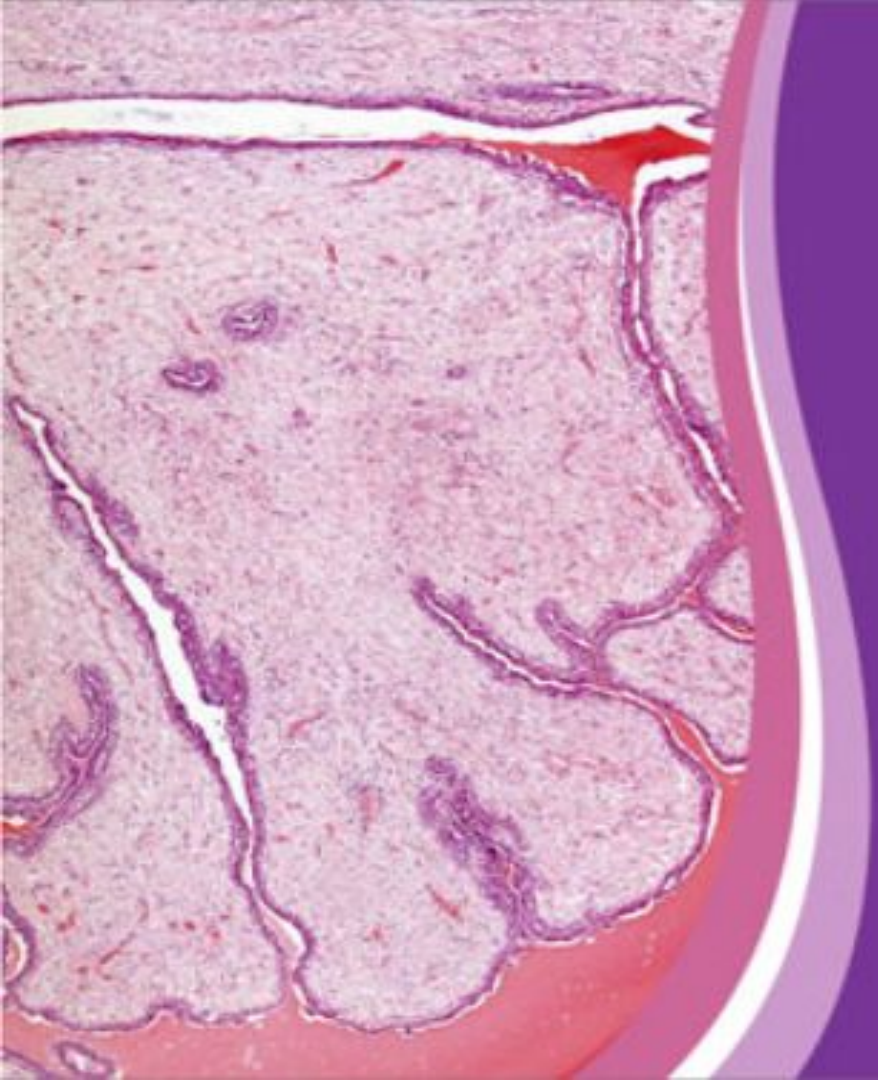


Histopathological Cancer Detection

Cyrus Wachong
&
Sean Paulsen

Outline

- Our Motivation
- Background
- Dataset Used
- Model Choice and Evaluation
- Training Procedure
- Results
- Future Plan
- Questions

Our Motivation

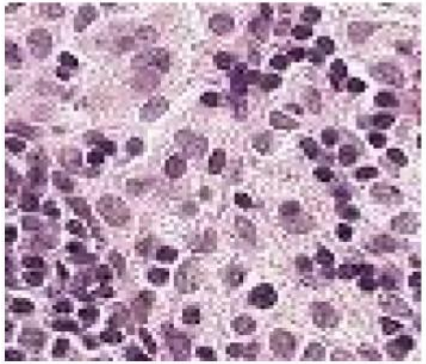
- We are Biomedical Engineering majors
- Interested in medicine and pathology
- Personally affected by cancer in our lives
- Wanted to train a network

