A Deep Learning-based Framework for Registration of Faxitron and Histopathology Images of the Breast

Negar Golestani

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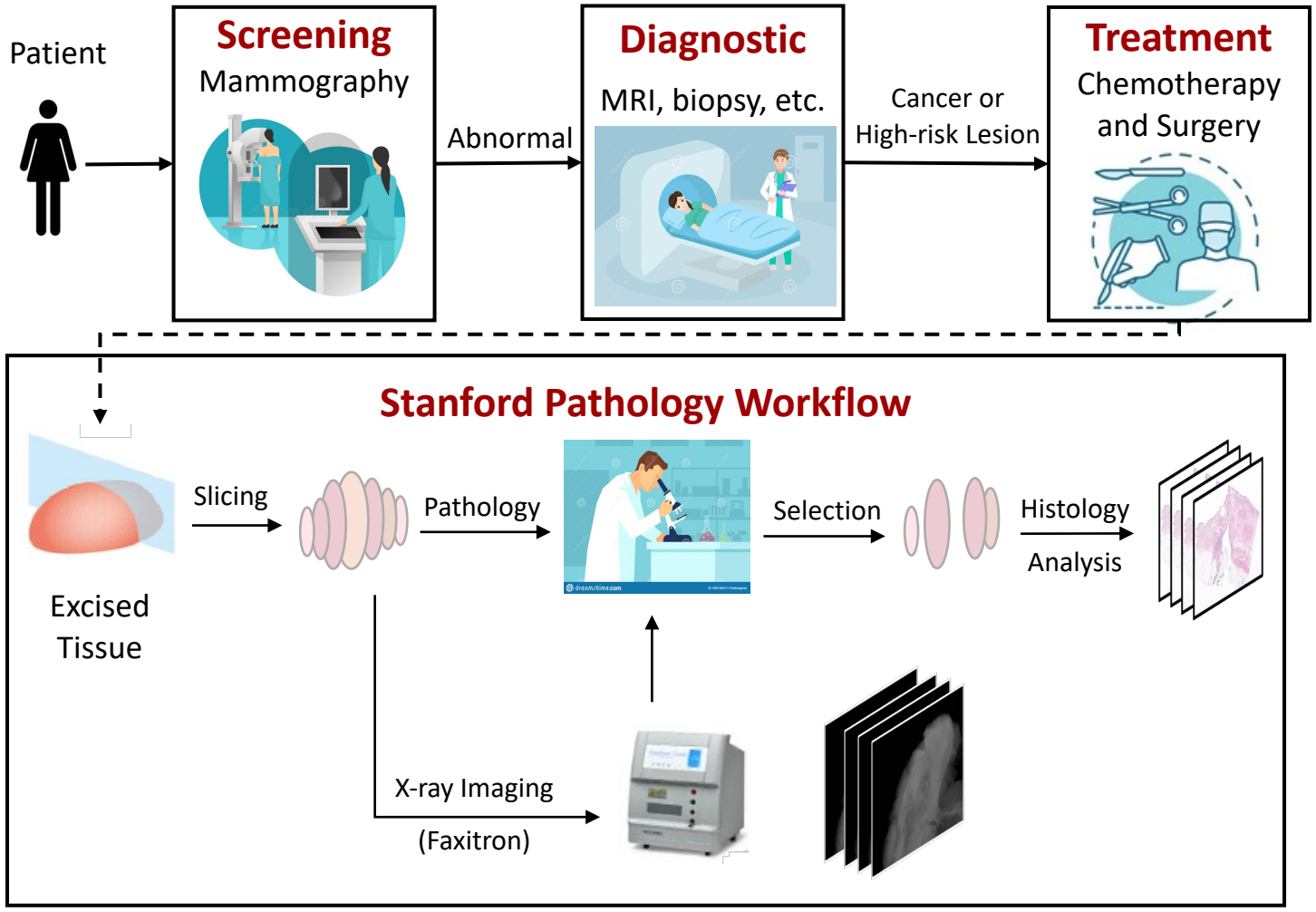
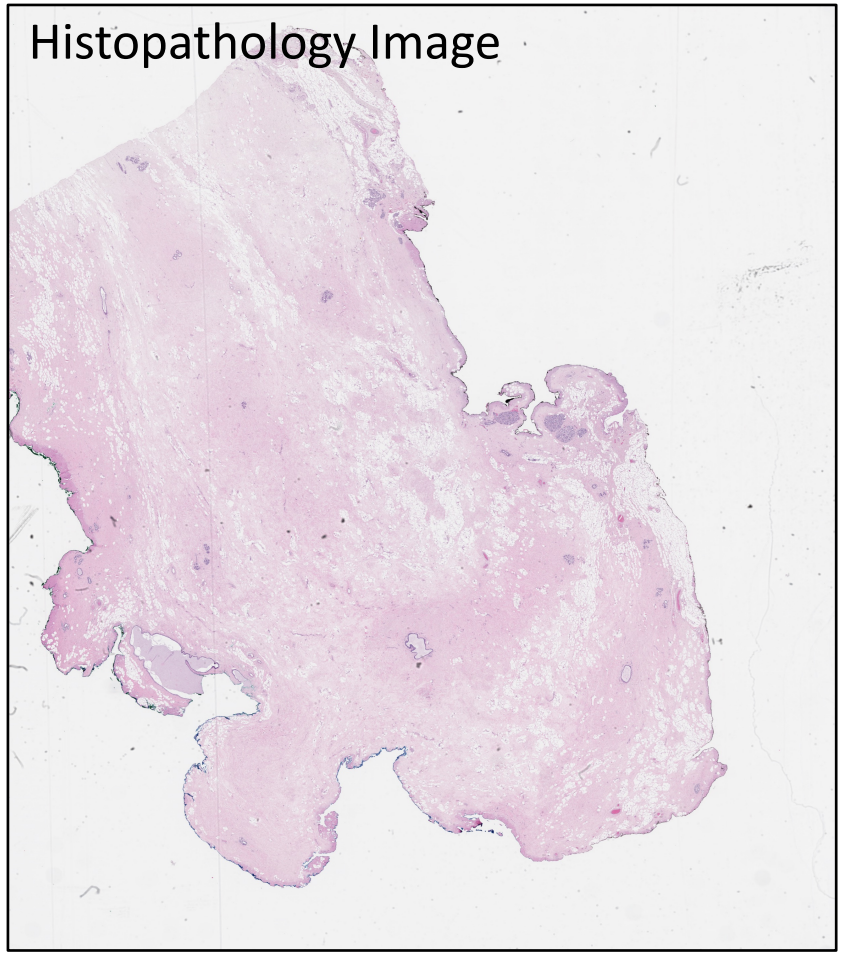
Introduction

