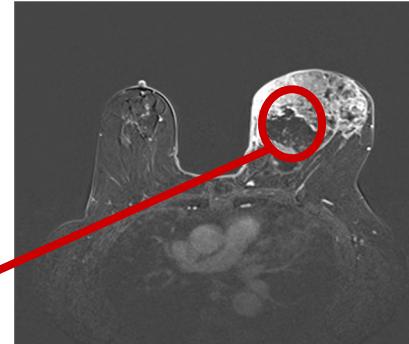
MammoGraphy  
**(MG)**



UltraSound  
**(US)**



Magnetic Resonance Imaging  
**(MRI)**



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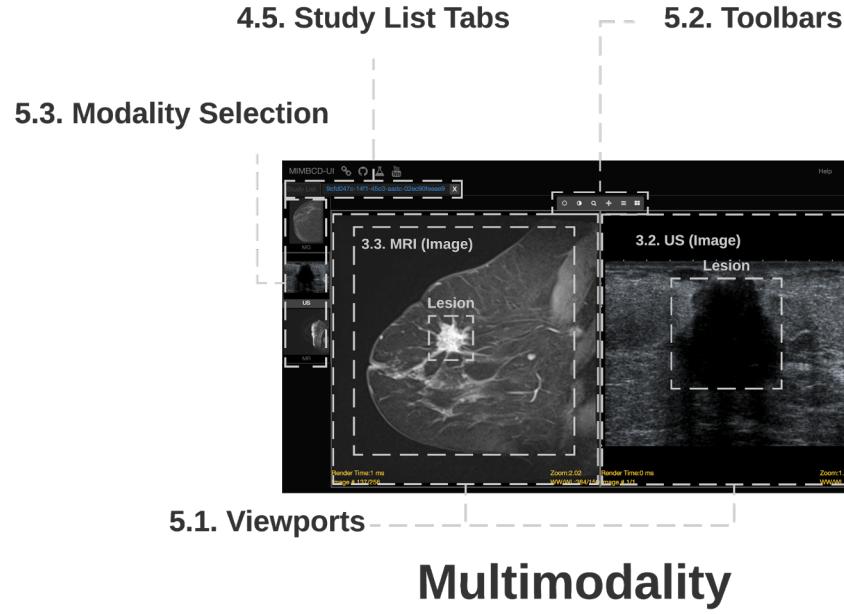
**Lesions**

4.

## BreastScreening

A medical imaging visualization framework to be evaluated  
in a realistic clinical scenario.

