

# Visual Question Answering

Team11 Sprint5

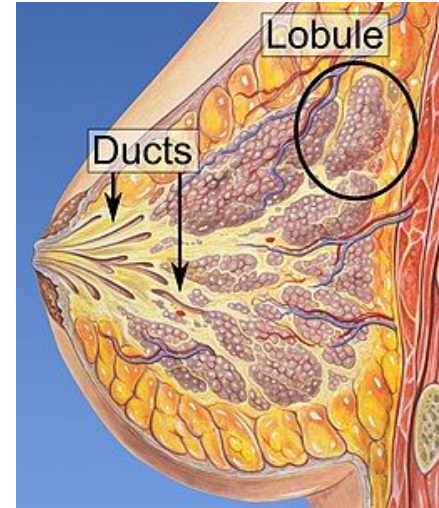
Kehan Guo, Jiaqi Zhang

# Last Time

- MCB, SAN models. 99 percent accuracy.
- In this sprint, deep dive into medical imaging.
- Goal: Assisting doctors with automatic detection.
- In a way of statistical analysis.

# Background

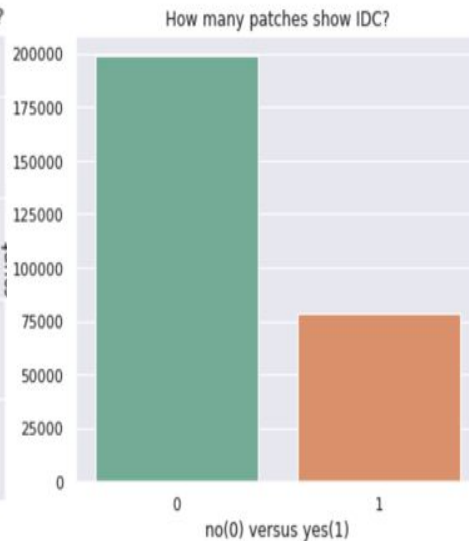
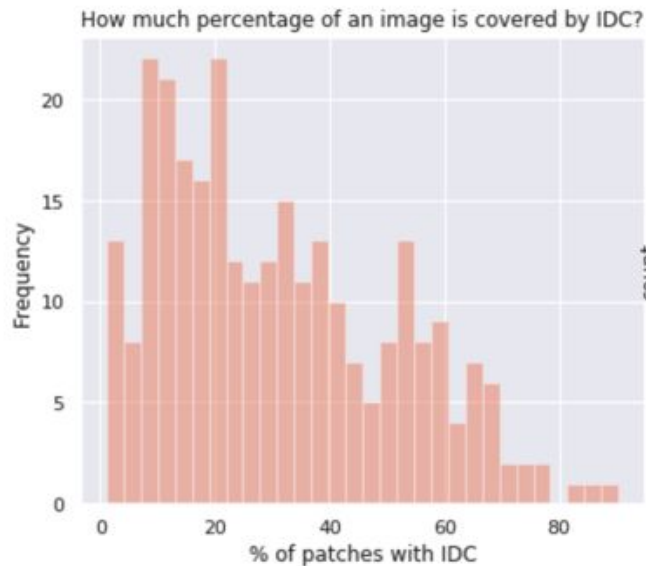
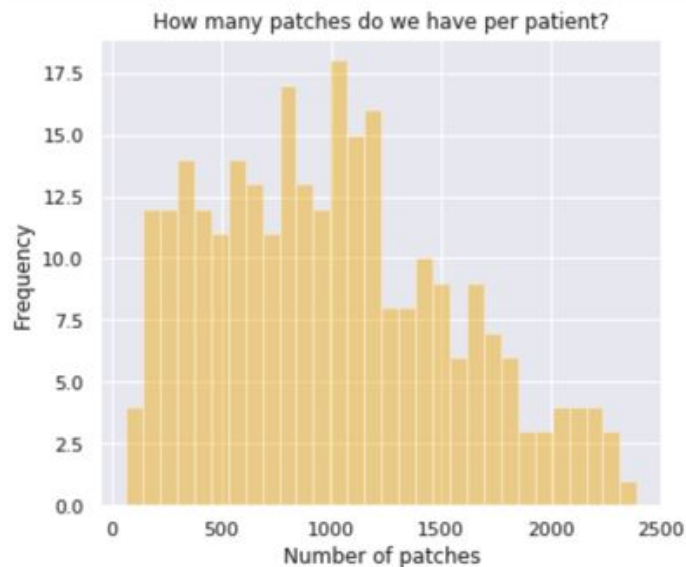
- Breast cancer is the most common form of cancer in women, and invasive ductal carcinoma (IDC) is the most common form of breast cancer.
- Deciding IDC has to be done manually and is time consuming.
- Deep Learning helps a lot.