- **One woman in eight** with invasive **breast cancer** over her lifetime
  - In 2022, estimated 287,850 new cases and 43,250 deaths among women in the US*
- **Neoadjuvant chemotherapy** for treatment before surgical excision
  - helps reduce recurrence risk, extent of surgery, and post-operative complications
- After surgery, **study excised tissue** to **assess treatment**
  - **Presence and extent** of residual invasive cancer is a strong **prognostic factor** for risk recurrence

Pathology Workflow





- Photos: https://www.vectorstock.com, https://www.dreamstime.com

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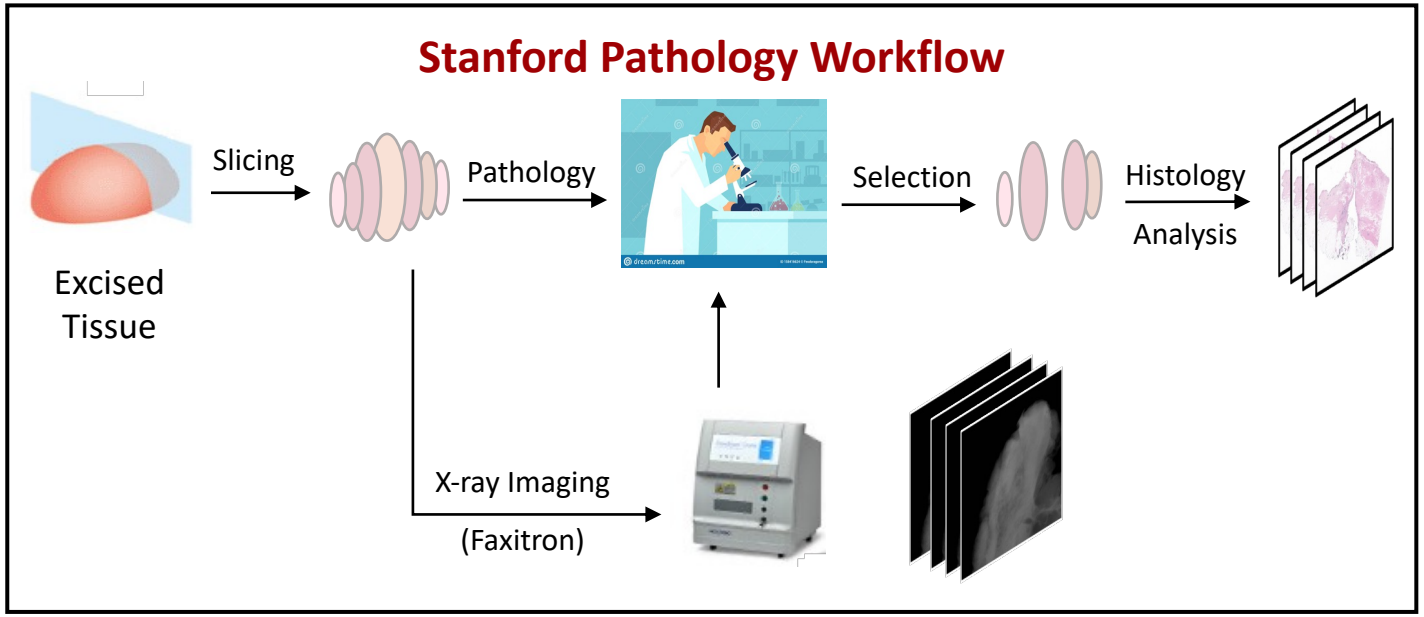
Motivations



- **Automatic identification** of **invasive** and **in situ** carcinoma on **faxitron** radiographs of excised tissue using AI methods
  - Improve process of specimen evaluation
  - Select regions with high likelihood of invasive cancer for histologic evaluation more accurately and efficiently

