

Biomedical Data Solutions LLC

Convolutional Neural Networks and Deep Learning for Malignant Cell Detection in Breast Tissue



Presented by
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BA in Biochemistry and Microbiology (University of Nebraska - Lincoln, 2019)

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Presentation Outline

Today's Topics

Overview of Breast Cancer Pathology >

Stakeholder/Business Problem >

Data >

Methods/Results >

Business Solutions & Recommendations >

Limitations/Next Steps >

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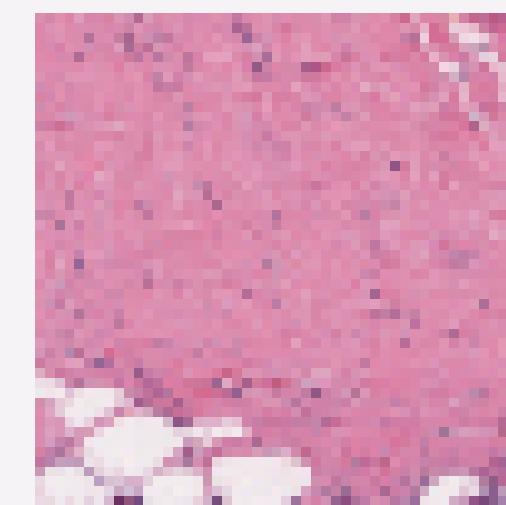
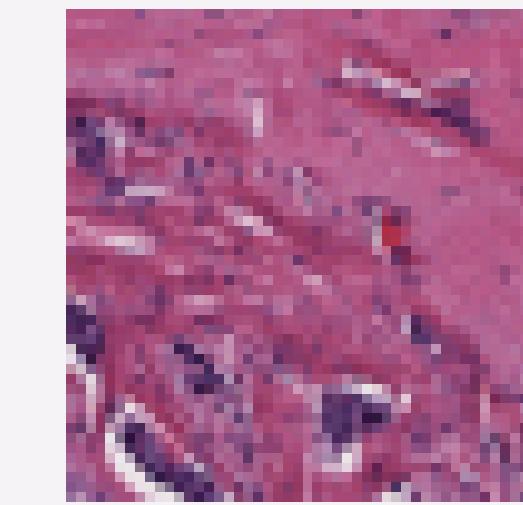
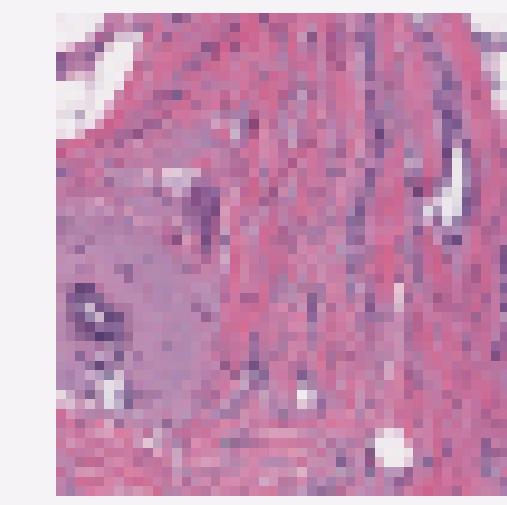
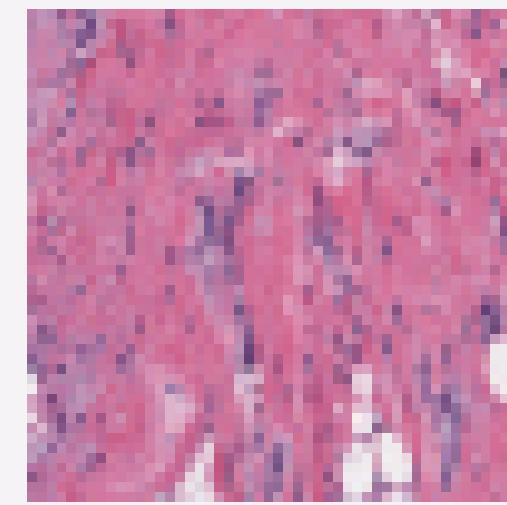