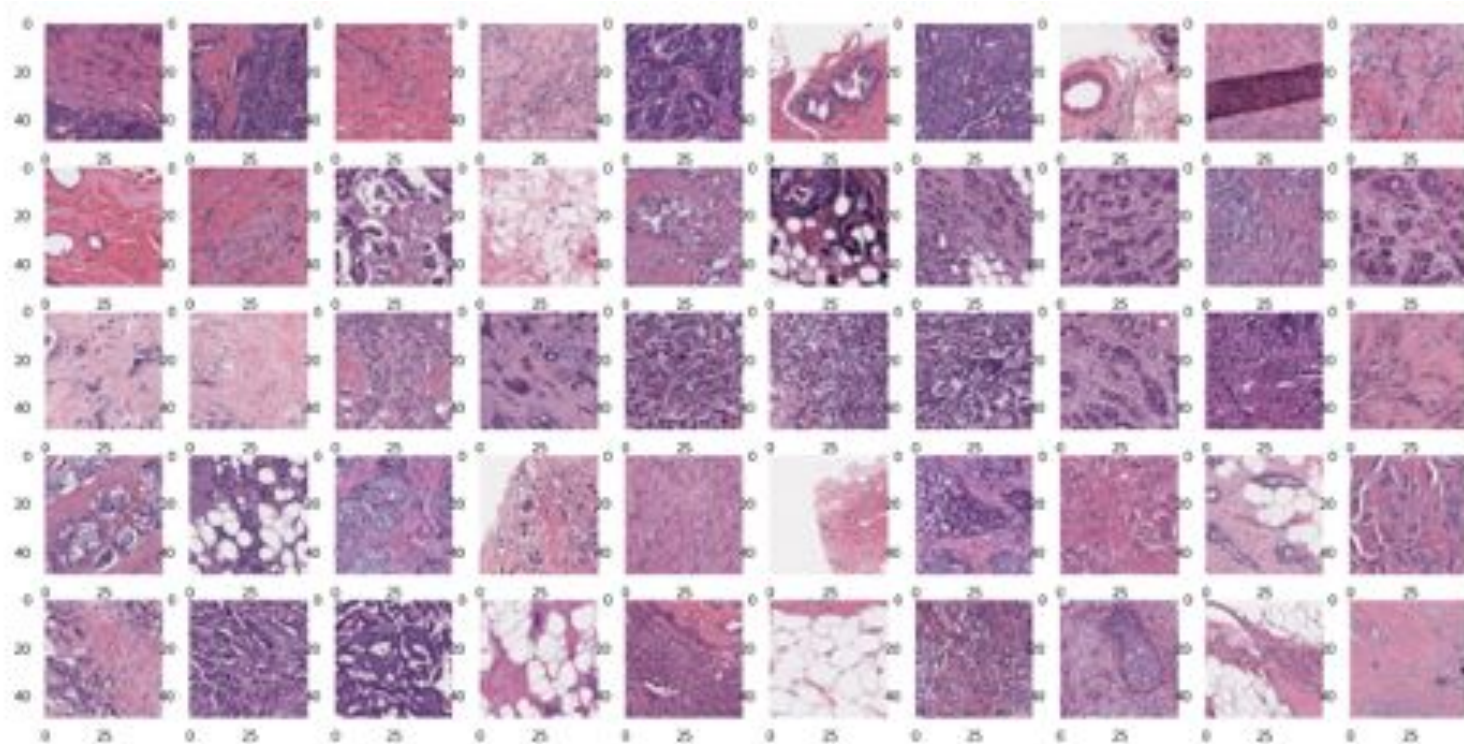
# Dataset

- 162 whole mount slide images of Breast Cancer (BCa) specimens scanned at 40x
- 277,524 patches of size 50 x 50 were extracted (198,738 IDC negative and 78,786 IDC positive).

