AIMIA

Homework 1

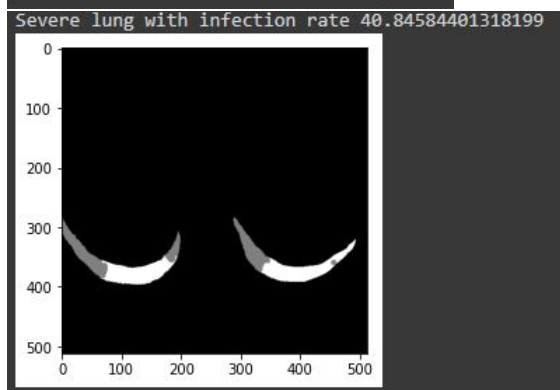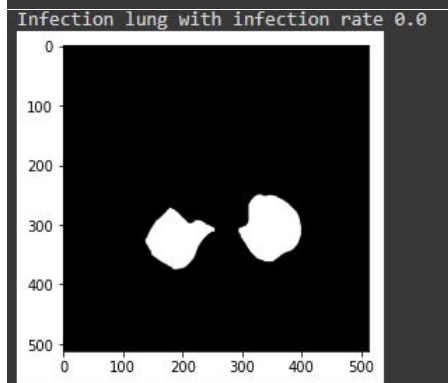*Abhishek Kumar Chaudhary*

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Problem 1:

The distribution I obtained is:
Normal: 1441, Mild: 1954, Severe: 159 Distribution in terms of percentage:
Normal: 40.5%, Mild: 54.9%, Severe: 5.5%
Photos:

Problem 2:

Apply the K-Means algorithm on the given CT Scans for segmenting the infected and healthy regions of the lung tissue. Compare the predicted mask from K-Means with expert annotation and report the averaged dice score, sensitivity, specificity, and accuracy for the normal and infected regions.

Table 1: Results of K means clustering

Results	Infection Region	Healthy Region
Dice Score	0.276	0.831
Sensitivity	0.451	0.822
Specificity	0.992	0.991
Accuracy	0.984	0.985

Also, display two sample slices along with the expert infection mask and predicted mask.
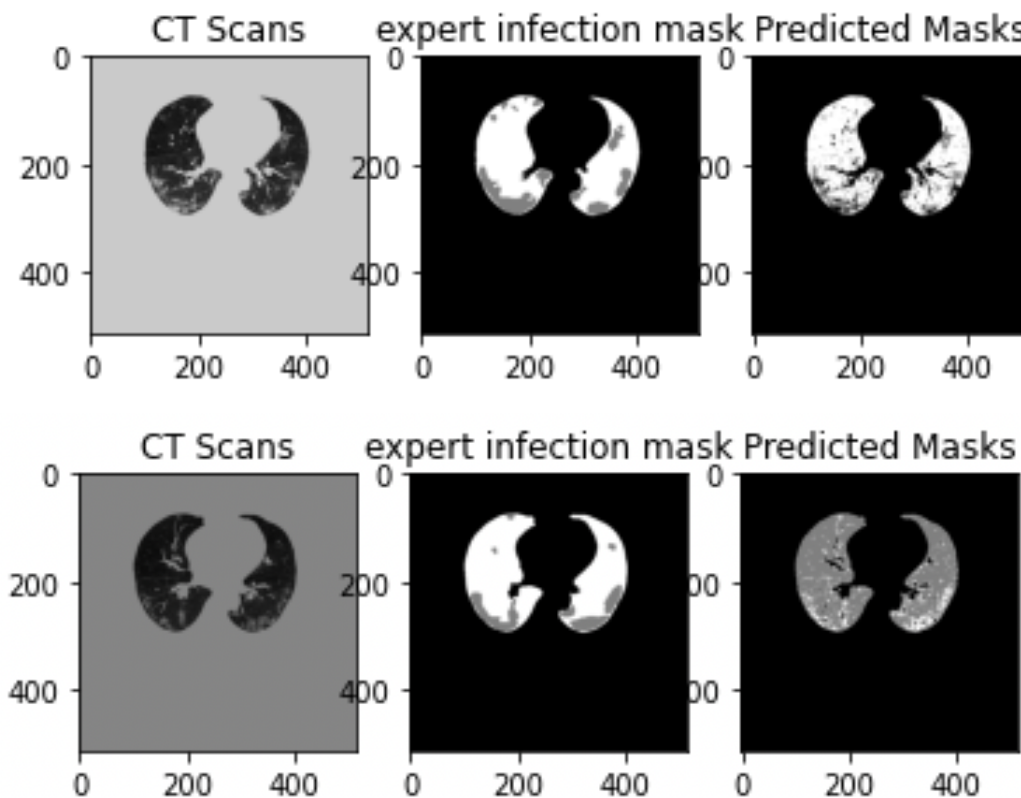