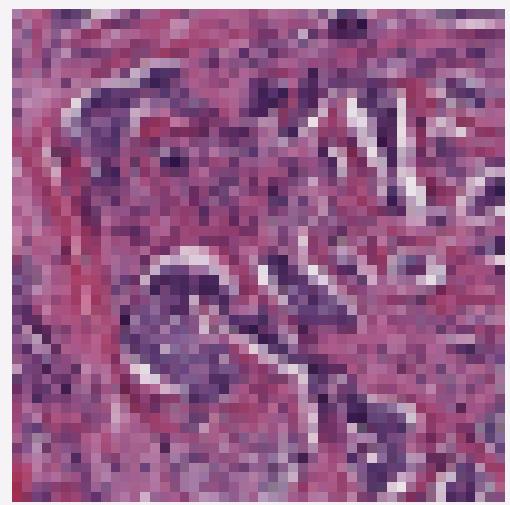
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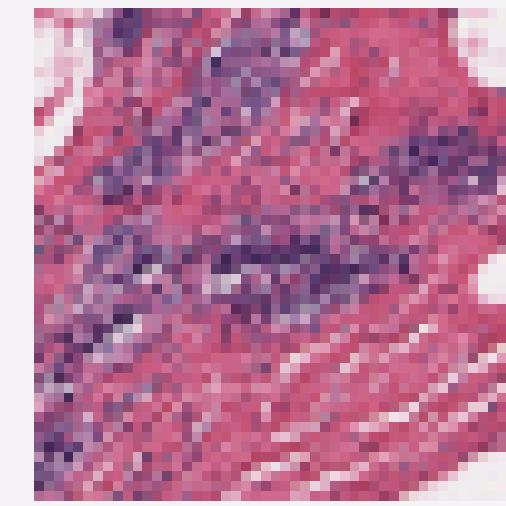
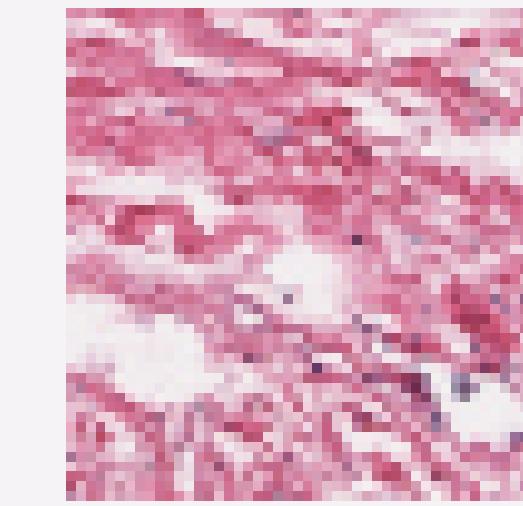
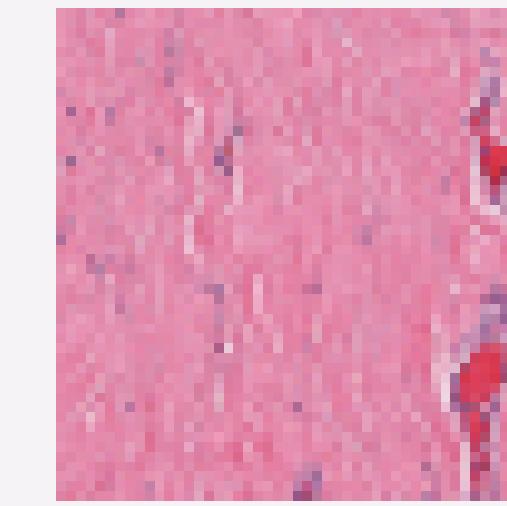
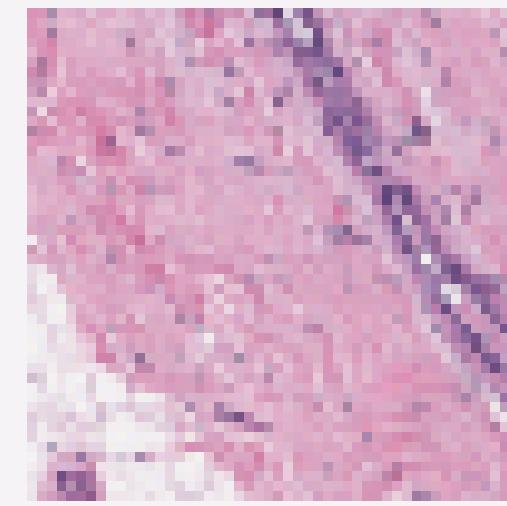
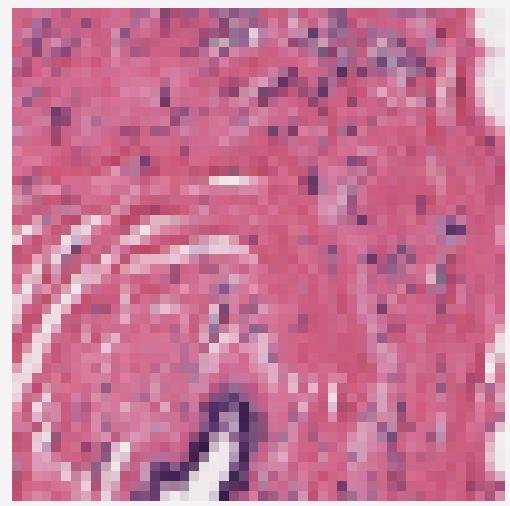
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Overview of Breast Cancer Pathology

