Lung Cancer Segmentation

Deep Neural Networks Final Project

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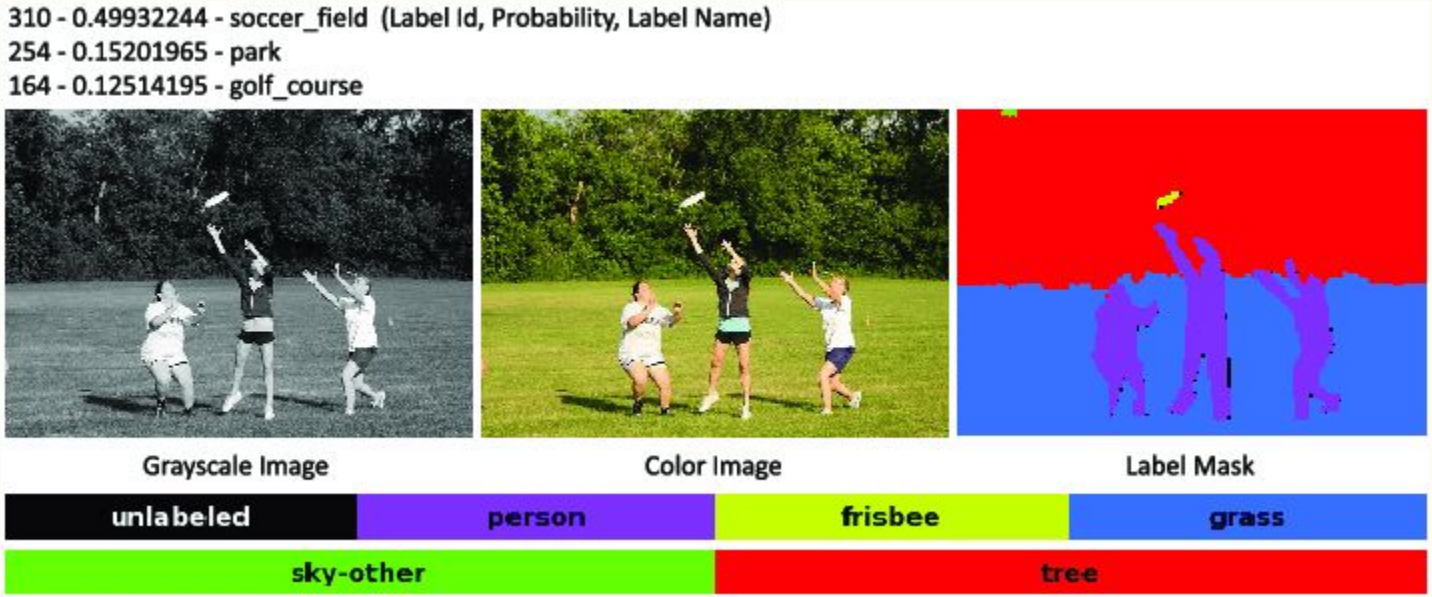
Research Statement

Comparative Analysis on Multiple Methods to Identify and Segment Lung Cancer Tumors.

Current Progress

- Per Pixel Classifier
- 2D convolutional per slice segmentation
- 3D convolutional per voxel segmentation