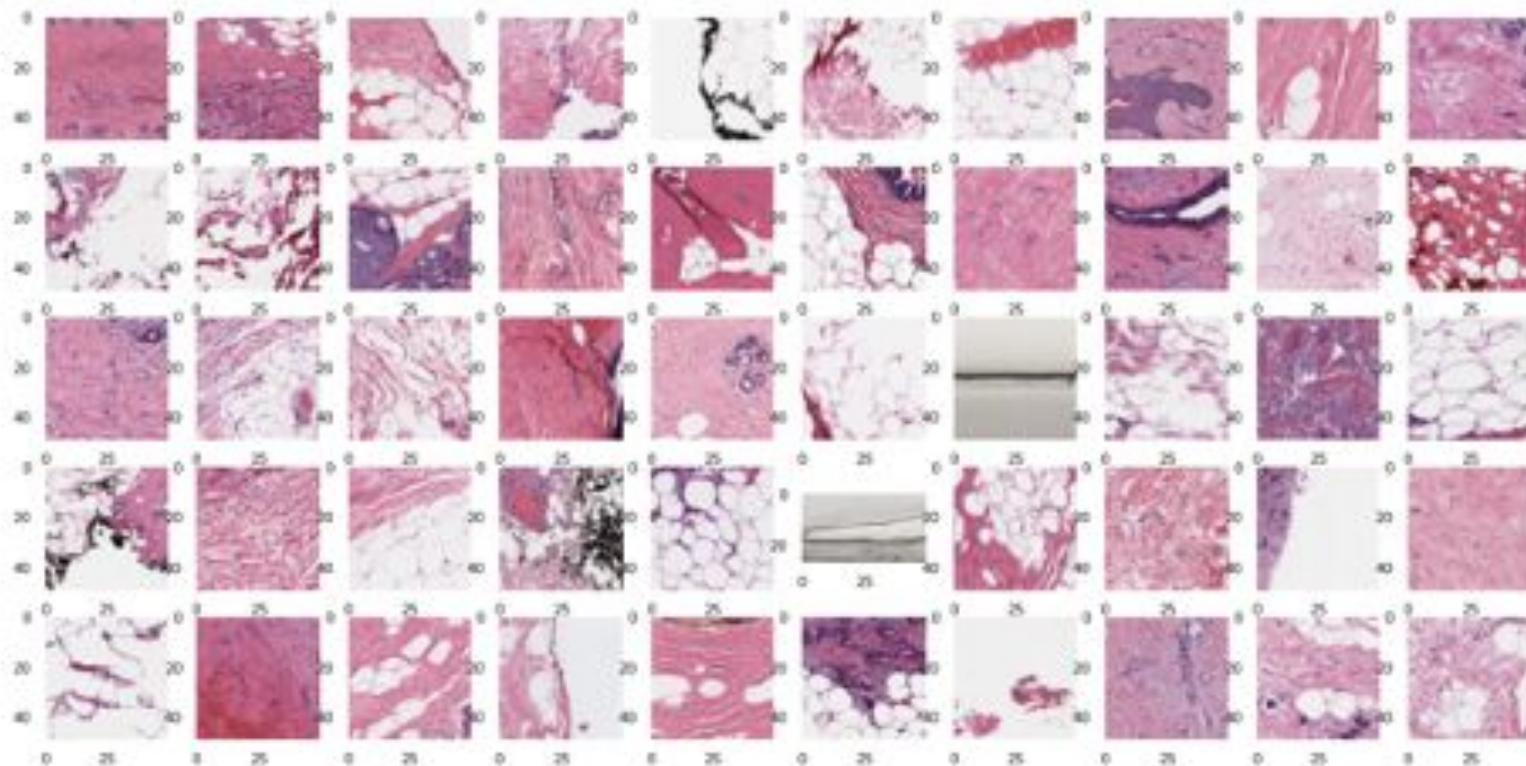
# Exploratory data analysis



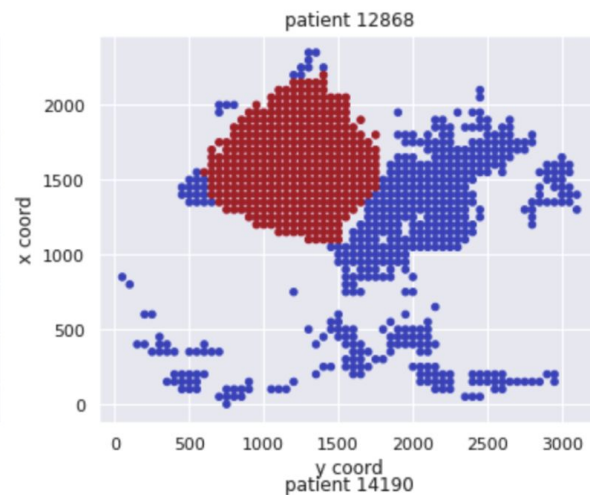
