Session 6 project

Gkloumpos Nikolaos, Malthe H. Boelskift, Louis Ildal, Guillermo V. Gutierrez-Bea,

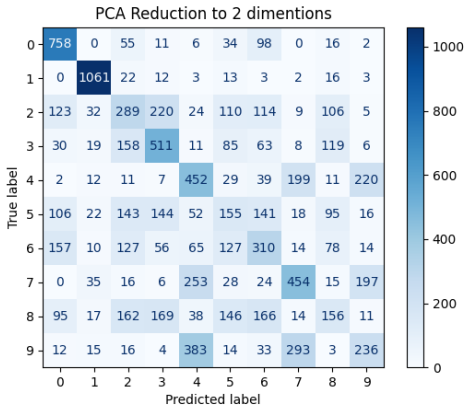
October 4, 2023

Group: 203

1 Excersise

Perform classification for the entire MNIST dataset based on the algorithms introduced: Use LDA for dimensionality reduction to 2 or 9 dimensions, classify the dimension-reduced data and compare this classification performance with that of using PCA.
The data is concatenated and then dimensionality reduced to 2 dimensions using LCA and PDA Using the reduced training data we train a classifier using K-nearest neighbor. Using the obtained classifier we predict the classes for the LCA and PCA reduced test data.
The prediction accuracy for PCA is 0.44.
The prediction accuracy for LDA is 0.55.
Confusion matrices

Figure 1: PCA reduction confusion matrix.



We repeated the exercise but this time the dimensionality of the data was reduced to 9 components instead of 2.
The prediction accuracy for PCA is 0.92.
The prediction accuracy for LDA is 0.92.
Confusion matrices in this case

The accurary of calssification of the PCA reduced data increased by 48%, whereas the accurary of calssification of the LDA reduced data increased by a 37%.

Figure 2: LDA reduction confusion matrix.

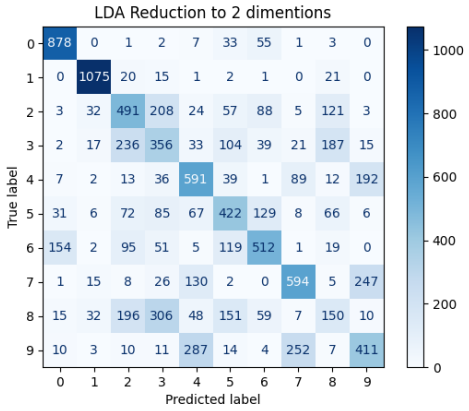


Figure 3: PCA reduction confusion matrix.

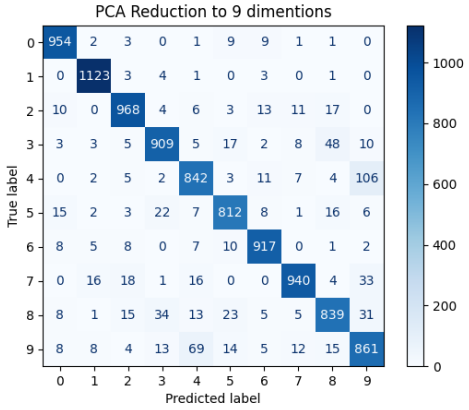


Figure 4: LDA reduction confusion matrix.