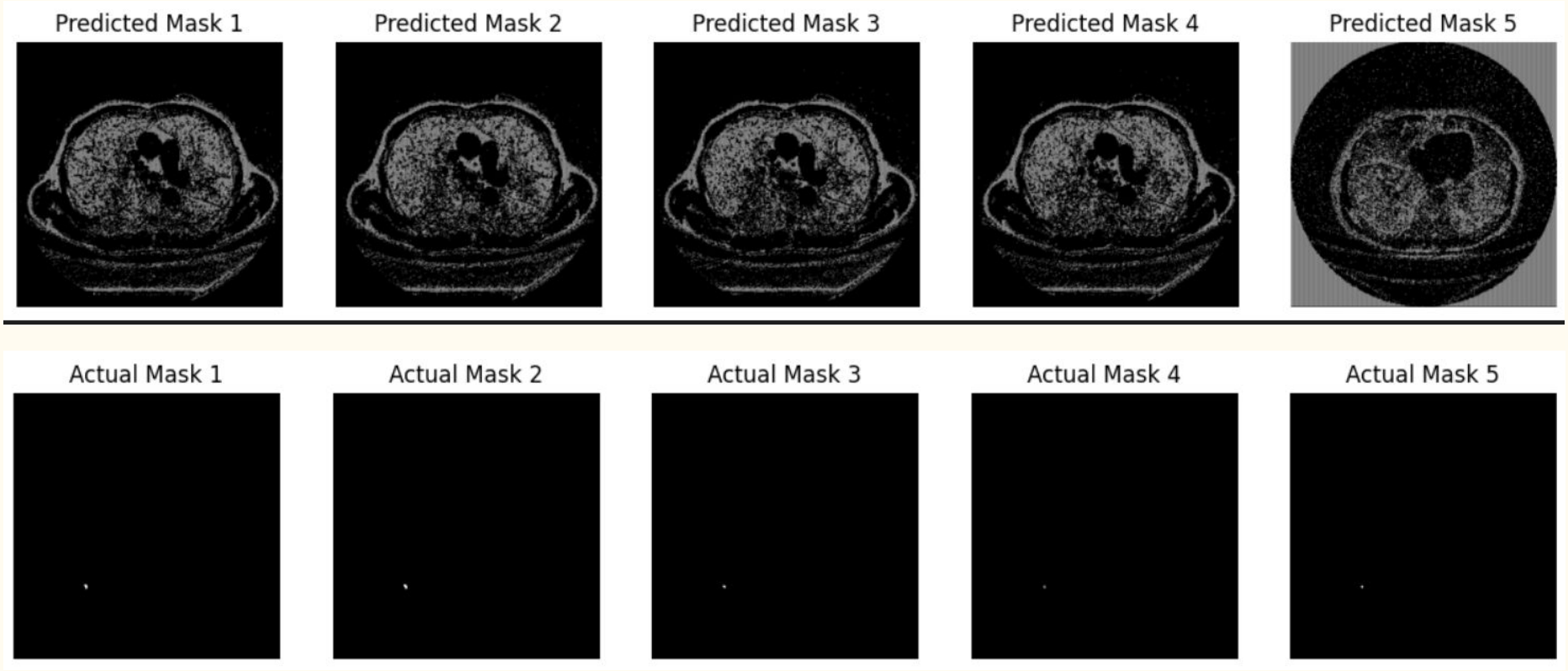
Per Pixel Segmentation



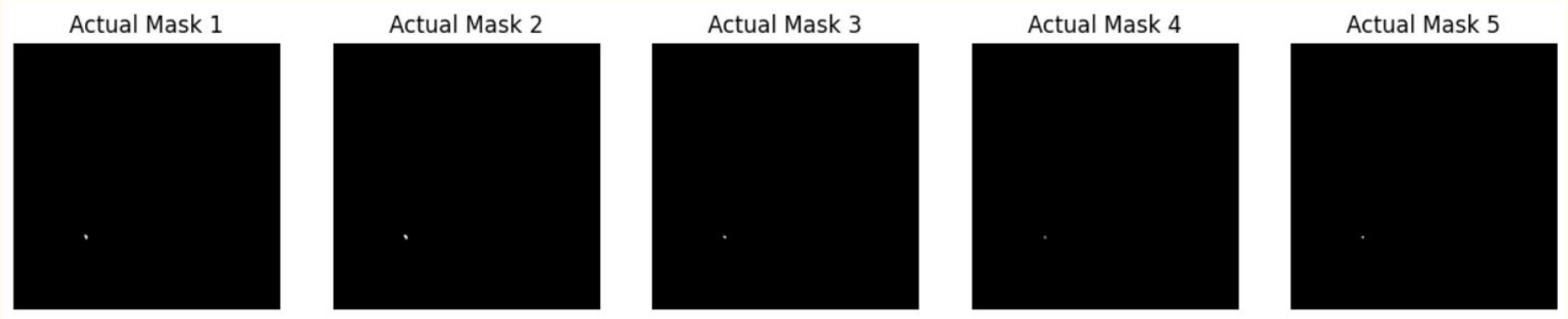
Per Pixel Semantic Segmentation Hyperparameters

- Loss Functions:
  - Mean Squared Error
  - Binary Cross Entropy
- Learning Rates varied from 0.0001-0.1
- Batch Size varied from 10 - 75
- Optimizers:
  - Adam
  - Adagrad
  - Adamw