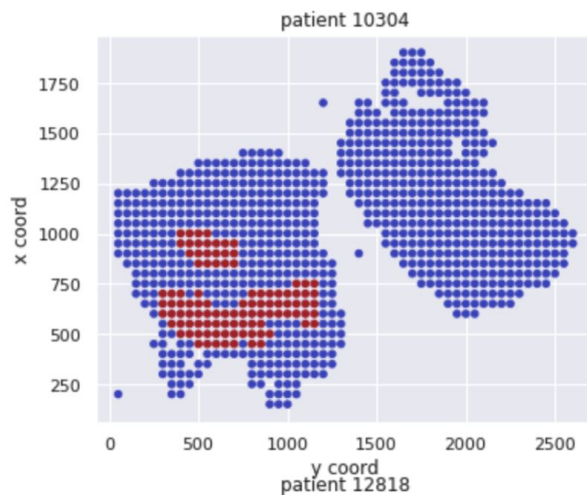
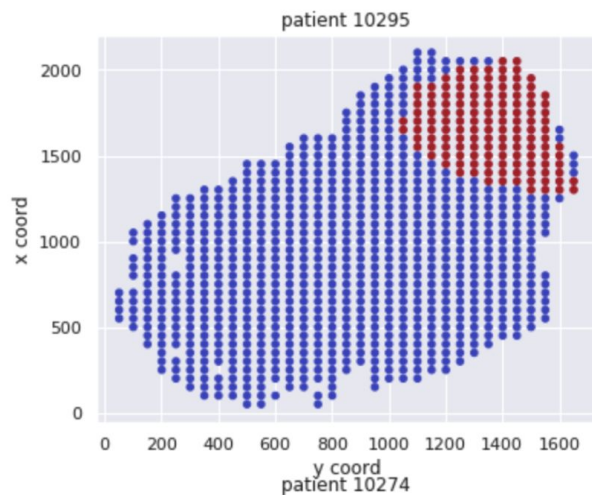
# Cancer patches



