CNN Image Classification of Invasive Ductal Carcinoma

Author: Aaron Cherry

Table of Contents

01 Introduction

“About 1 in 8 U.S. women (about 13%) will develop invasive breast cancer over the course of her lifetime.”

“For women in the U.S., breast cancer death rates are higher than those for any other cancer, besides lung cancer.”

“The overall death rate from breast cancer decreased by 1% per year from 2013 to 2018. These decreases are thought to be the result of treatment advances and earlier detection through screening.”

— BREASTCANCER.ORG

Digital Pathology

Digital pathology is a sub-field of pathology that focuses on data management based on information generated from digitized specimen slides. Through the use of computer-based technology, digital pathology utilizes virtual microscopy.[1] Glass slides are converted into digital slides that can be viewed, managed, shared and analyzed on a computer monitor.

— Wikipedia

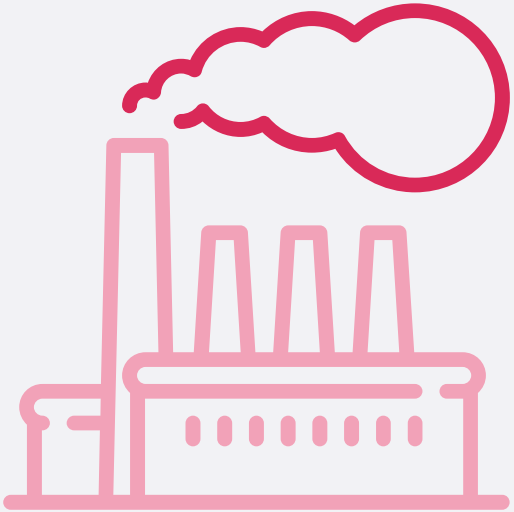
Benefit of CNNs

- Cut time/cost of testing
- Sometimes more accurate than trained eye
- Augmenting current practices
- Natural next steps in digital pathology

02

Data

Data



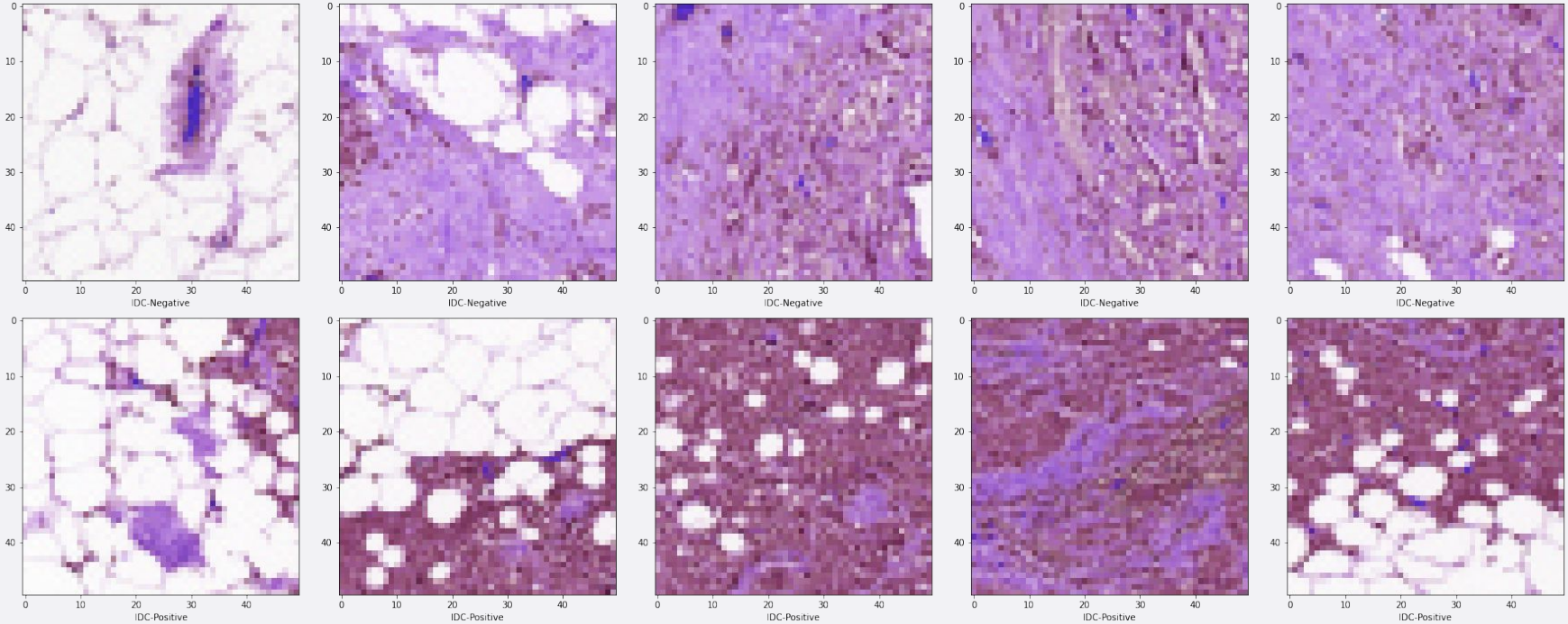
Kaggle (Case Western Base Study)

