Cancer Detection - Final Project

Applied Deep Learning - Fall 2022
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Problem Statement

In this project, the goal is to predict whether a slide contains cancerous cells or not given the slide with different zoom levels.

The approach implemented here is inspired by the work done by Yun Liu and others in a paper titled “Detecting Cancer Metastases on Gigapixel Pathology Images”.

Data Pre-processing

- To train the detection model, I used images with two different zoom levels (2 and 3) taken from a dataset that contains 12 slides for training, 4 for validation and 4 for testing.

- The images are generated by creating non-overlapping patches of size (299,299) from each slide and labeling them according to the provided mask.

- The training database is balanced using extra overlapping patches that was taken from the cancerous cells to make the two classes balanced (50-50) ratio.

Training

- The model uses two pre-trained resnet models connected by a dense layer followed by a dropout layer and an output layer to predict the result.

- The model was trained first without changing the resnet models, and then fine-tuned later with a lower learning rate.

Evaluation

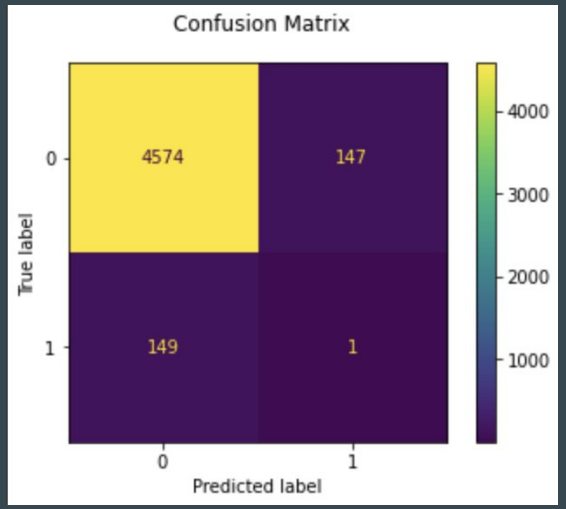
- The model overall performance was assessed using multiple metrics including AUC, ROC curve, accuracy, precision, and recall.
- Heatmaps were generated to compare the predicted masks to the actual masks

Test accuracy: 0.975

Test precision: 0.675

Test recall: 0.657

Test AUC: 0.926



Evaluation - heatmaps