Artificial Intelligence for Medical Image Analysis Assignment 2

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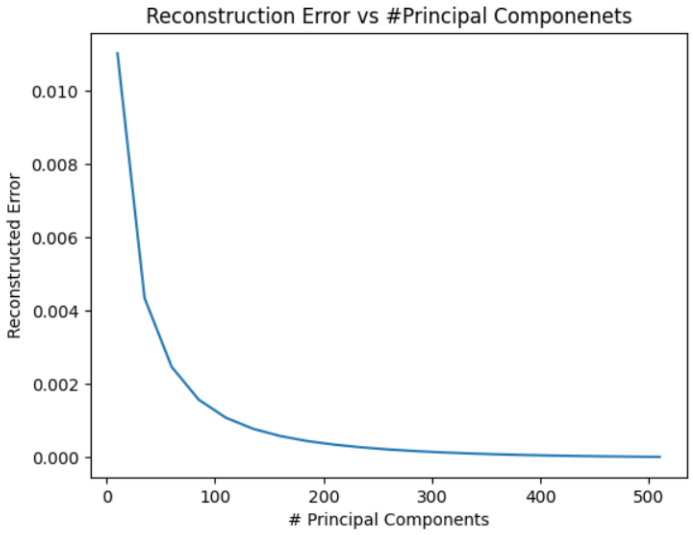
Q1

Task: Perform Principal Component Analysis(PCA) and project the high dimensional CT embeddings to 100 and 50 dimensions.
Reconstruction Error, when reduced dimension is **50: 0.00304**
Reconstruction Error, when reduced dimension is **100: 0.00124**
Graph between Number of Principal Components and Reconstruction Error:



Q2

Task: Used PCA to reduce the dimensions from 1024 to 150. Applied Multi-class SVM with Linear and RBF kernel to classify the CT embeddings as one of the three classes i.e., Normal, Mild and Severe.
The following results were obtained:

1. **Linear Kernel**

TRAIN SET	Normal	Mild	Severe
Accuracy	93.85%	93.69%	99.60%
F1 Score	0.92	0.94	0.96

Evaluation metrics for Train Set(Linear Kernel).

VALIDATION SET	Normal	Mild	Severe
Accuracy	93.52%	93.80%	99.15%
F1 Score	0.93	0.94	0.88

Evaluation metrics for Validation Set(Linear Kernel).

TEST SET	Normal	Mild	Severe
Accuracy	91.99%	91.57%	99.02%
F1 Score	0.91	0.92	0.87

Evaluation metrics for Test Set(Linear Kernel).

2. **RBF Kernel**

TRAIN SET	Normal	Mild	Severe
Accuracy	97.06%	96.90%	99.52%
F1 Score	0.96	0.97	0.95

Evaluation metrics for Train Set(RBF Kernel).

VALIDATION SET	Normal	Mild	Severe
Accuracy	96.34%	95.21%	98.87%
F1 Score	0.96	0.95	0.82

Evaluation metrics for Validation Set(RBF Kernel).

TEST SET	Normal	Mild	Severe
Accuracy	94.66%	93.82%	98.88
F1 Score	0.94	0.94	0.85

Evaluation metrics for Test Set(RBF Kernel).