- 837 whole slide scans
- 50x50 pxl images (~280k)

Classes

- IDC - Positive
- IDC- Negative

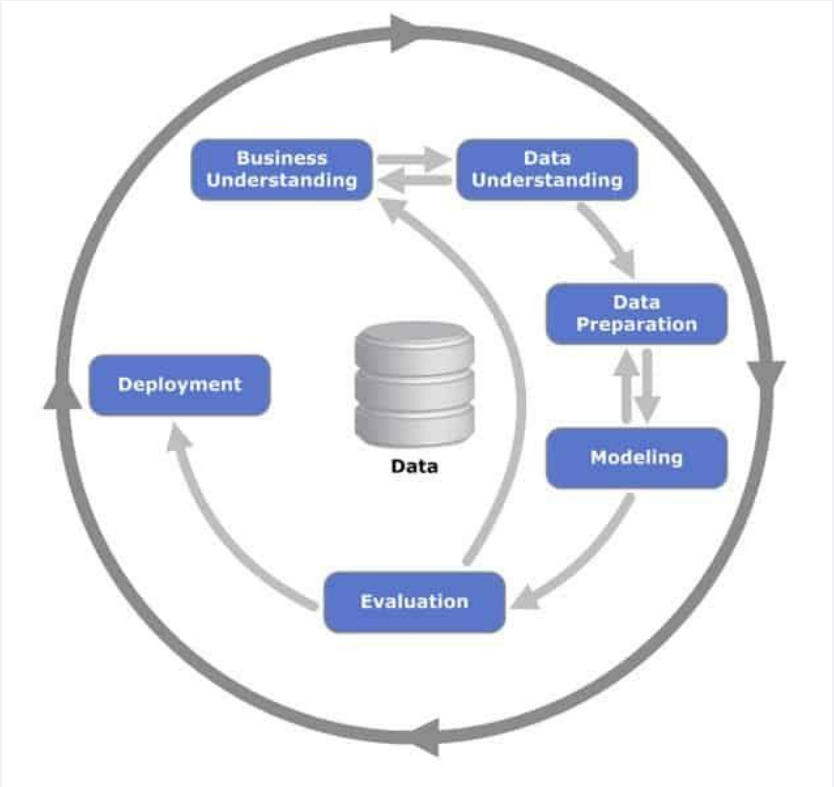
Example Images



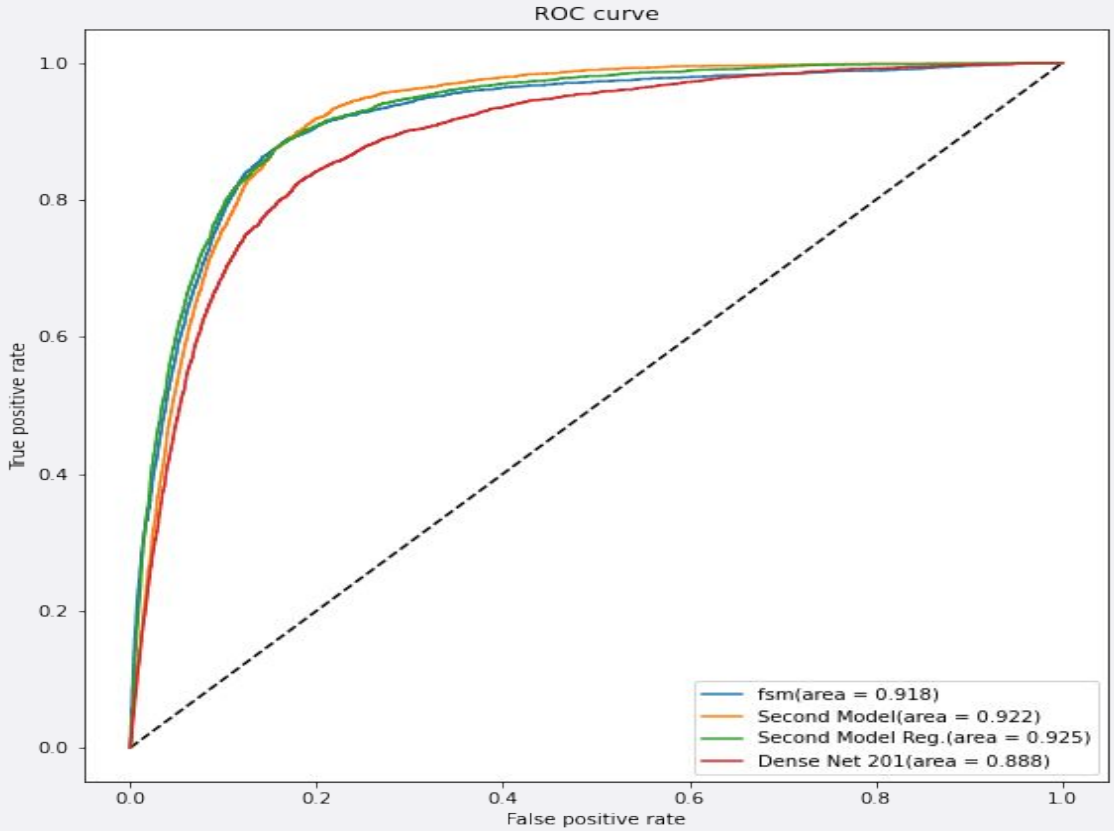