# Healthy patches

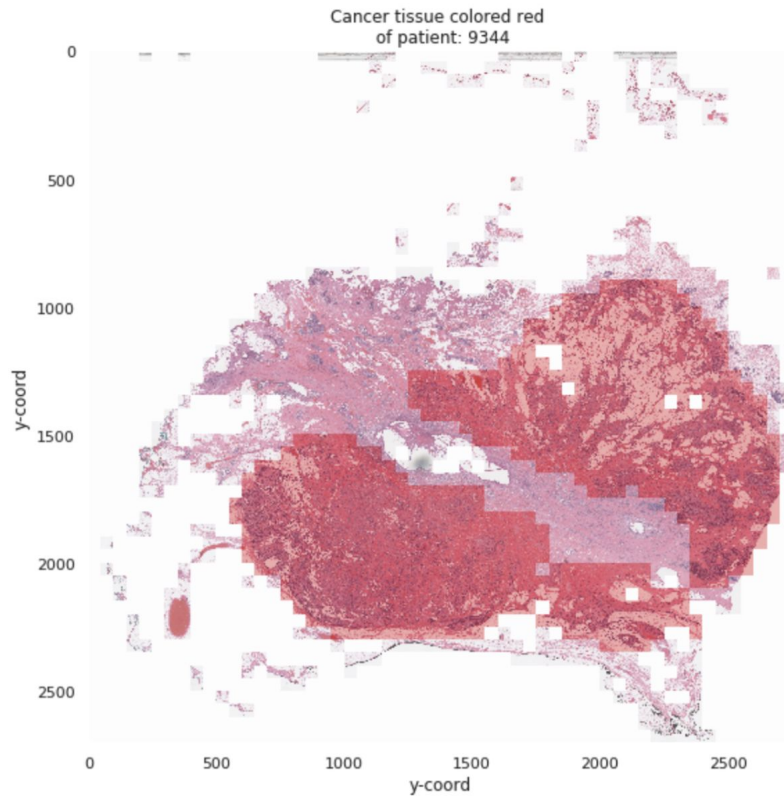
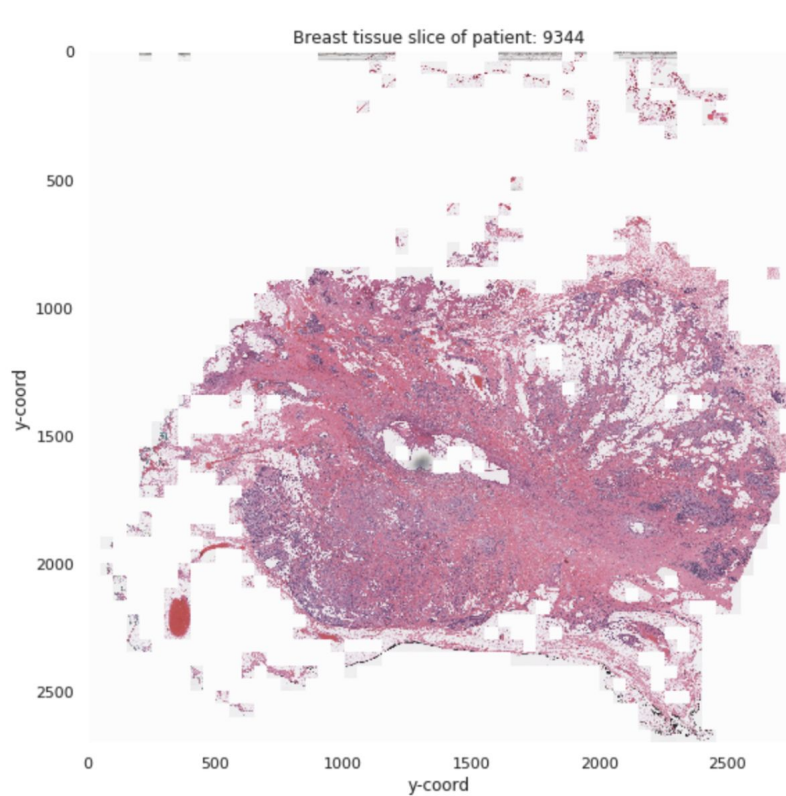