Background

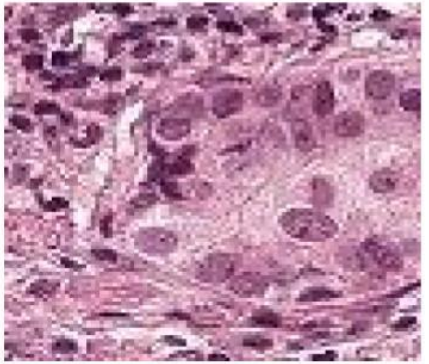
- Histopathology is the microscopic examination of tissue to study the manifestation of disease
- Cancer is the leading cause of death in Canada
- Manual histopathological image analysis is monotonous and prone to error

Dataset Used

- Found on Kaggle
- 220 025 images
- 96 x 96 pixels
- 130 908 healthy and 89 117 malignant



Healthy



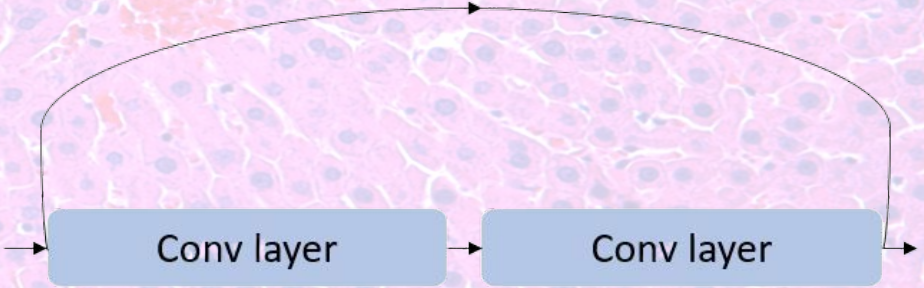
Malignant

Model choice and evaluation

ResNet-50

- Uses residual blocks eliminating the vanishing gradient problem with deeper neural networks

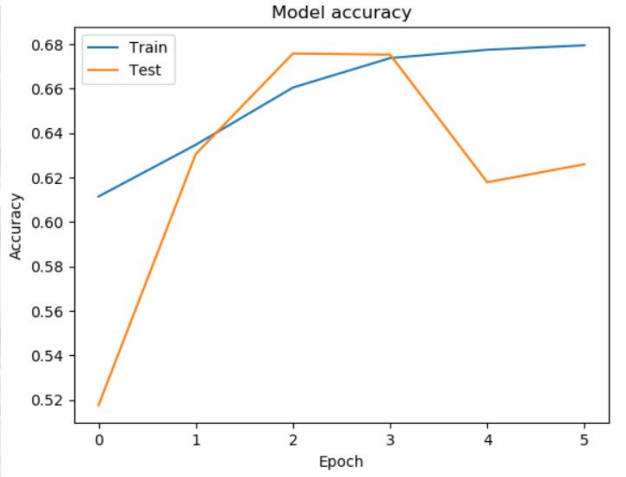
- Residual blocks have two convolutional layers with the output being connected to the input



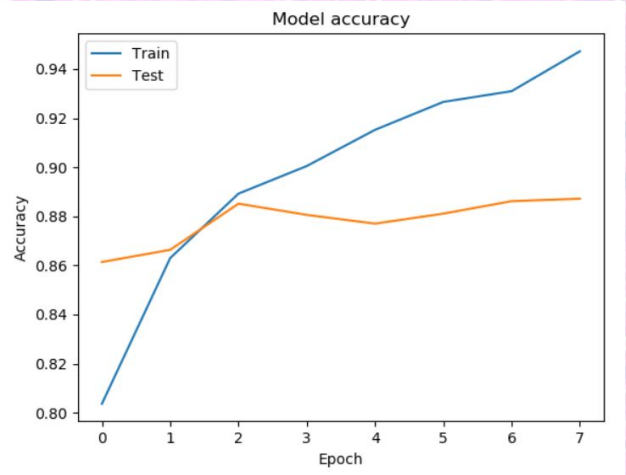
Testing Procedure

- Initially trained using a subset of the full dataset
- Simple ResNet-50 with 80/20 training/validation split
- Binary cross-entropy loss
- Added transfer learning
- Included layer freezing
- Implemented dynamic learning rate
- Added dropout layer with dropout fraction of 0.5 to minimize overfitting