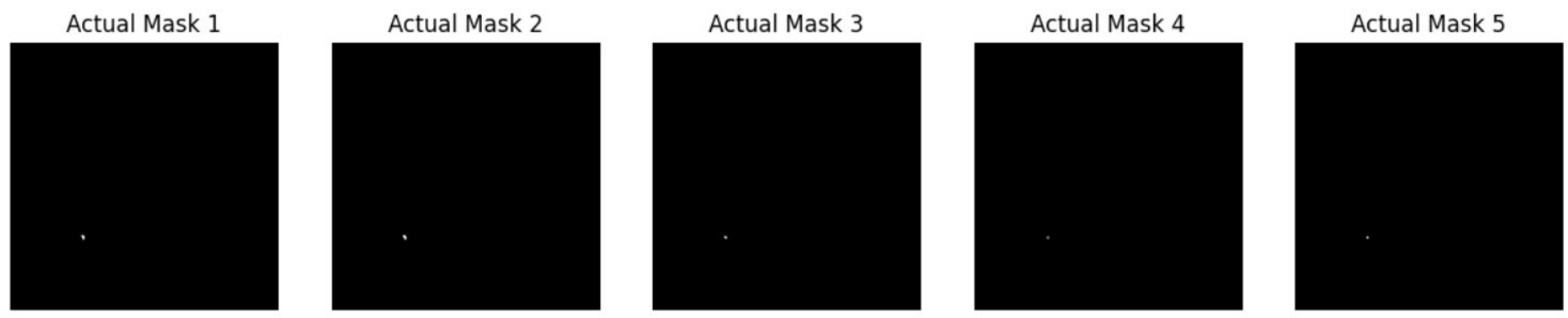
1st Epoch 70% Accuracy

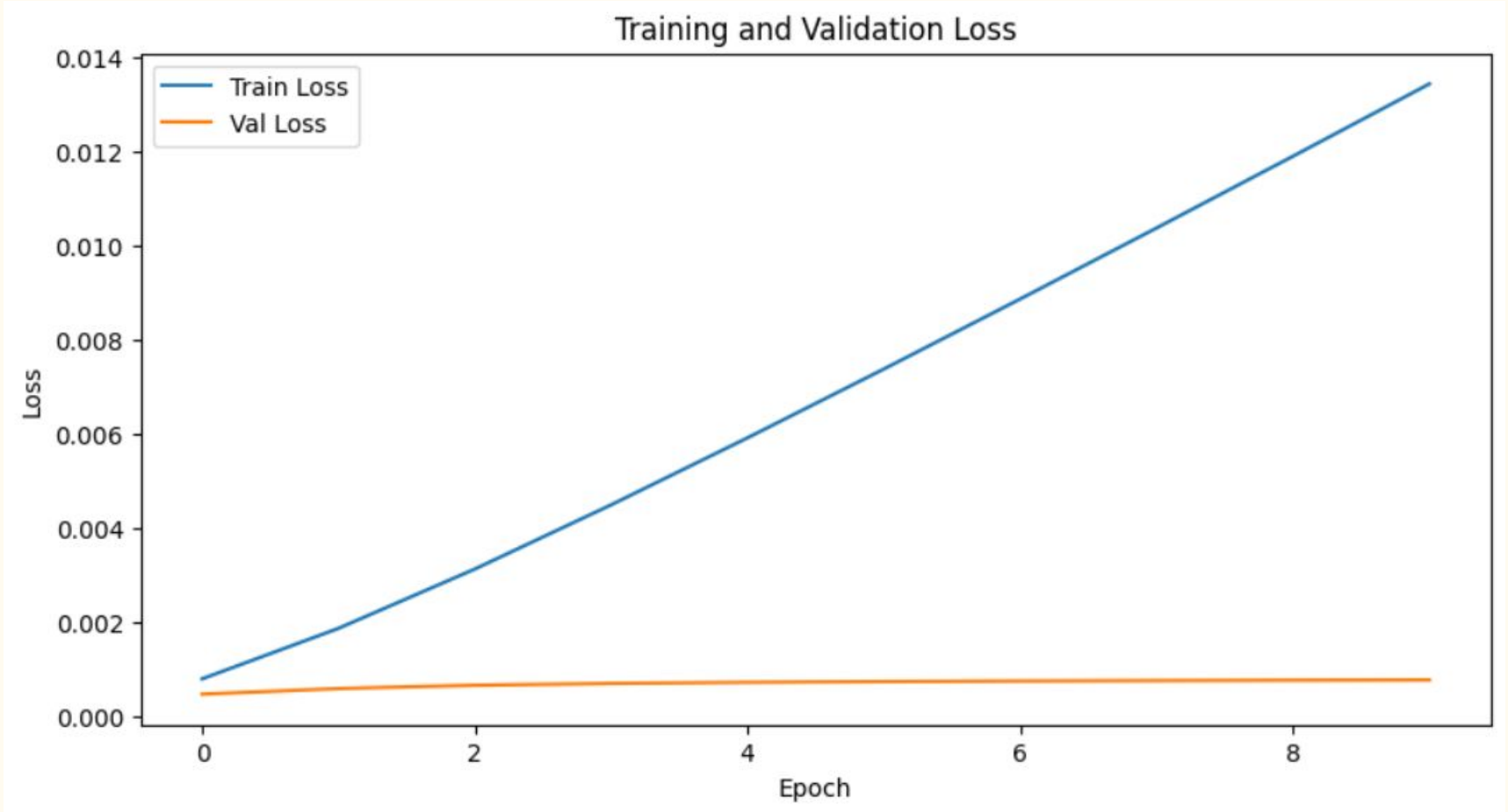


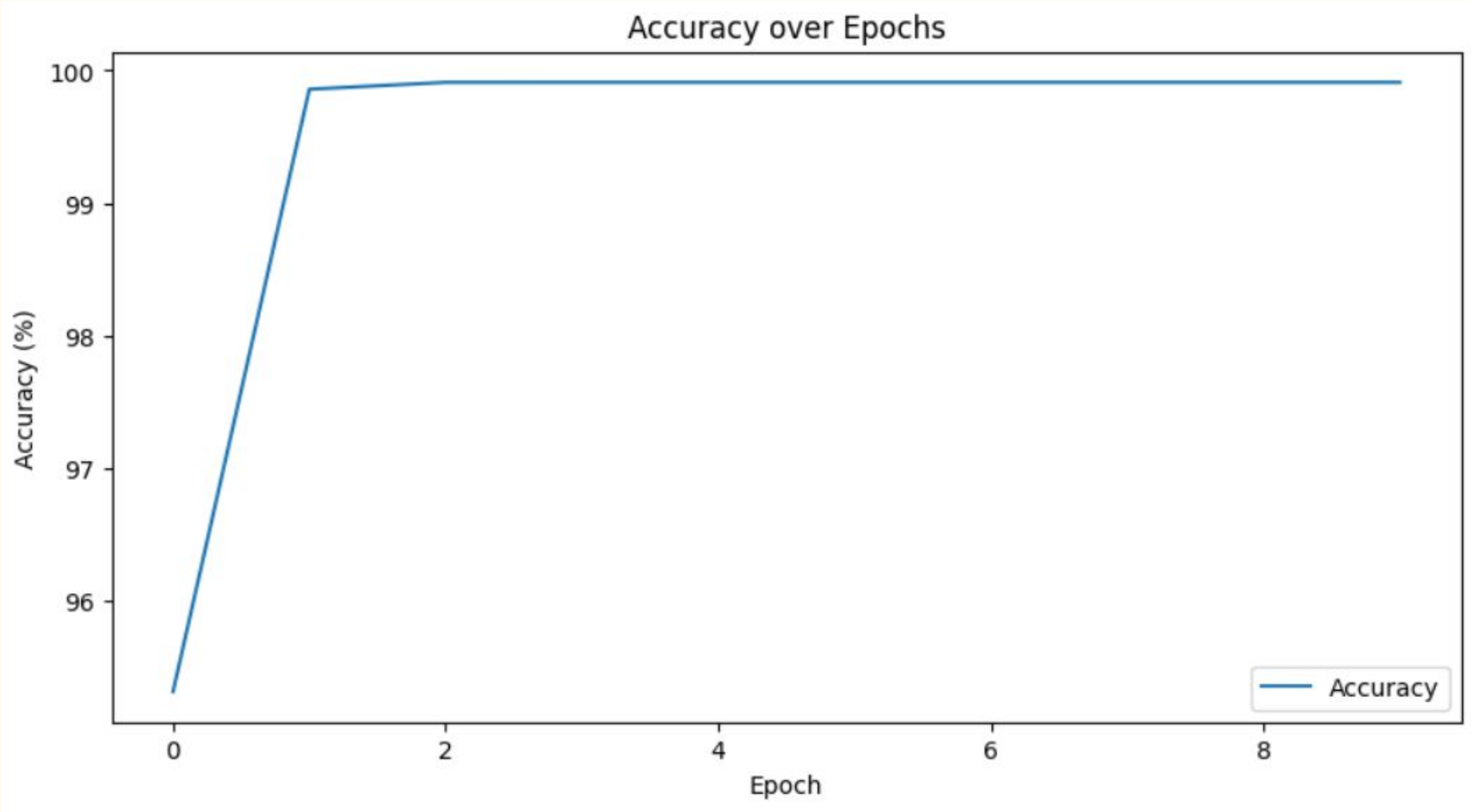
2nd Epoch 90% accuracy



3nd Epoch 98% accuracy

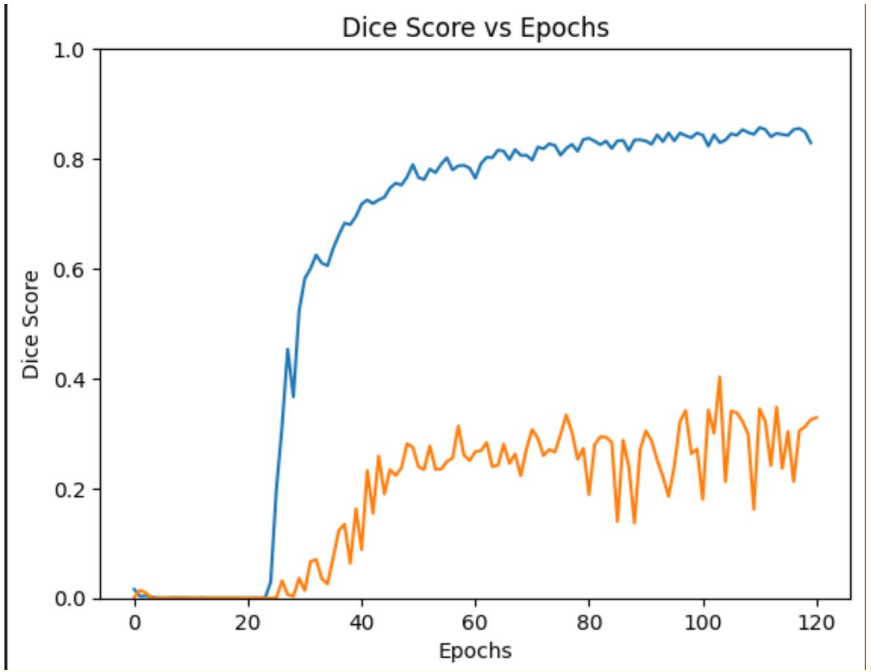



Training and Validation Loss
Train Loss
Val Loss
Loss
Epoch
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
0
2
4
6
8


Accuracy over Epochs
100
99
98
97
96
Accuracy (%)
0
2
4
6
8
Epoch
Accuracy

Custom UNET Model

Batch_Size: 8/16
Loss_Fn: Binary Cross Entropy
LR: 1e-4 - 1e-8
Image_size: 256x256
Optimizer: Adam