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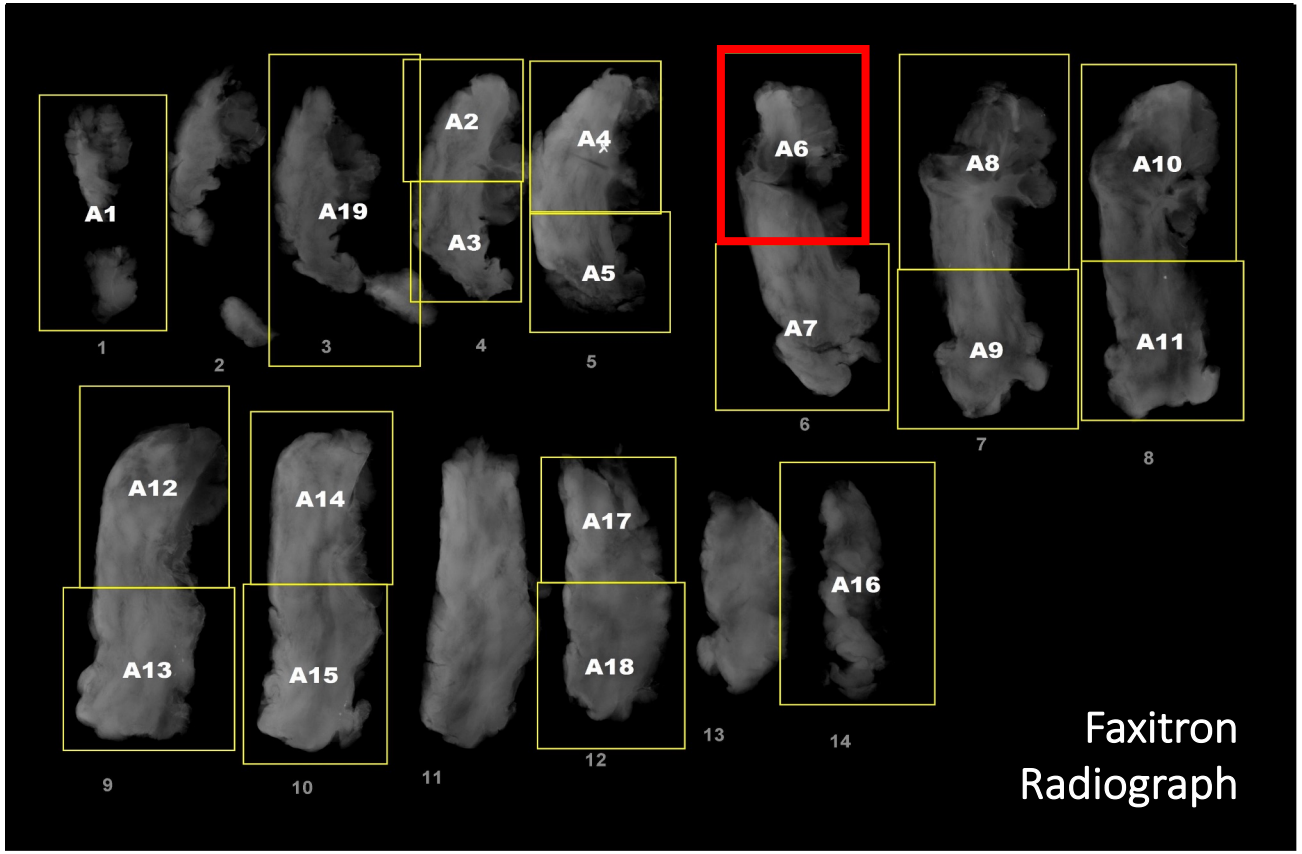
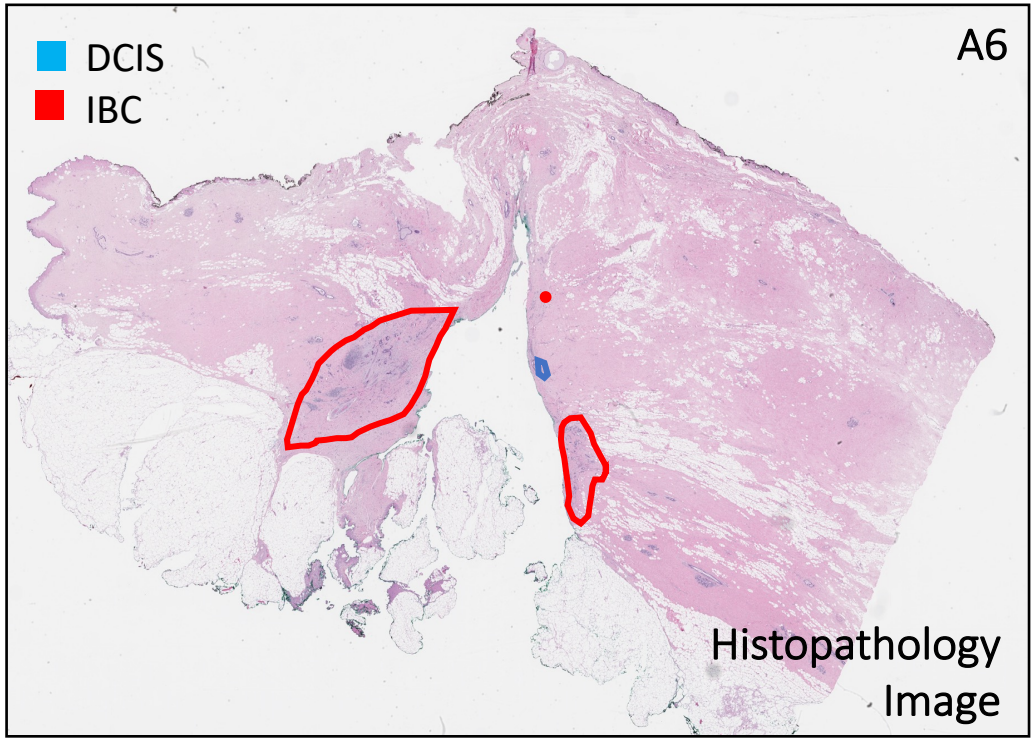
Data