02

Modeling

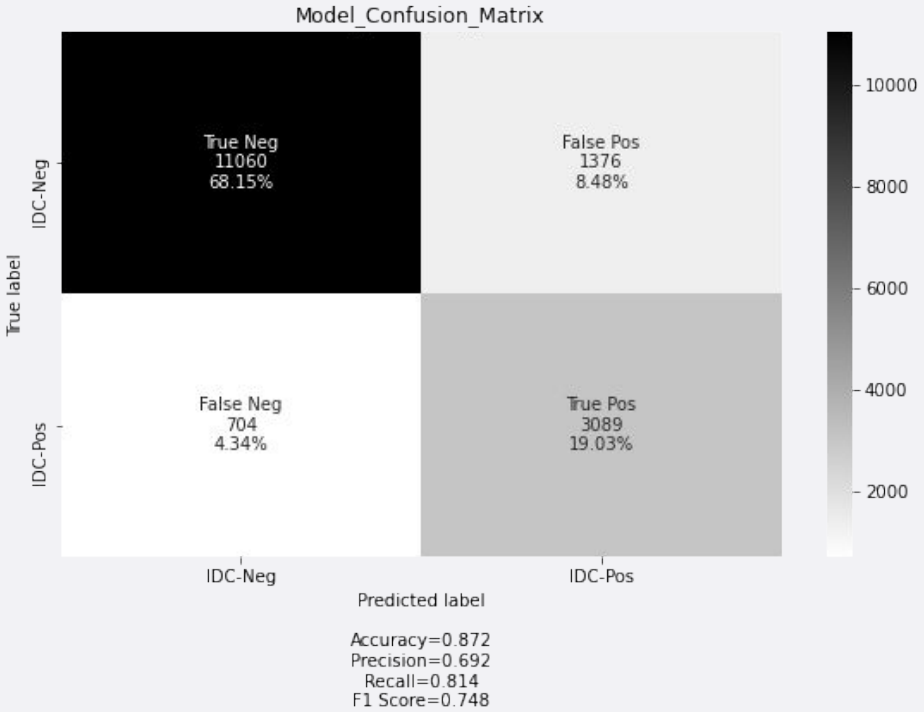
CRISPR


Business Understanding
Data Understanding
Data Preparation
Modeling
Evaluation
Deployment
Data