Custom UNET Model

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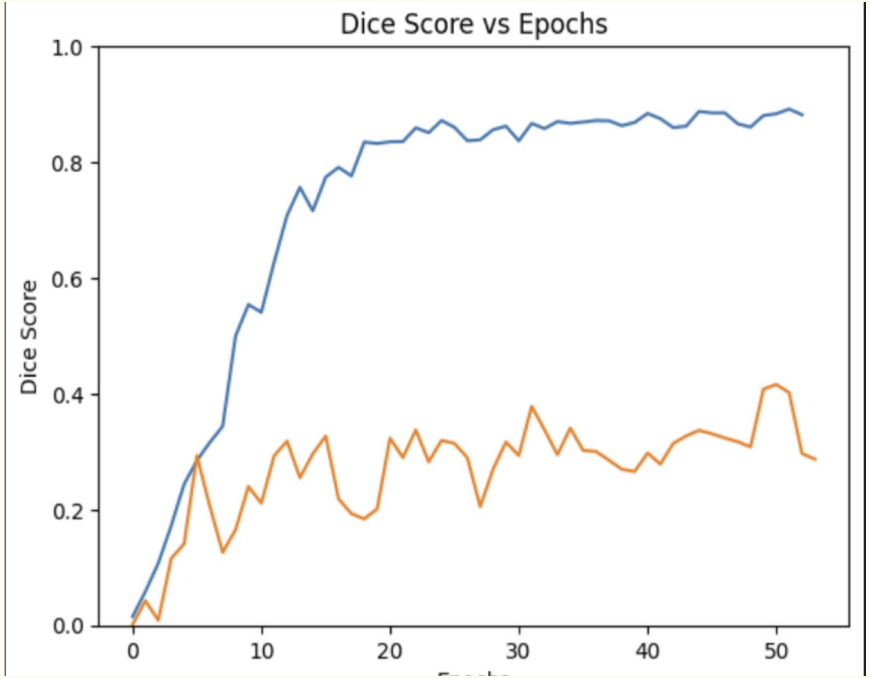
Loss_Fn: Dice
LR: 1e-4 - 1e-8
Image_size: 256x256
Optimizer: Adam



Pretrained UNET (MobileNetV2 encoder)

Batch_Size: 8/16
Loss_Fn: Binary Cross Entropy
LR: 1e-4 - 1e-8
Image_size: 256x256
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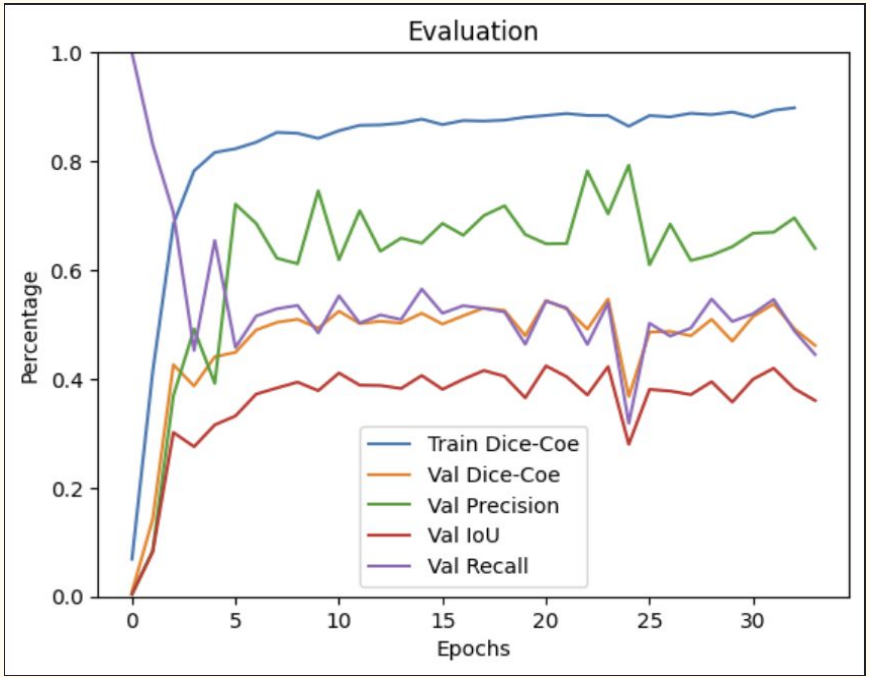