- Data of 100 women, including Faxitron radiographs and Histopathology slides





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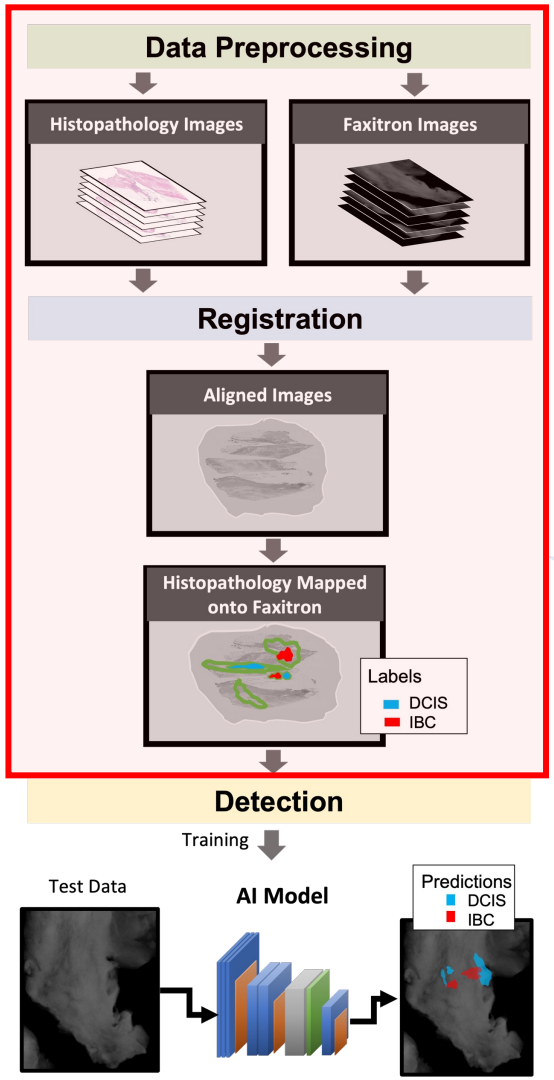
Framework



Data Preprocessing

Prepare faxitron and histopathology images.

Registration

Create accurate spatial ground truth labels of DCIS and IBC on Faxitron radiographs.

Detection

Develop AI models to detect the extent DCIS and IBC on Faxitron radiographs.