Health Effects of Data Science



Graphs



Model

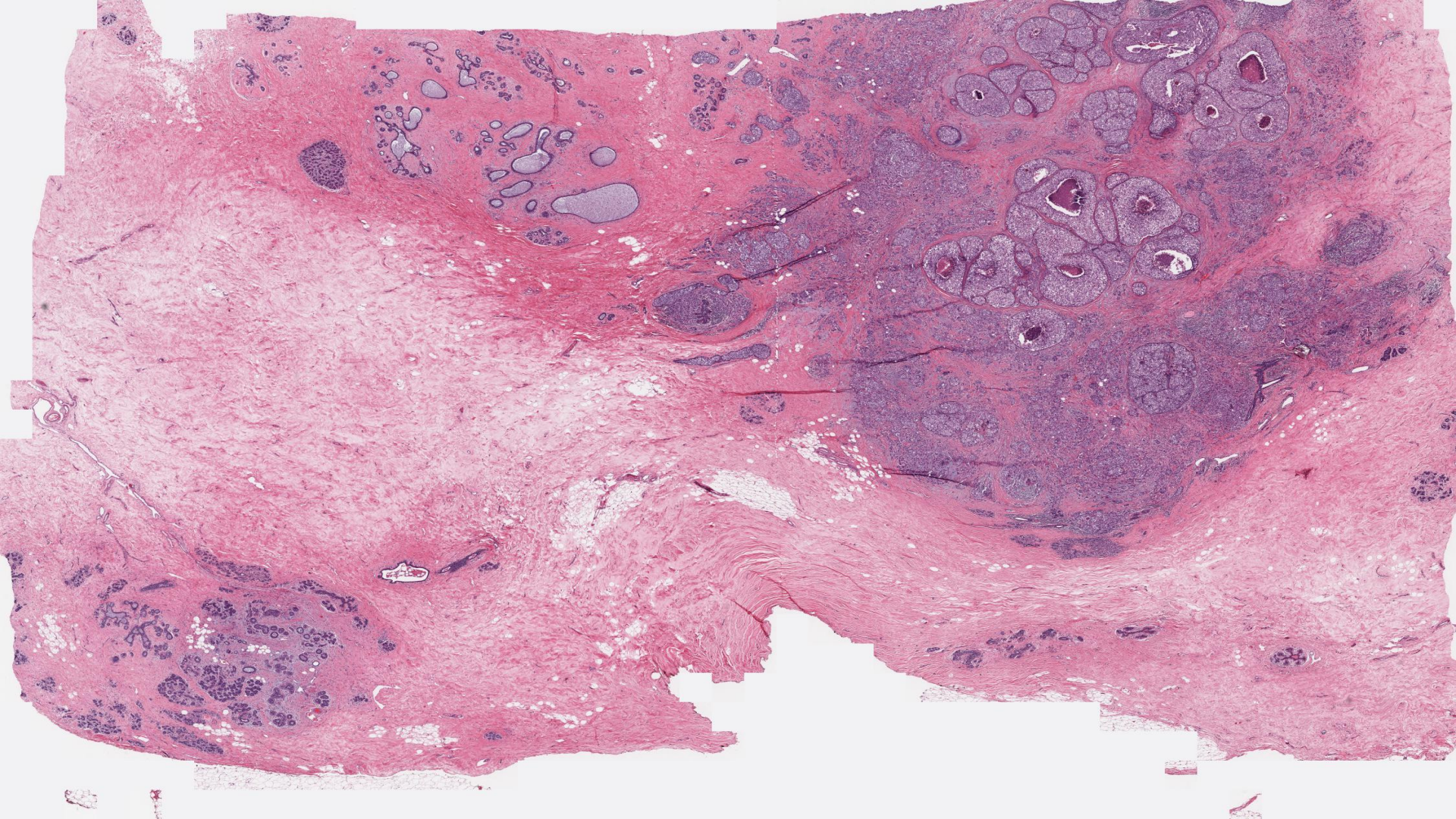
0.25 prediction cutoff

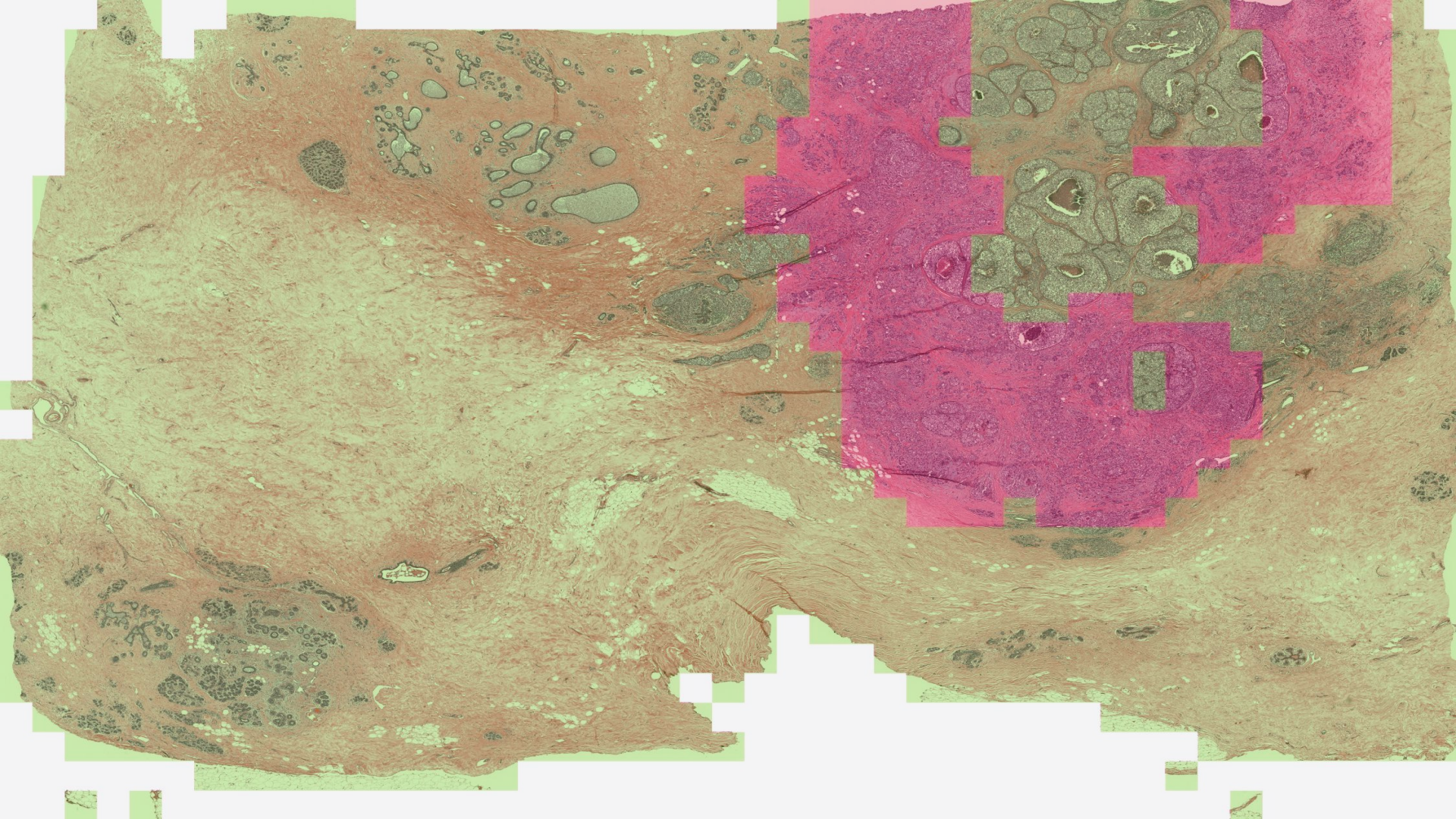
Metrics

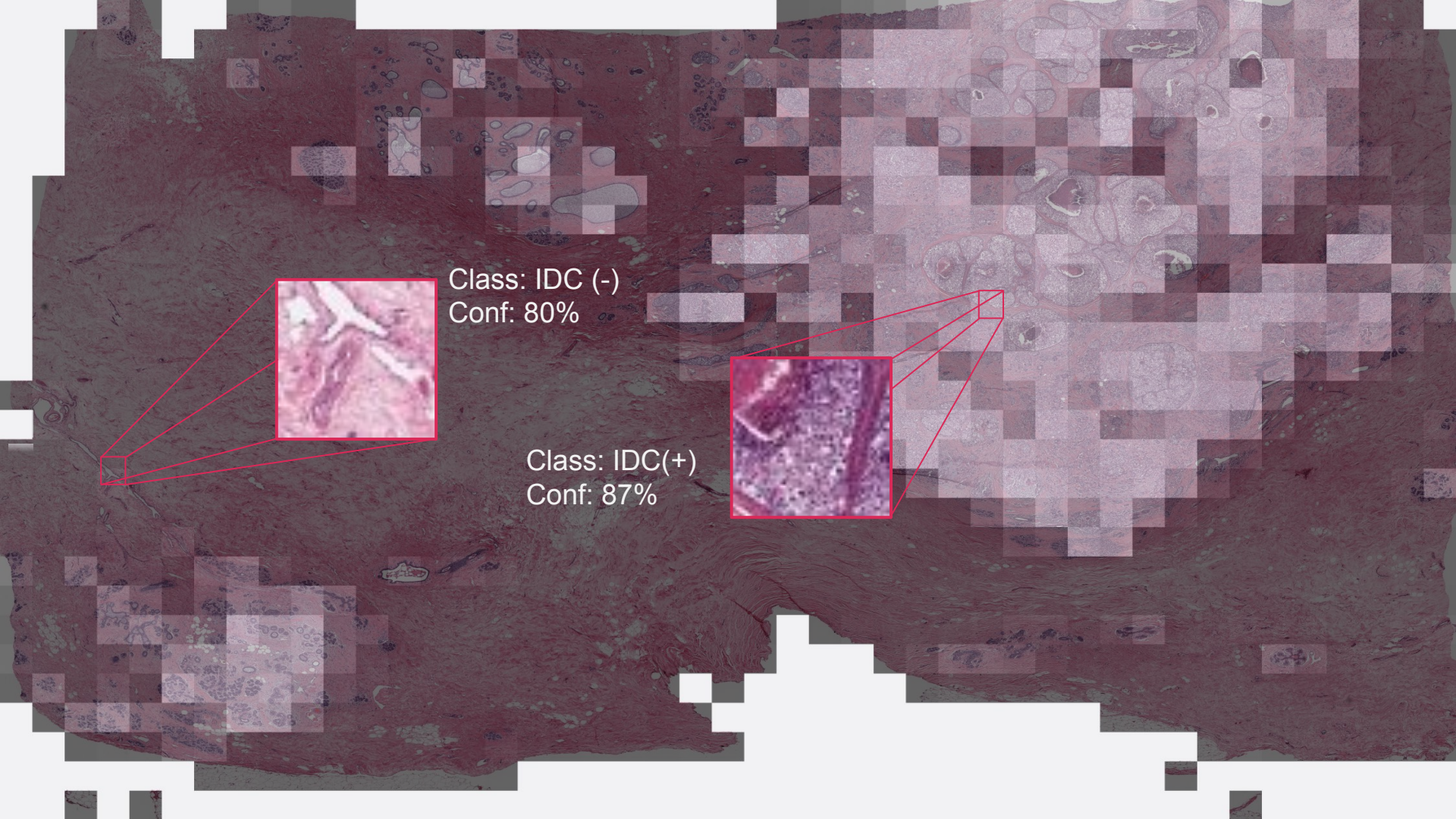
Optimized on Recall (False Neg)/(False Neg + True Pos)

03

Application






Class: IDC (-)
Conf: 80%
Class: IDC(+)
Conf: 87%

Conclusion

You can enter a subtitle here

04

Conclusions

Problem

Time
Money
Accuracy

Trained CNN

87.2% accuracy
81.4% recall
0.925 AUC

Application

Deployed Web App
WSI Classification
Confidence Map

Next Steps

Optimization

More Complex Models
Pre-Trained Models
Other Datasets
Expert Feedback

Multi-Classing

Multi-Class Model
Benign
Malignant

Deployment

Endorsement
Grant Proposal