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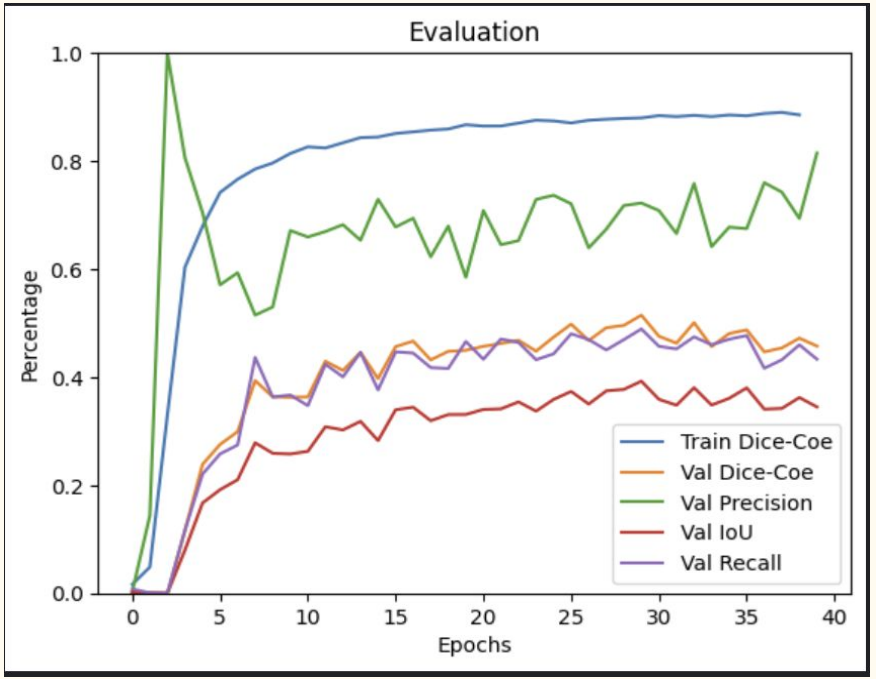
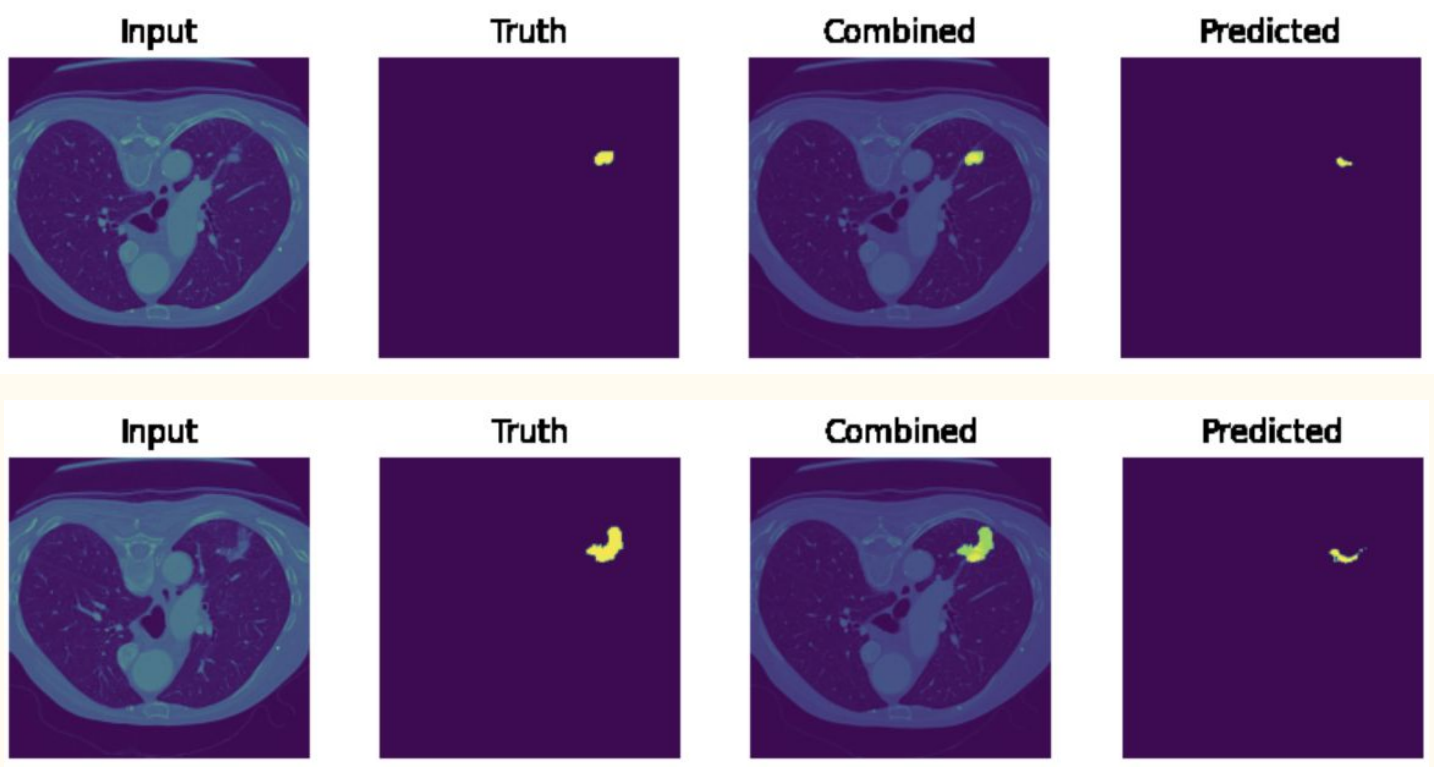
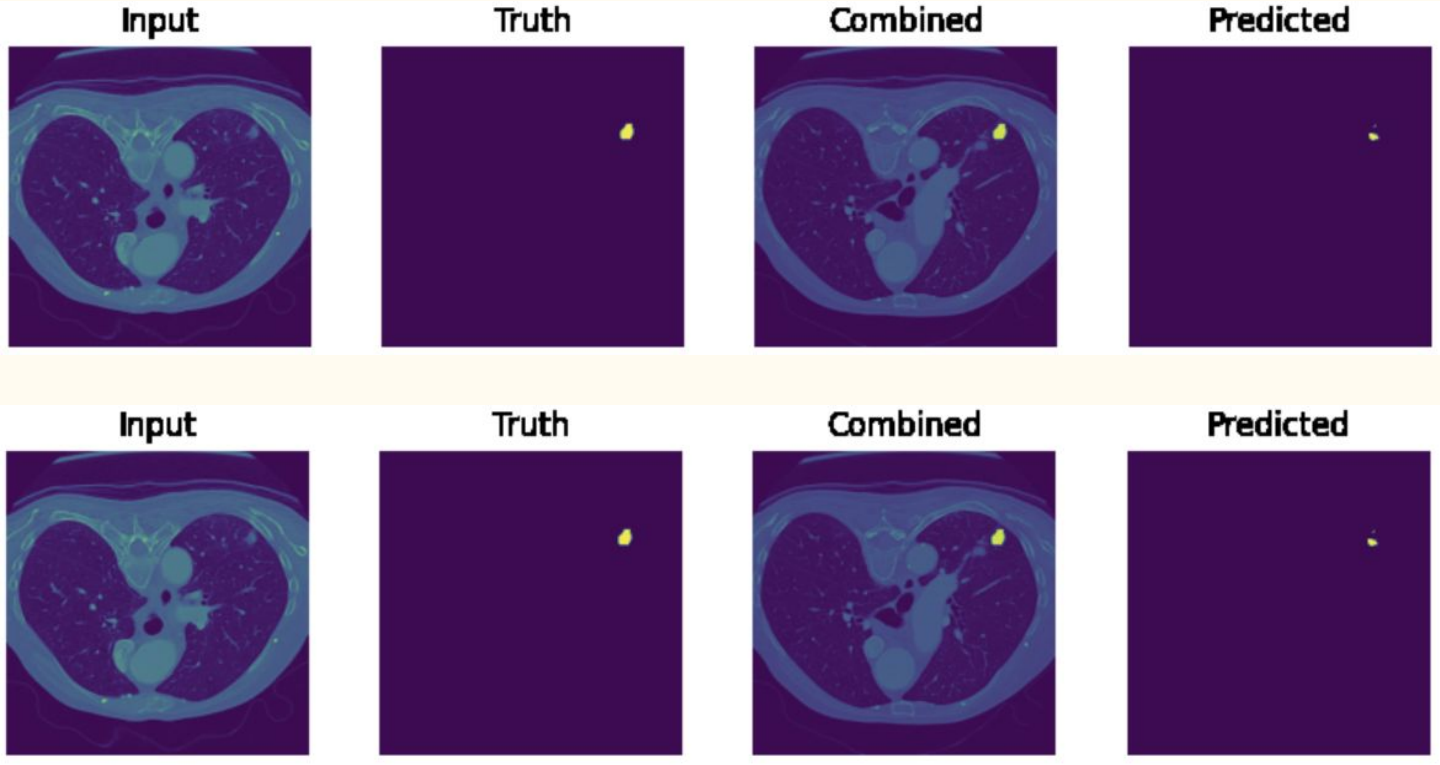