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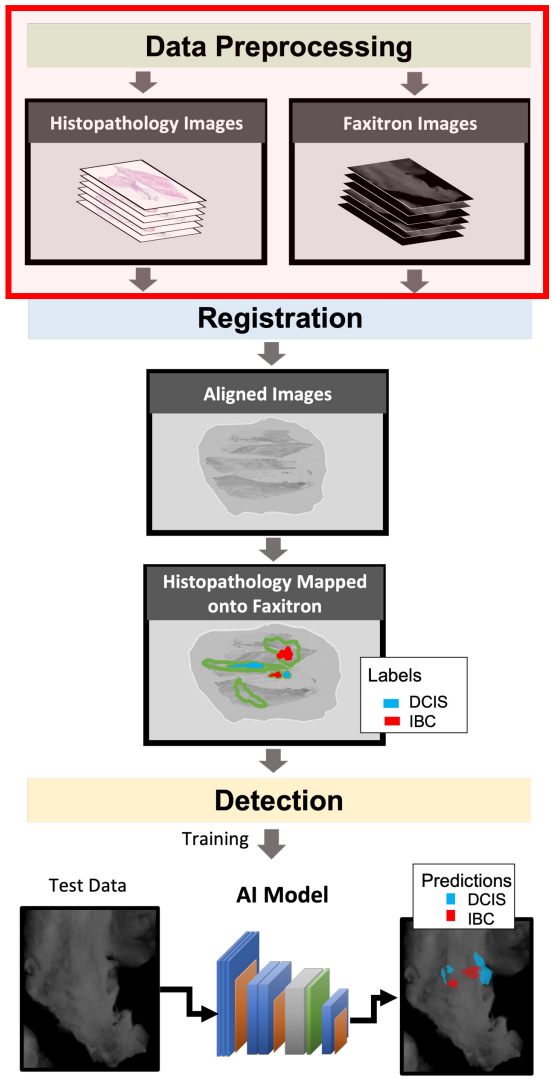
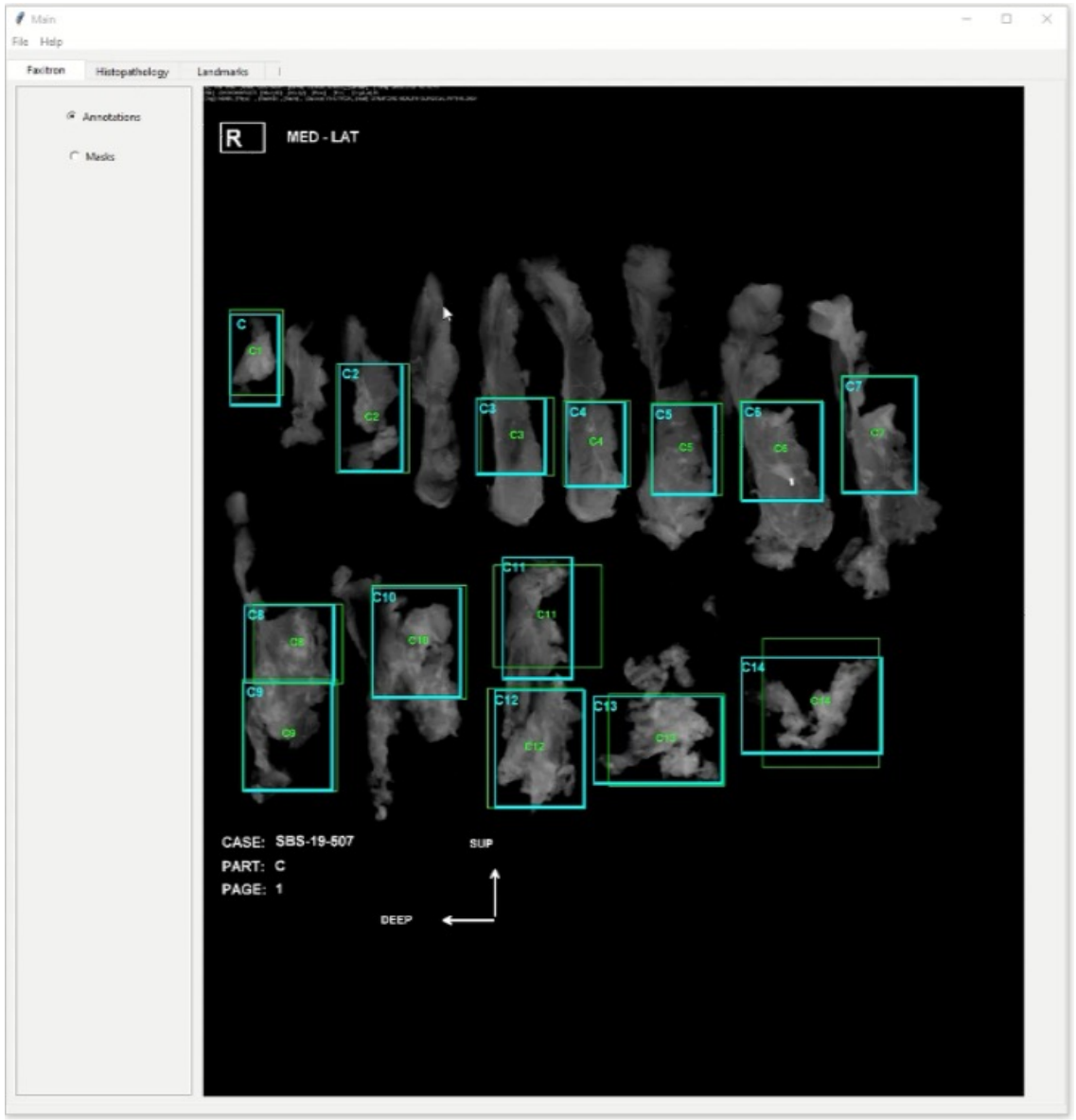
Data Preprocessing