Normal



Cancerous





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Stakeholder & Business Problem



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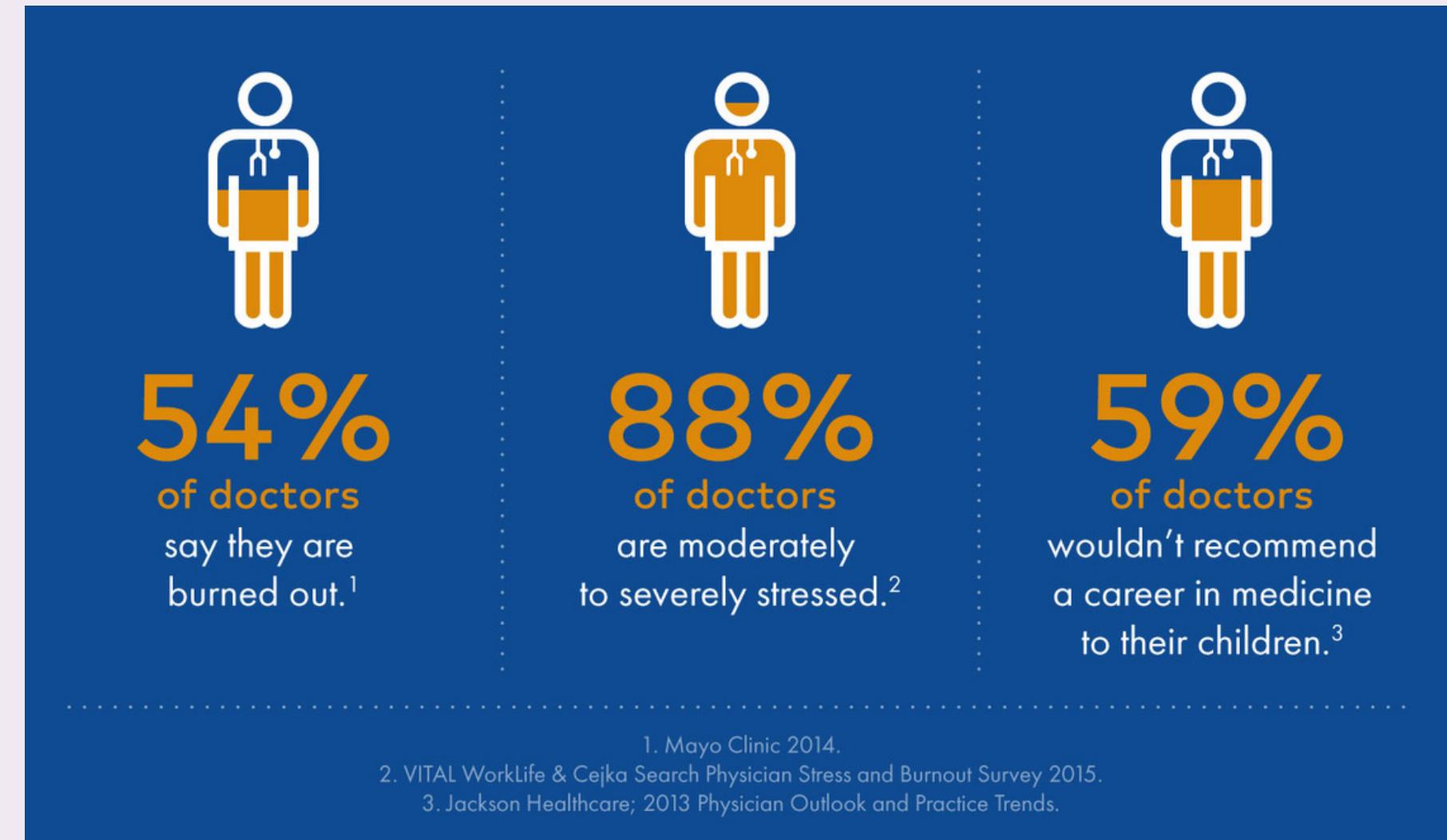
Business Problem