Predictions



Predictions

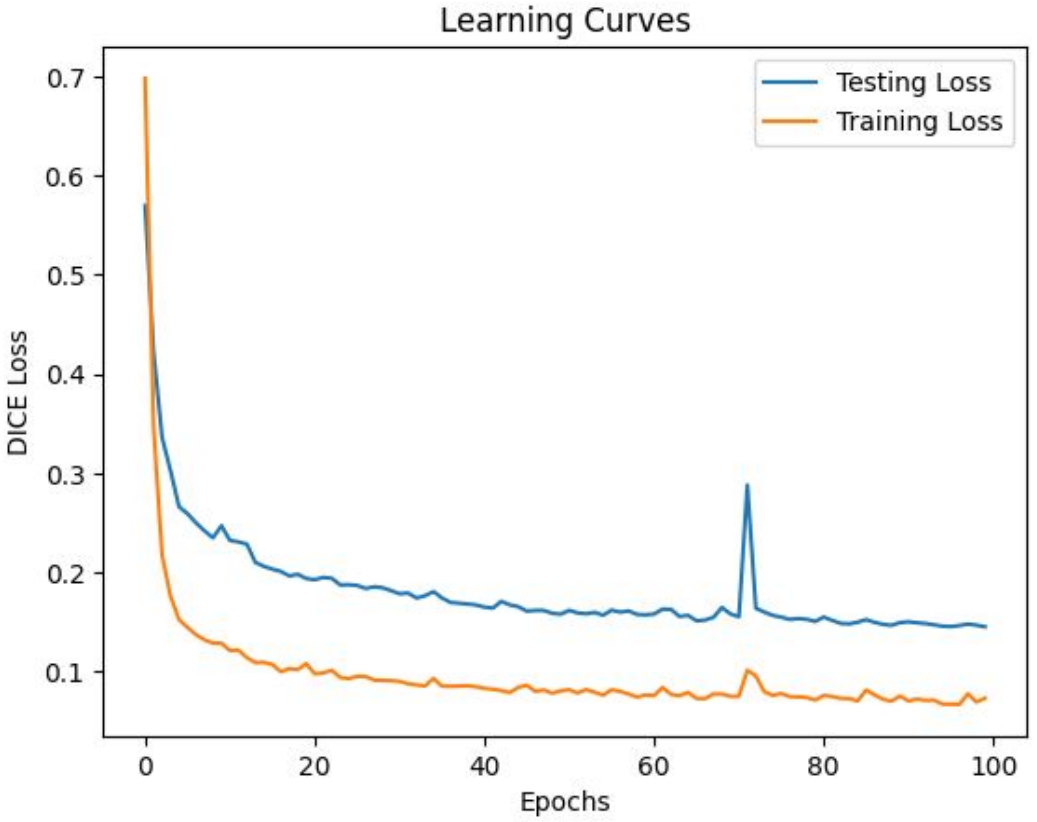


Pretrained ResNet34

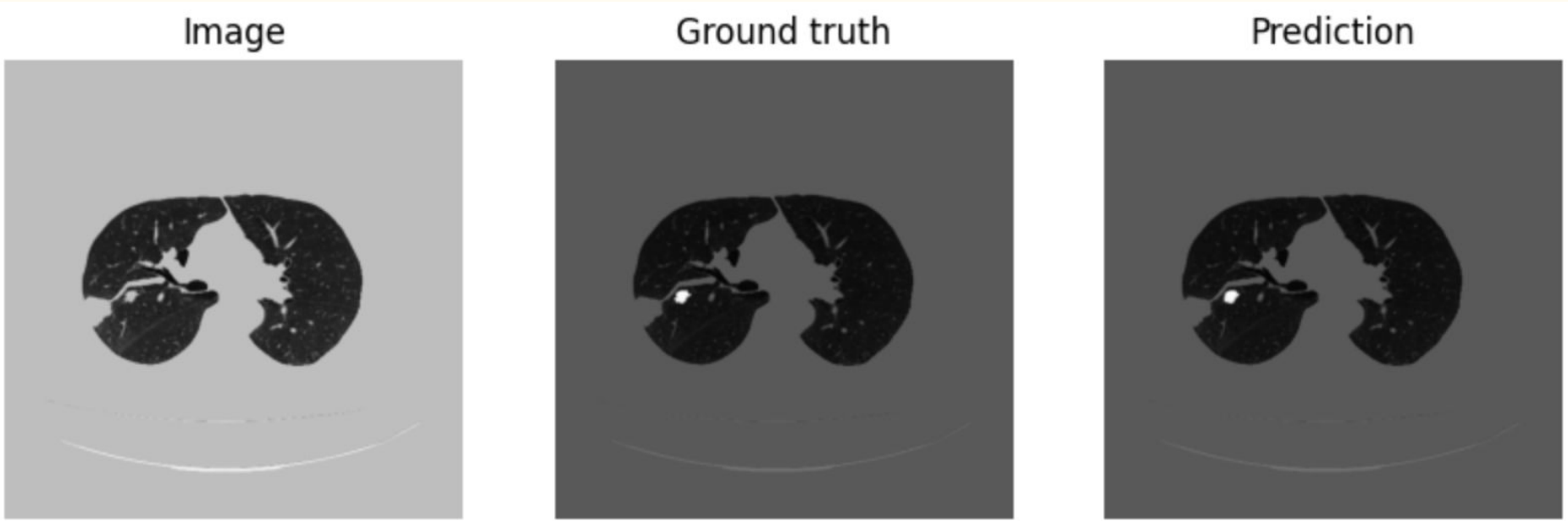
Loss @ 100 Epochs

Training: 0.06
Testing: 0.144

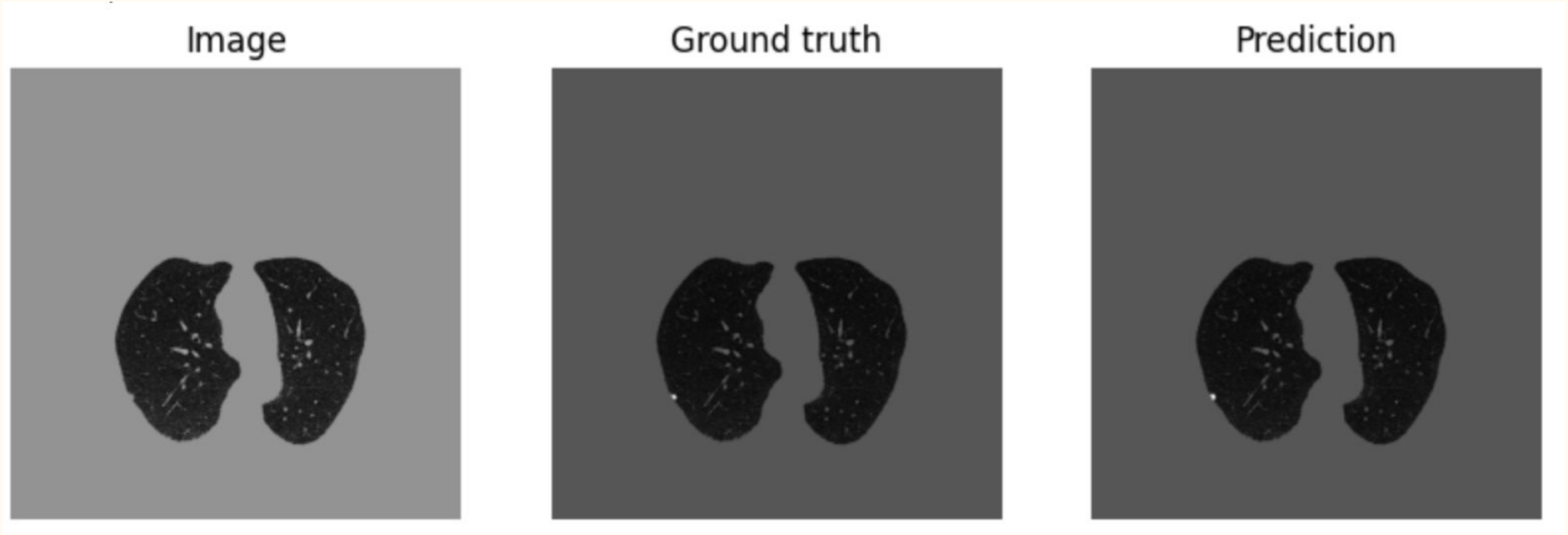
- Train Set: 800 images
- Test Set: 172 images
- Loss Func: Dice
- Optimizer: Adam
- Learn Rate: 0.0001
- Batch Size: 16