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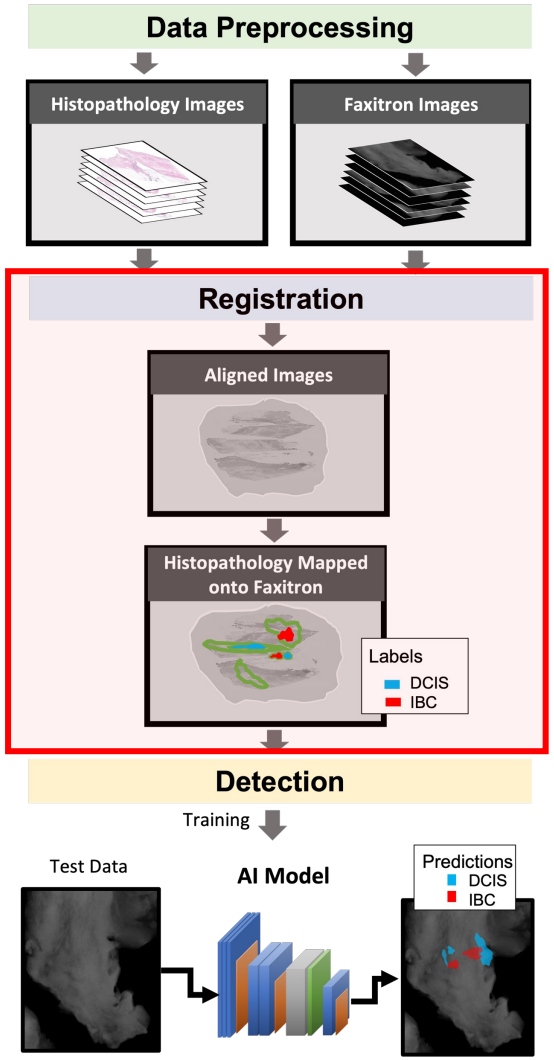
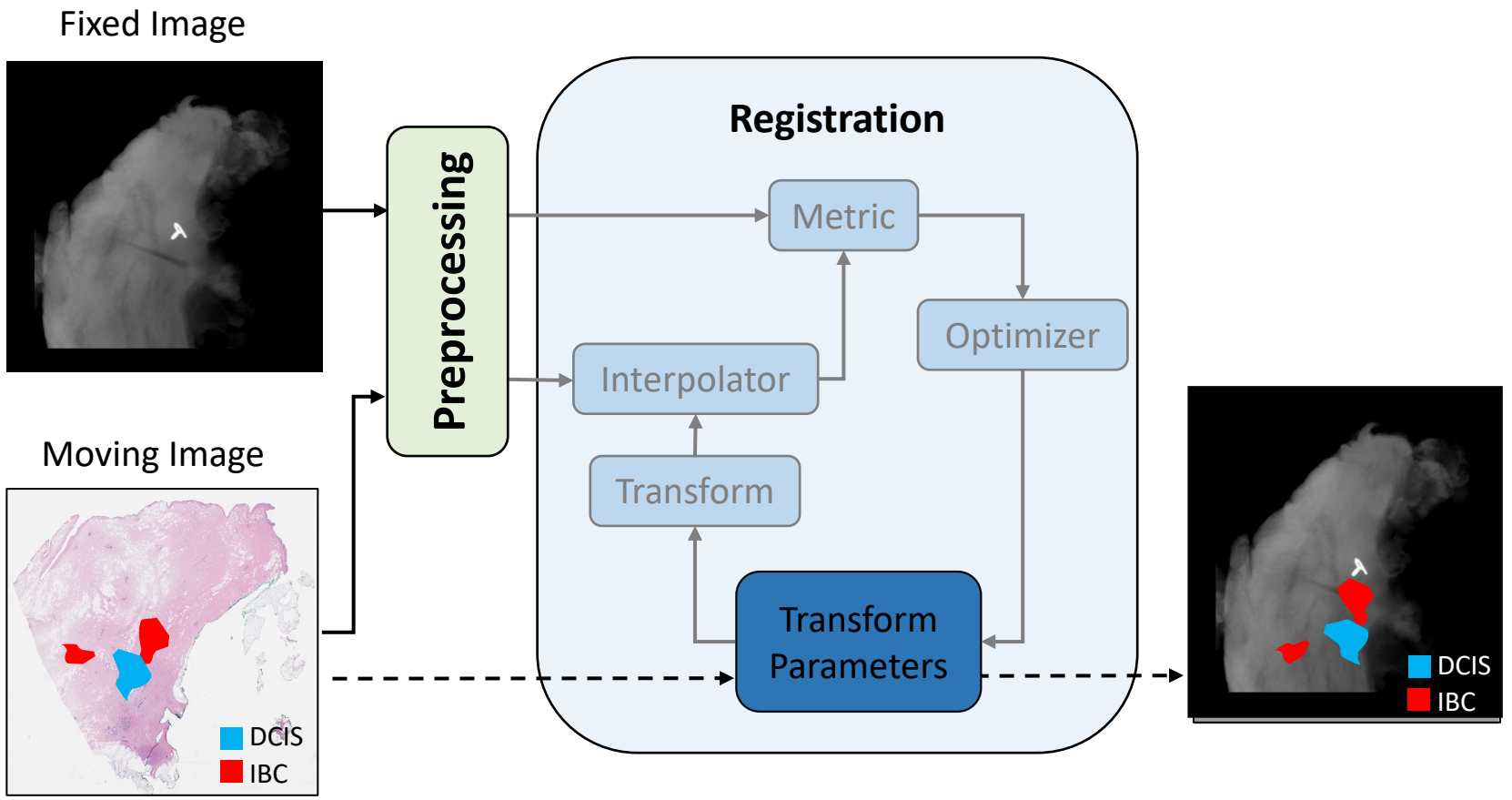
Registration





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Thank You!



Dr. Mirabela Rusu
Assistant Professor of Radiology

Dr. Bruce Daniel
Professor of Radiology

Dr. Gregory Bean
Assistant Professor of Pathology

Aihui Wang
Life Science Research Professional I, Pathology

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