Detecting COVID-19 via Chest X-rays Using Deep Learning
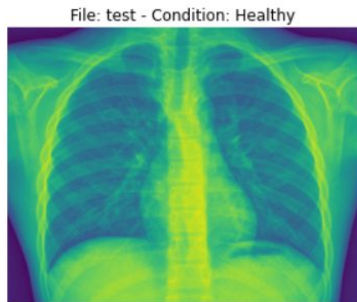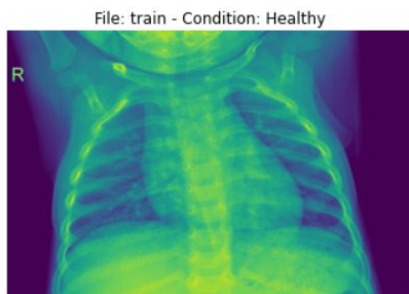
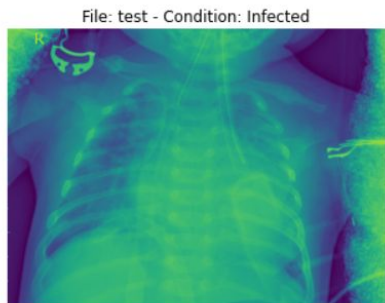**COMP 4711 Final Project**

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Phase 1

Use transfer learning(applied VGG-16 and Resnet) to train a model to detect pneumonia X-ray scans from healthy scans. ([dataset](#))


Result:

Network	Accuracy	Precision	Recall
VGG-16	91.99%	89.72%	98.46%
ResNet-50	91.18%	90.36%	96.15%

Phase 1 (cont.)

- Apply adjustment on the original dataset by changing the ratio of training, validation and testing sets.
- Achieve an improved result for VGG-16 and Resnet
- Train a model of SqueezeNet on the adjusted dataset
- Ensemble VGG-16 and Squeezenet to achieve a better test accuracy
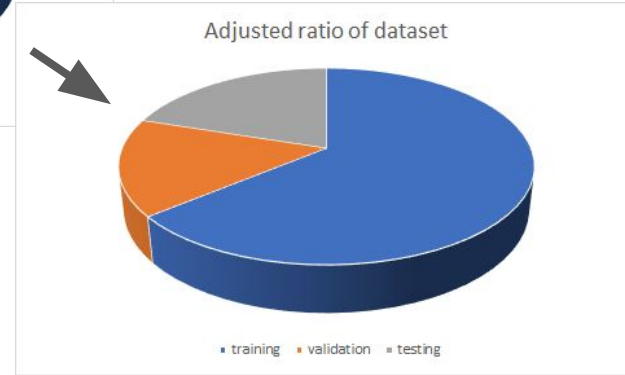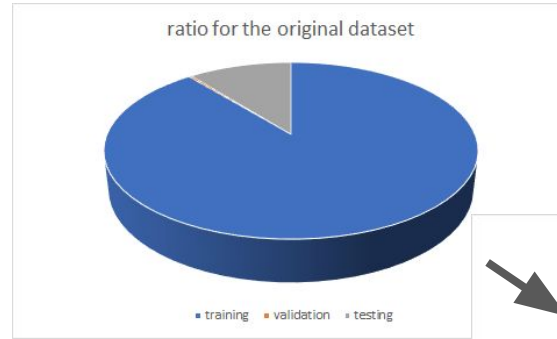
Network	Accuracy	Precision	Recall
VGG-16	97.35%	98.00%	98.34%
ResNet-50	96.33%	96.63%	98.34%
SqueezeNet	96.67%	97.08%	98.34%
Ensemble	97.87%	97.67%	99.41%

Phase 2

Apply transfer learning for VGG-16 model to classify COVID-19 scans from the pneumonia X-ray scans. (dataset add additional images of bacterial scans and COVID-19 scans from other datasets)

Network	Accuracy	Precision	Recall
VGG-16	97.88%	89.66%	100.00%
SqueezeNet	98.59%	96.15%	96.15%
Ensemble	98.59%	92.86%	100.00%

Bone Suppression with CycleGAN

Apply CycleGAN to transfer the original X-ray images into their bone-suppressed version to help doctors for their diagnosis. Suppress the shadow casted by the bones and enhance the quality of X-ray scans.

Original Input   **Bone-suppressed**