# Visualizing the breast tissue





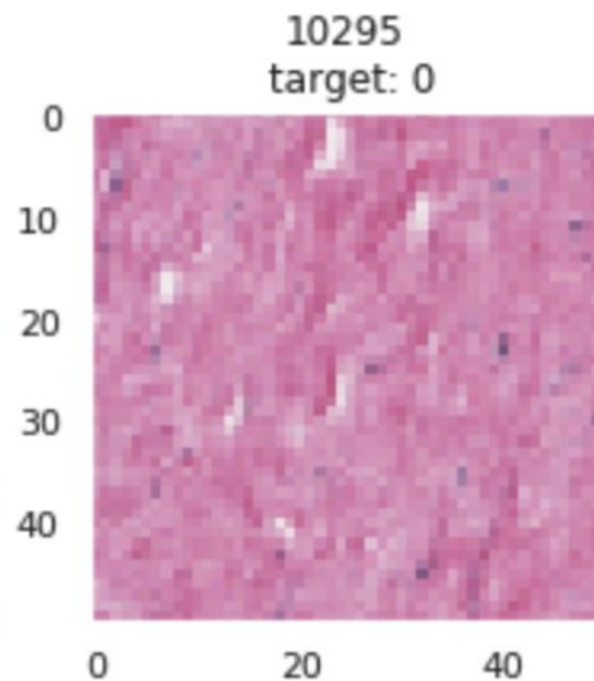
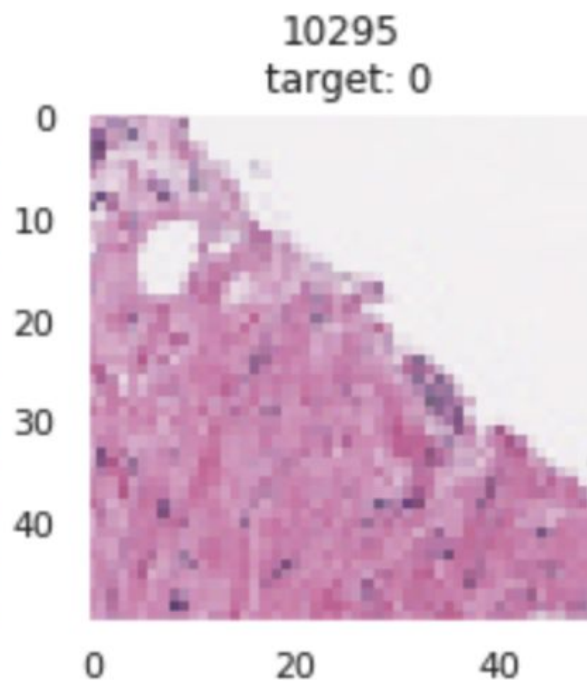
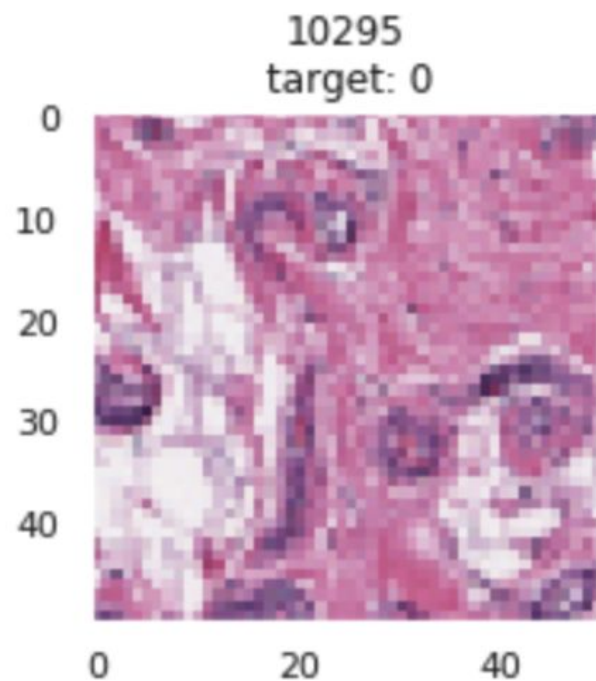
# Visualizing the breast tissue images



# Data preparation

- Data processing
- Splitting training set and testing set

# Image after transformation



# Model

- Transfer Learning
- Pretrained resNet18
- Loss function: binary cross entropy
- Evaluation: F1-score

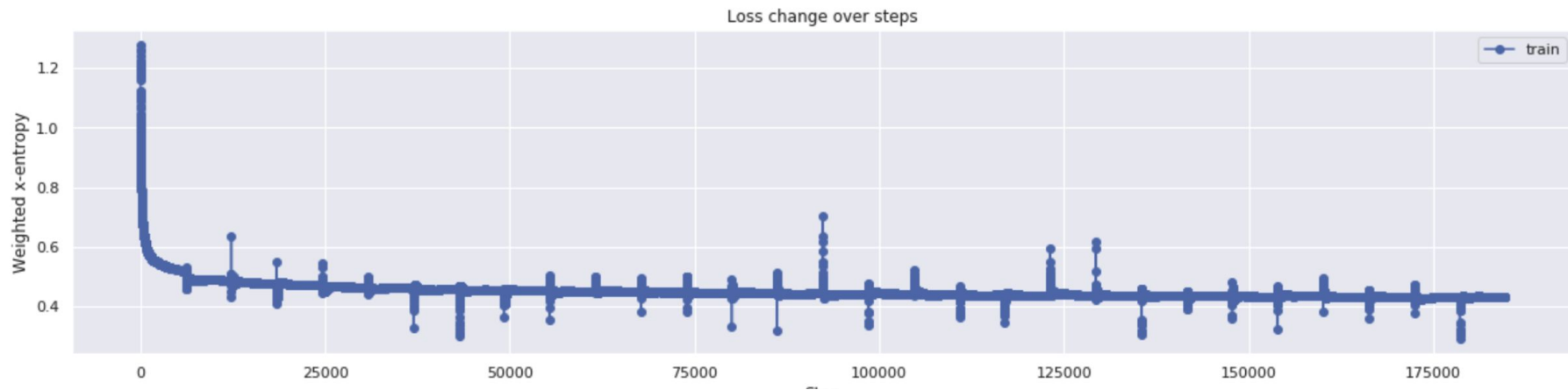
$$L = - \sum_{n=1}^N \sum_{k=1}^{K=2} w_k \cdot t_{n,k} \cdot \ln(y_{nk})$$