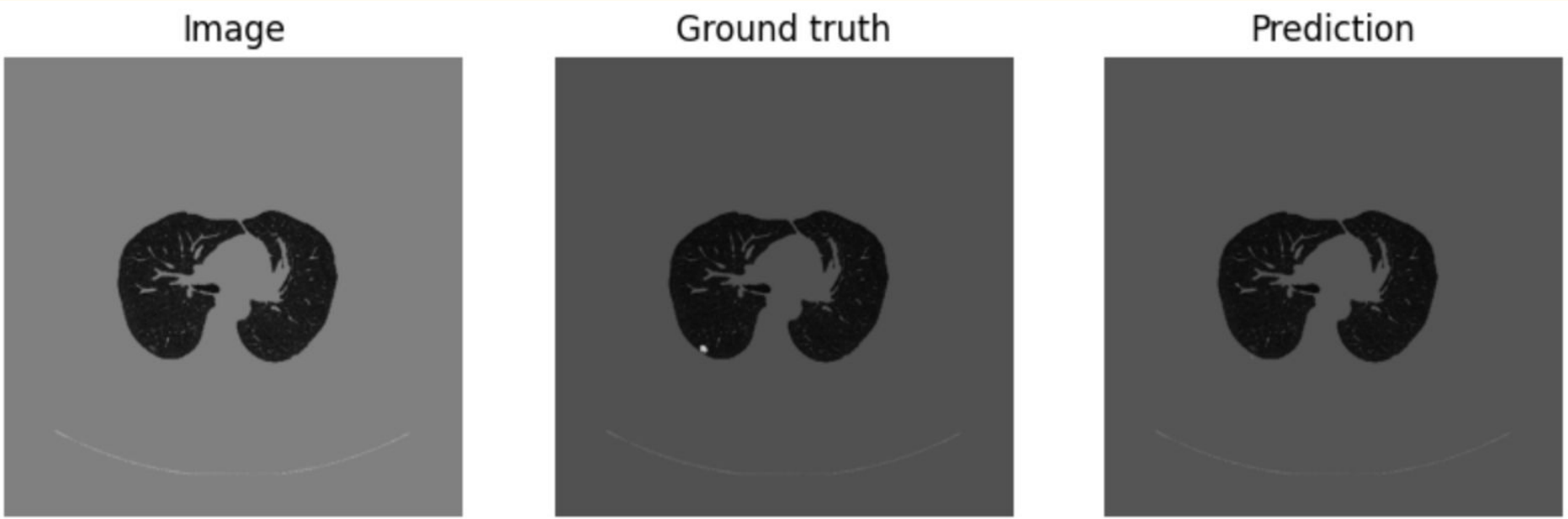
Pretrained ResNet34



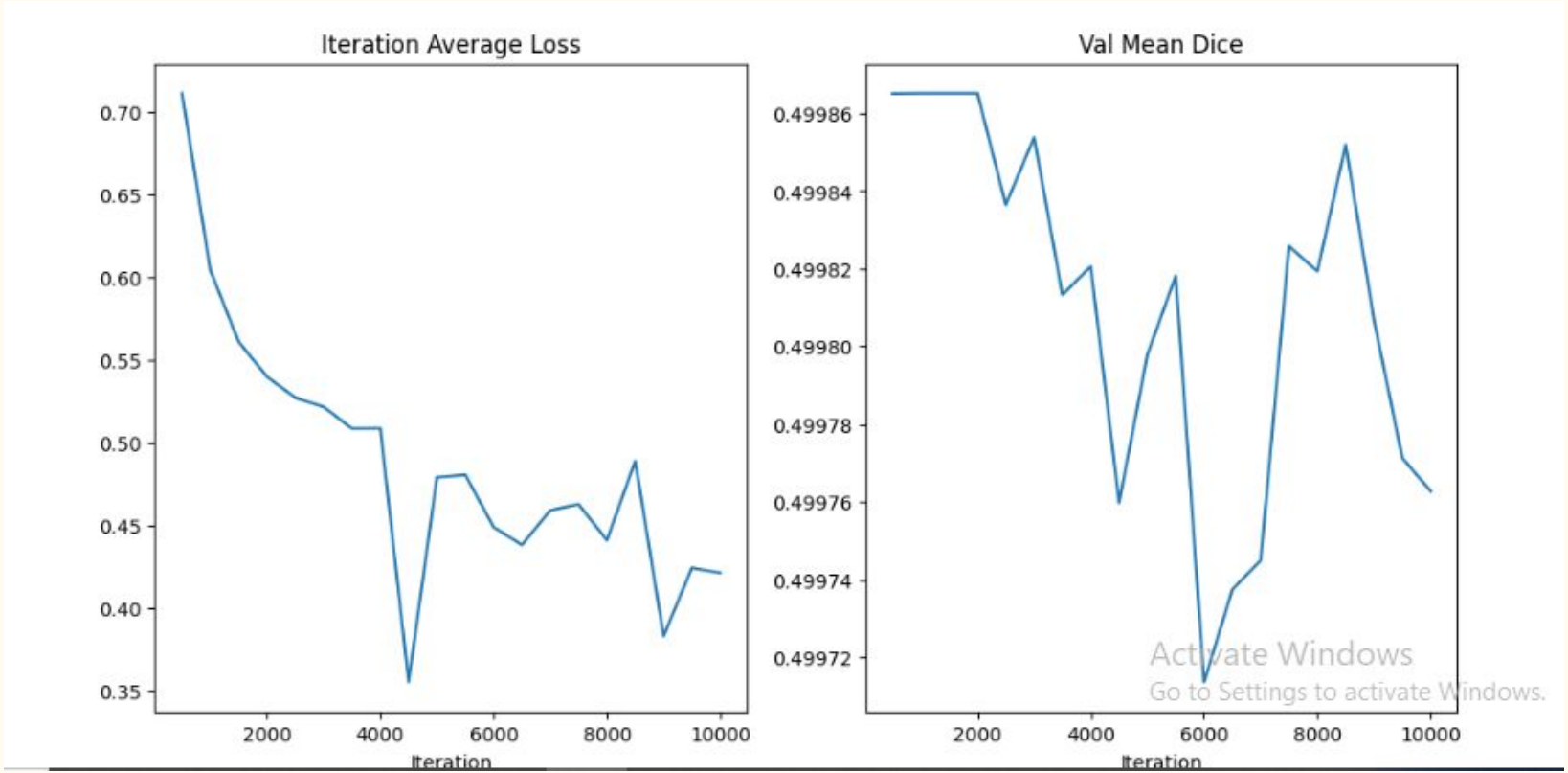
Pretrained ResNet34



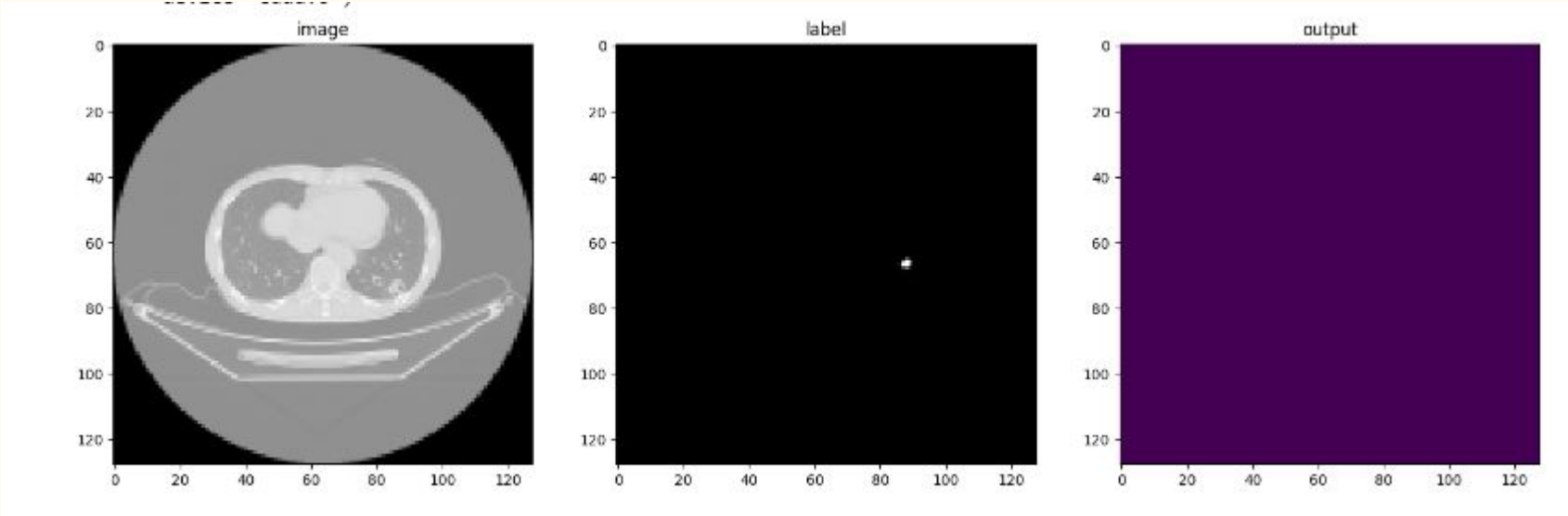
Pretrained ResNet34



UNET-R DiceLoss and Metric



UNET-R Results to Fix before Hyperparameter Tuning



Tentative Development Schedule

Apr 11-18.....Dataset sourcing and literature review

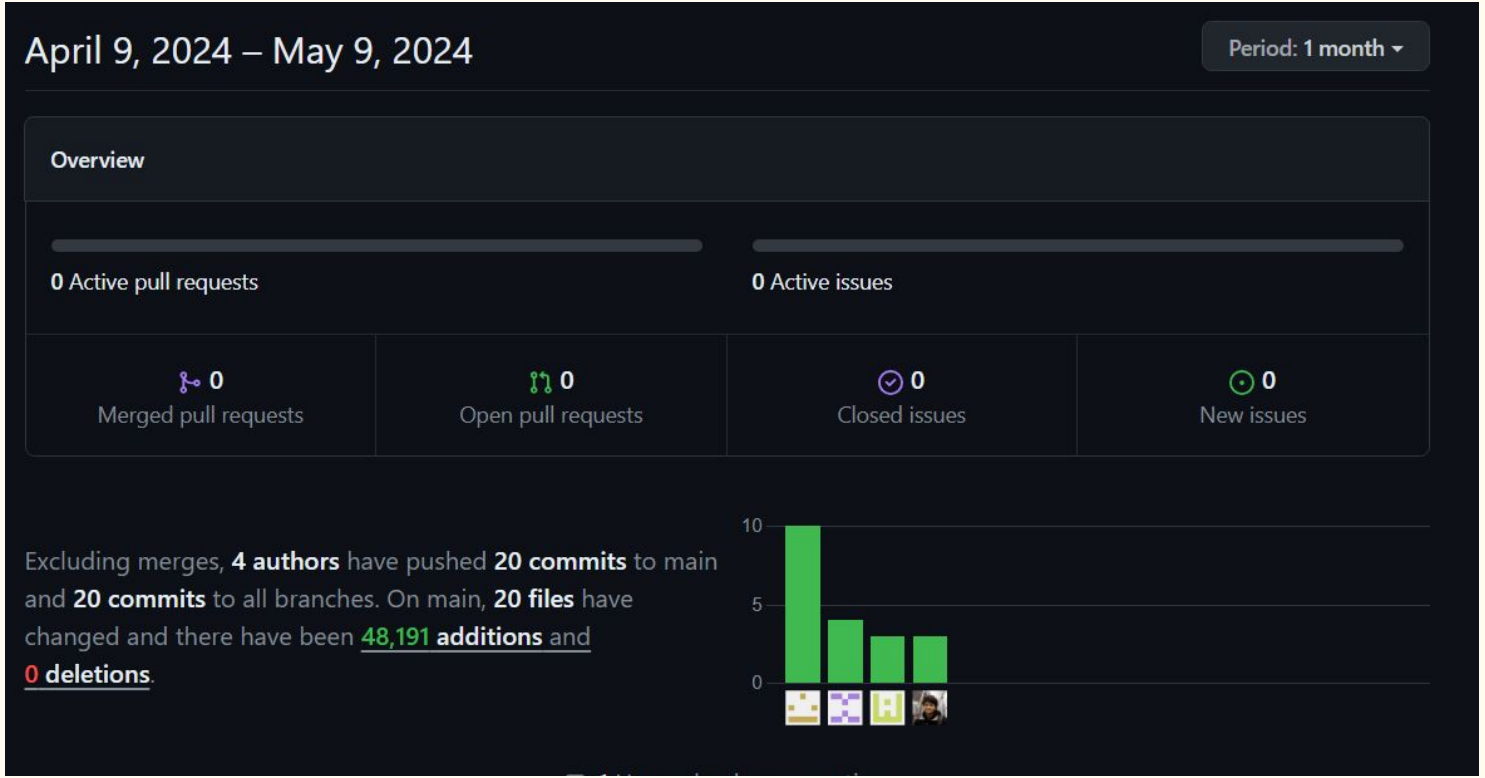
Apr 18-25.....Finetune a pretrained model with this dataset

Apr 25-May 2.....Develop baseline models

May 2-9.....Finish testing baseline models with results

May 9-16.....Presentation & Paper

Github Repo


April 9, 2024 – May 9, 2024
Period: 1 month
Overview
0 Active pull requests
0 Active issues
0
Merged pull requests
0
Open pull requests
0
Closed issues
0
New issues
Excluding merges, 4 authors have pushed 20 commits to main and 20 commits to all branches. On main, 20 files have changed and there have been 48,191 additions and 0 deletions.
10
5
0