● ○ ○ Physician burnout

- High Stakes = High Stress
- Overworked

● ● ○ Cancer Biopsies

- Unclassified scans
- Misclassification of cells



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Data Overview

Data Overview

3 SETS:

Train

Normal: 2,943 images
Cancer: 3,920 images

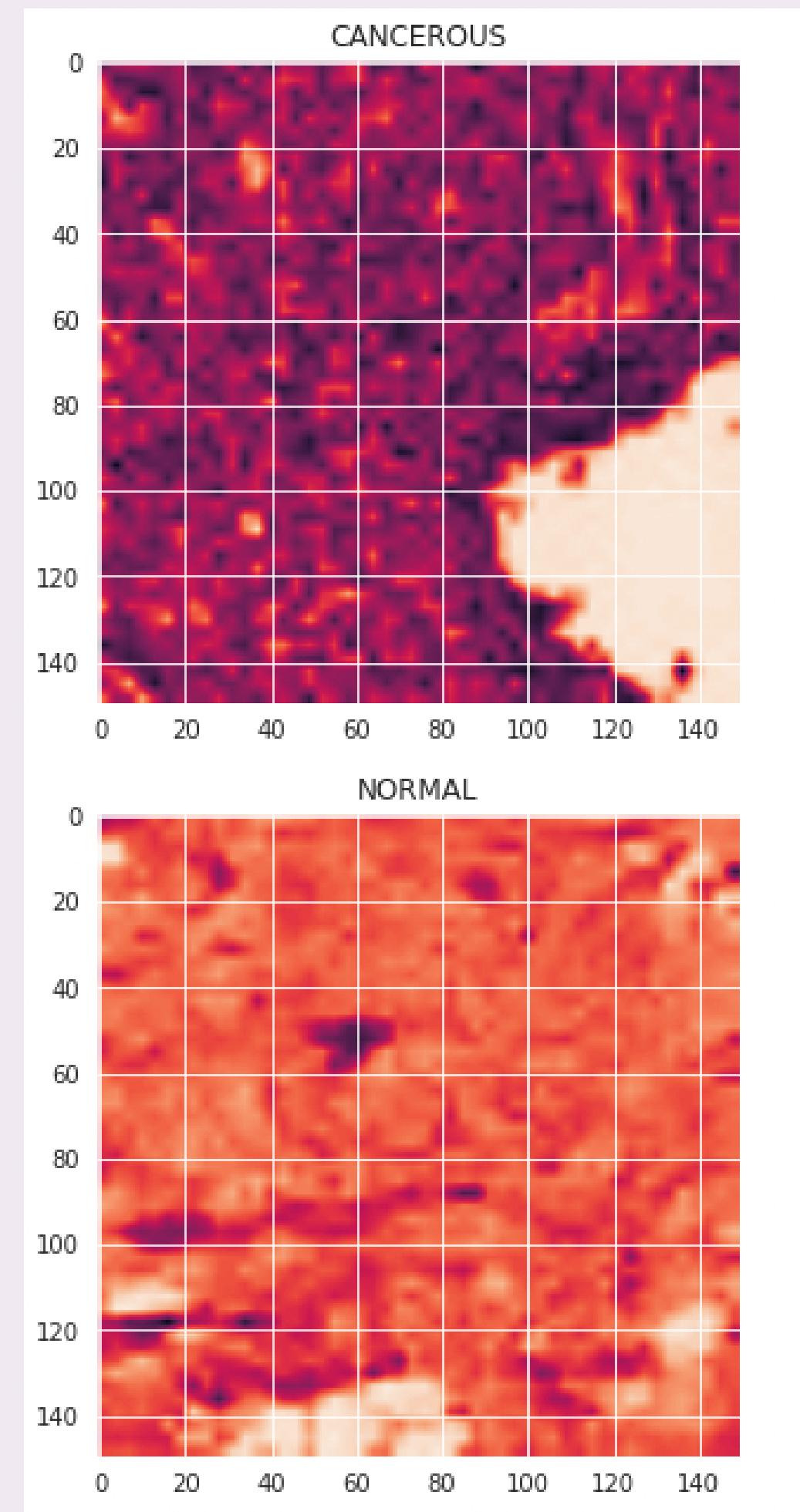
Test

Normal: 773 images
Cancer: 208 images

Validation

Normal: 65 images
Cancer: 44 images

**Data Generation and
Image Augmentation: 555,903 images**



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Modeling & Results



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PATHOLOGY SERVICES**

Modeling

1 . CLASSIFICATION MODEL :

LOGISTIC REGRESSION

0 = NORMAL ,

1 = CANCEROUS

2 . DEEP LEARNING MODEL :