$$f_1 = \frac{2}{\frac{1}{recall} + \frac{1}{precision}}$$

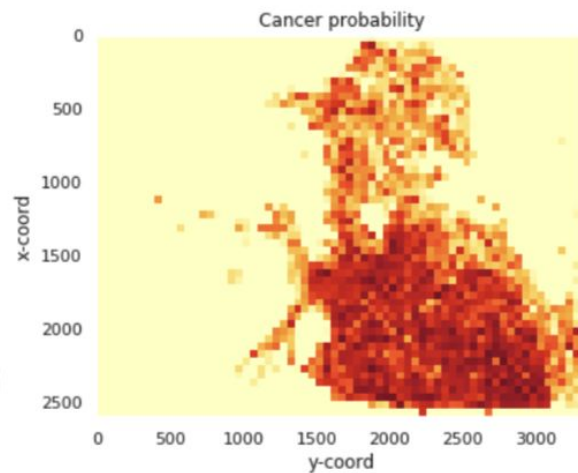
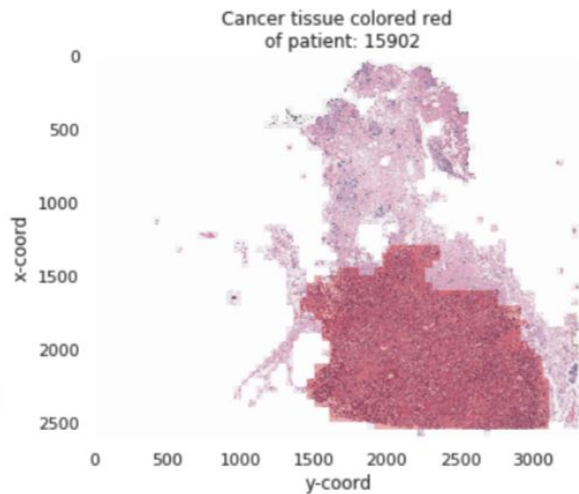
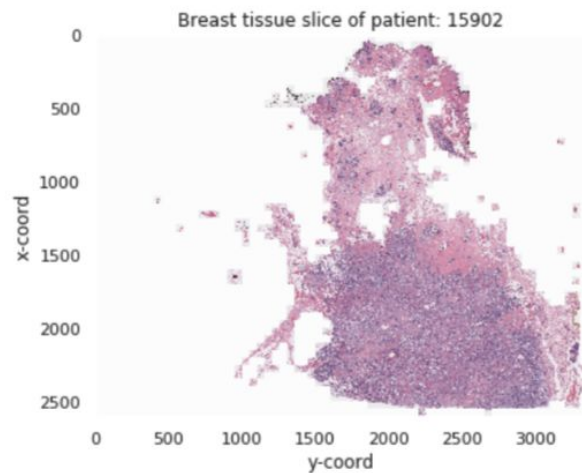
$$recall = \frac{TruePositives}{TruePositives + FalsePositives}$$

$$precision = \frac{TruePositives}{TruePositives + FalseNegatives}$$

# Training



# Result



# Conclusion

- Combine it with other Sprints in the poster
- In the future, trained with other deep learning models.

Thanks!