## User Interface

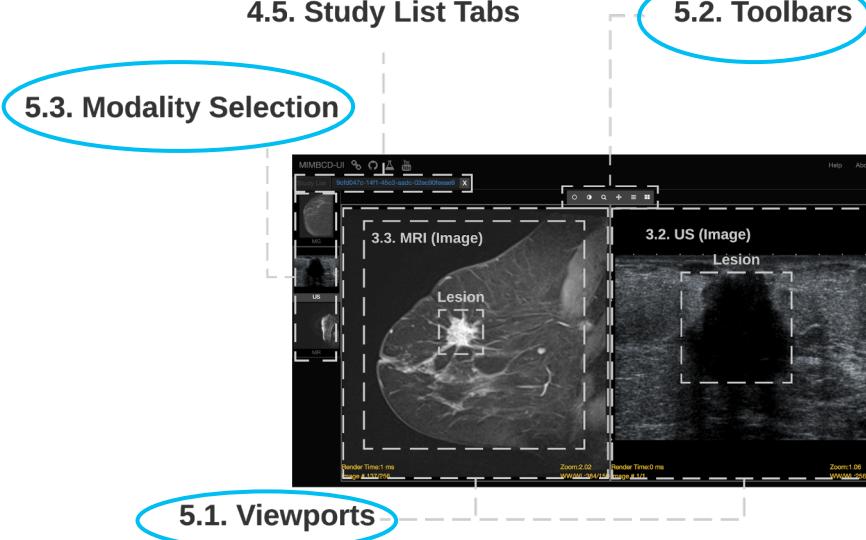


## User Interface



Multimodality

## User Interface



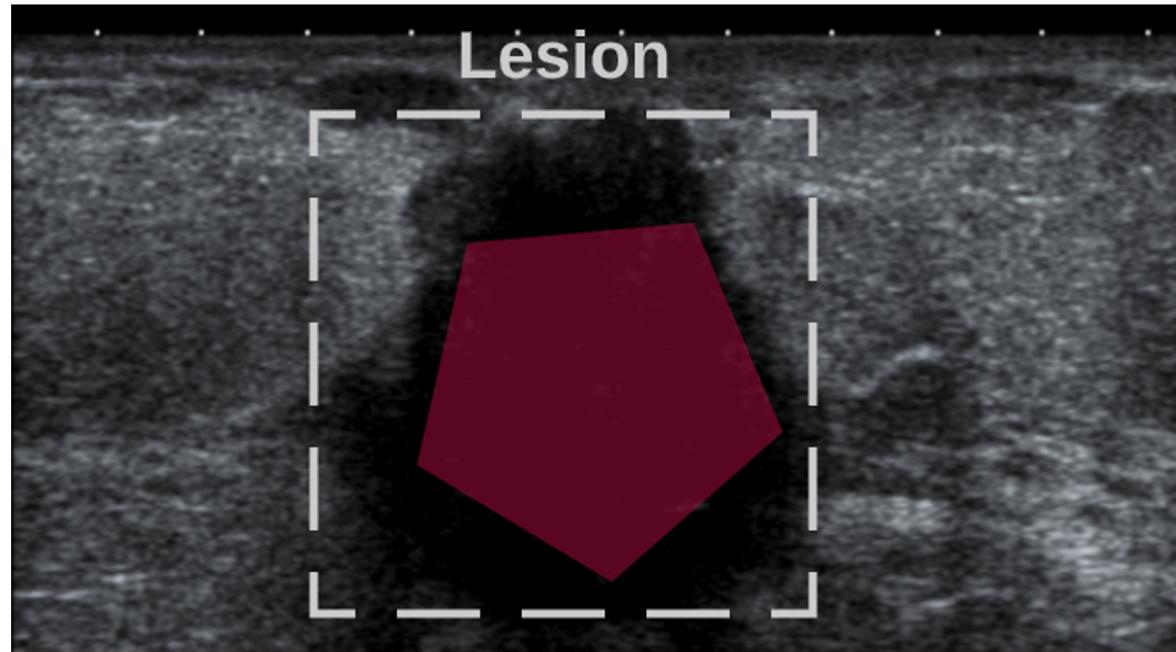
Multimodality

5.

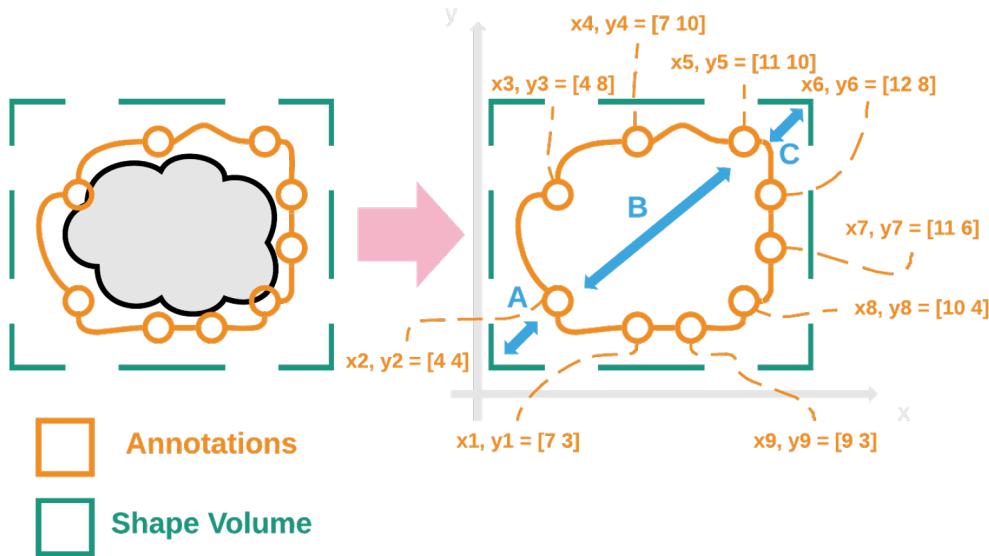
## Medical Annotations

Lesion annotations among the breast cancer disease.

## Image Segmentation



## Lesion Labels



## Dataset Generation



# 6.

## Conclusion

The contributions and conclusions of our work.

## Contributions & Conclusions

- » New medical imaging framework supported by an interactive UI;
- » Development of a framework to generate a standardized dataset of medical imaging annotations;
- » Providing clinicians a novel tool for the production of several qualified datasets;
- » Fostering clinicians' sharing and collaborative diagnostic by developing a distributed and remote framework;

# Thank you!

## Information



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*The paradigm shift of the ImageNet thinking is that while a lot of people are paying attention to models, let's pay attention to data. Data will redefine how we think about models.*

- Li Fei-Fei