CONVOLUTIONAL NEURAL NETWORK



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PATHOLOGY SERVICES**

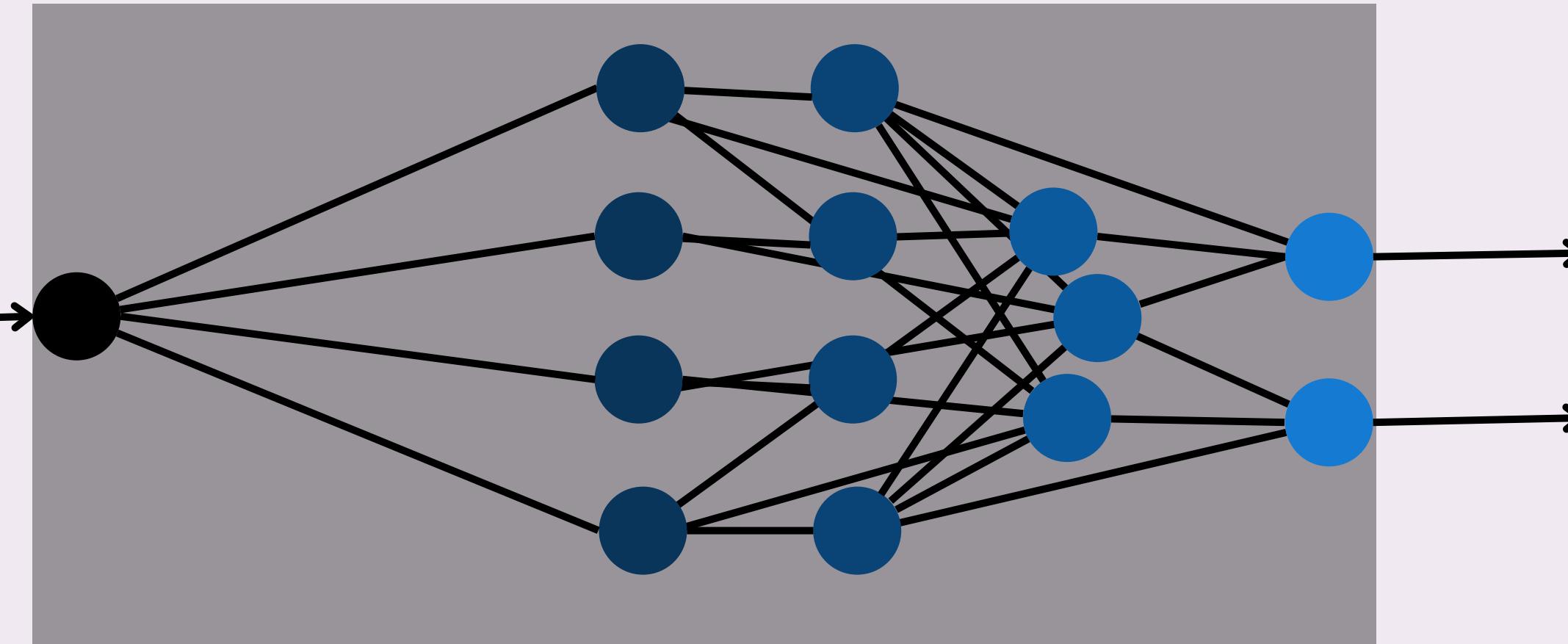
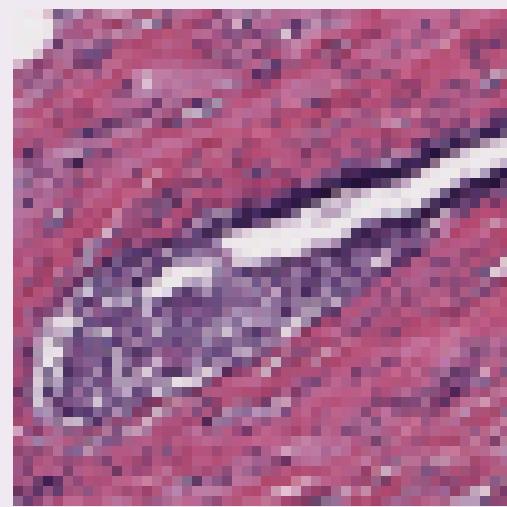
Logistic Regression - Baseline Model

Accuracy = 83%

Limitation:

22% of misdiagnoses were
False Negatives (Bad)

Convolutional Neural Network



Accuracy: 90%

Recall: 89%

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Business Solutions & Recommendations



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Recommendations

- 1. PRELIMINARY DETECTION TECHNIQUE :**
 - SAVES TIMES
 - REDUCES WORKLOAD/BURNOUT
 - FOCUS ON WHAT MATTERS

- 2. FAIL-SAFE CHECK:**
 - REDUCES STRESS
 - FEWER MISTAKES AND MISDIAGNOSIS

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Limitations/Next Steps



LIMITATIONS

- LIMITED COMPUTING CAPACITY/TIME
- DEMOGRAPHIC INFORMATION
- EXCLUSIVELY BREAST CANCER

NEXT STEPS

- TRAIN ON MORE PATIENTS
- MAP & TOPOGRAPHICAL INFO
- EXPLORE OTHER APPLICATIONS

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Thank you for your time.

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Contact Information

For questions, comments and inquiries

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