Problem 3:

Reconstruct the given CT Scans from limited angle Sinograms (4x and 8x) and report the averaged quality metrics PSNR and SSIM for the limited angle reconstructions. Used K-means
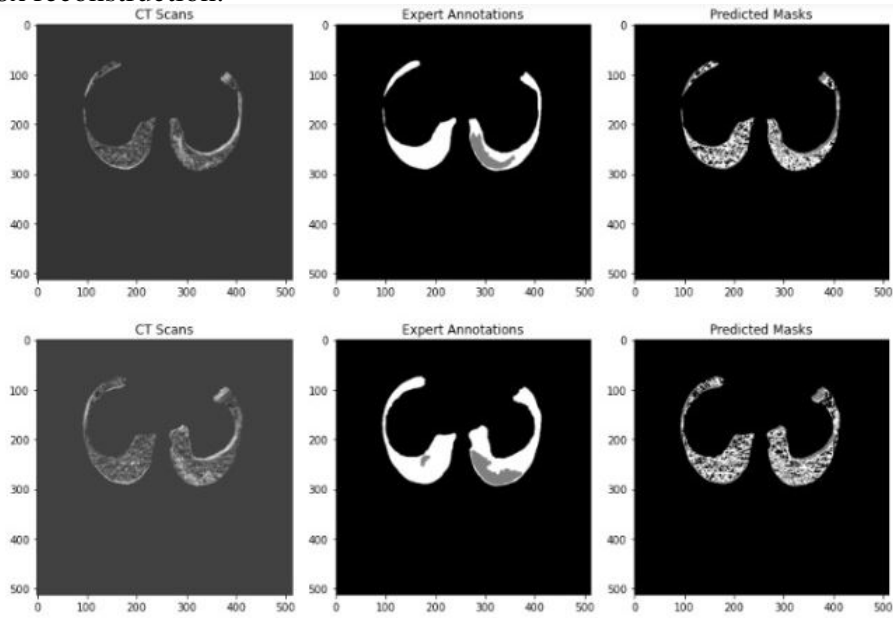
Table 2: PSNR & SSIM for Reconstructed CT Scan Images

Results	4x Reconstruction	8x Reconstruction
PSNR	4.276	3.451
SSIM	0.134	0.121

Also, display a sample slice along with 4x reconstruction.
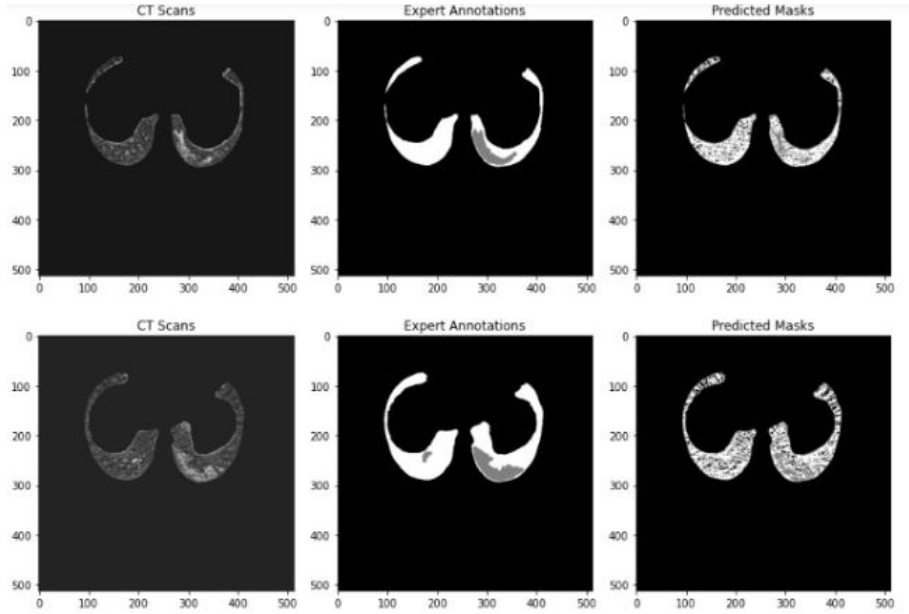
8x reconstruction.

Repeat Q2 on the limited angle CT reconstructed data.
(i) 4x Reconstruction

Table 3: Results metrics

Results	Infection Region	Healthy Region
Dice Score	0.294	0.841
Sensitivity	0.421	0.572
Specificity	0.942	0.991
Accuracy	0.954	0.955

(ii) 8x Reconstruction

Table 4: Results metrics

Results	Infection Region	Healthy Region
Dice Score	0.182	0.652
Sensitivity	0.482	0.591
Specificity	0.942	0.981
Accuracy	0.985	0.975

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