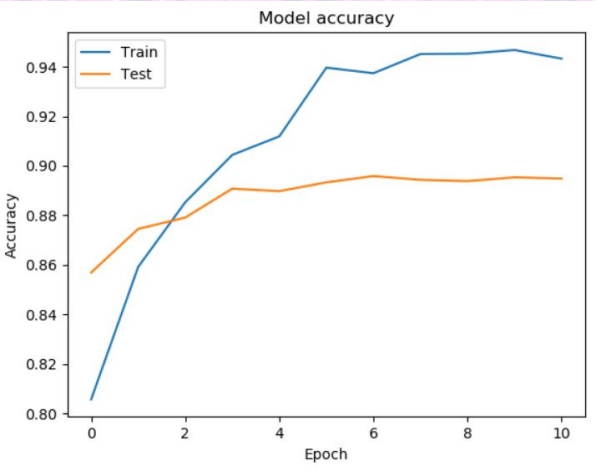
Results



Initial setup

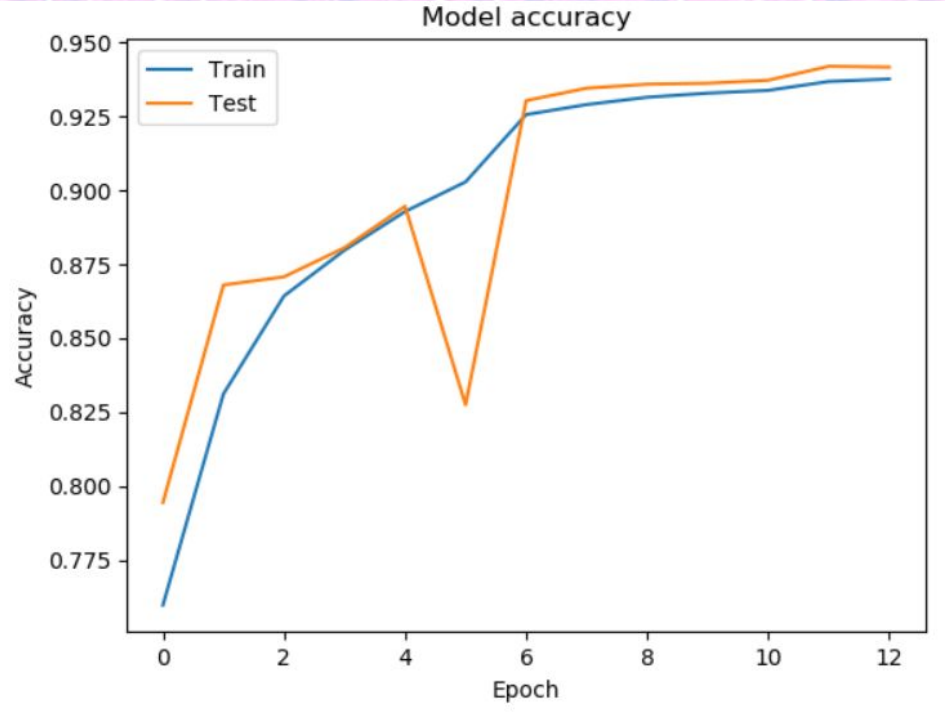


Transfer Learning



Dynamic Learning Rate

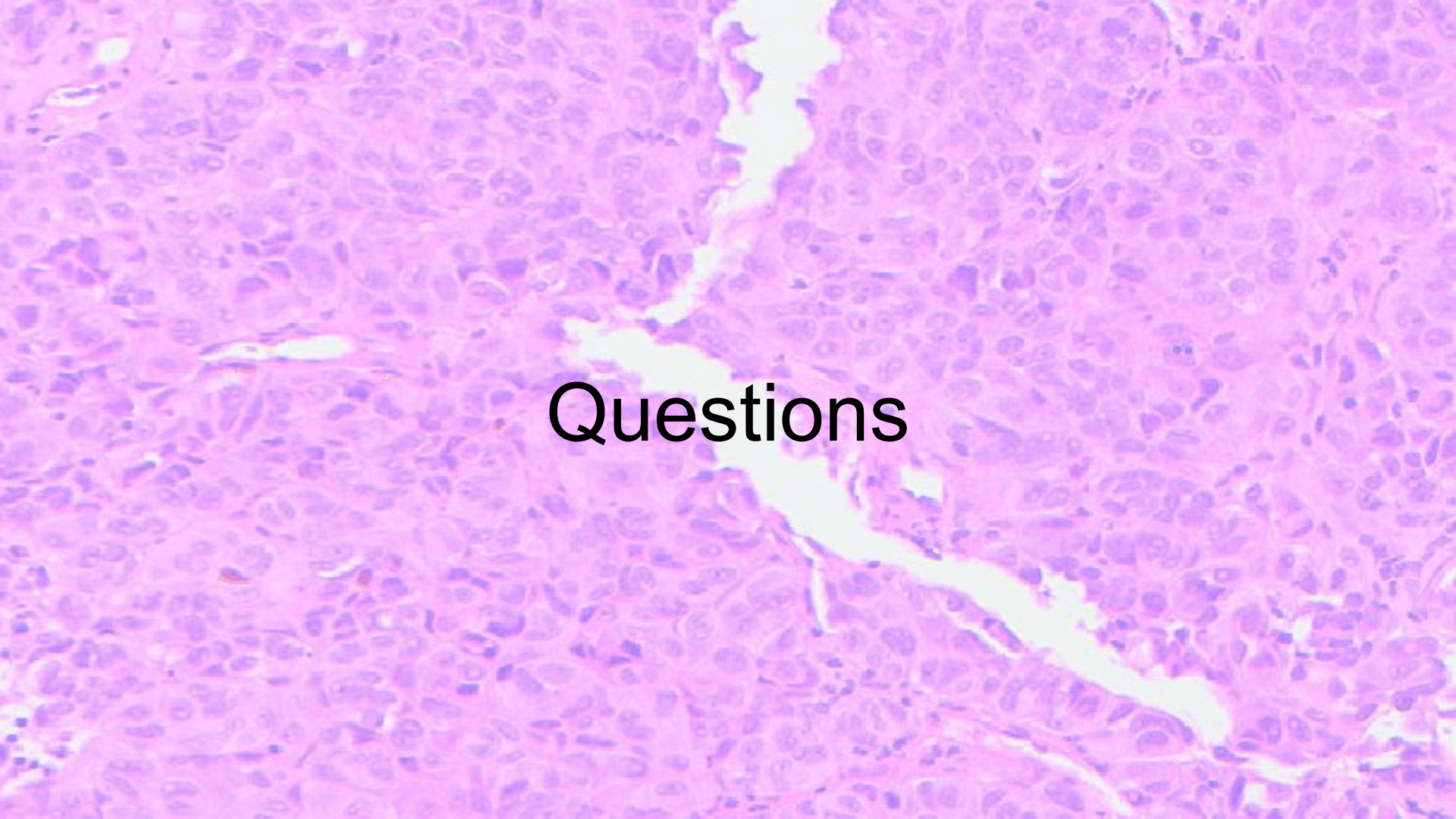
Results



Epochs	13
Initial Learning Rate	0.01
Patience	2
Preloaded Weights	ImageNet
Validation Split	80/20
Final Validation Loss	0.1699
Final Validation Accuracy	0.9416

Future Plan

- Acquire more data to further generalize network
- Implement basic data augmentation to further generalize network
- Work with larger/deeper networks for more trainable parameters
- Transfer learn with more relevant weights, trained on medical images
- Use semantic segmentation in place of a binary output for localization of tumour pixels


Questions