**Department of Electrical and Computer Engineering**

Homework Assignment No. 04:

**HW No. 04: Linear Discriminant Analysis**

submitted to:

Professor Joseph Picone

ECE 8527: Introduction to Pattern Recognition and Machine Learning

Temple University

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February 9th, 2023

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# Task 1

The goal for Task 1 was to complete the table below. For ease of reading, I have altered the values that I have calculated myself to be highlighted. Performing these calculations was relatively easy as we have performed a Quadratic Discriminant Analysis (QDA) in a past assignment and Linear Discriminant Analysis (LDA) is quite easy to implement. Conducting the Class-Independent Principle Component Analysis (PCA), however, took a bit more time to complete and implement successfully.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **DS** | **System** | **Training Data** | **Train** | **Dev** | **Eval** |
| #08 | KNN | /train | 23.48 | 26.62 | 64.18 |
| RNF | /train | 29.23 | 29.45 | 59.77 |
| CI-PCA | /train | 0.3607 | 0.3685 | 0.3177 |
| QDA | /train | 0.4992 | 0.4978 | 0.4633 |
| LDA | /train | 0.3610 | 0.3608 | 0.4134 |
| CI-PCA | /train + /dev | 0.3607 | 0.3598 | 0.3301 |
| QDA | /train + /dev | 0.4993 | 0.4992 | 0.4633 |
| LDA | /train + /dev | 0.3610 | 0.3608 | 0.4134 |
| #09 | KNN | /train | 2.11 | 3.81 | 16.63 |
| RNF | /train | 2.06 | 3.82 | 18.32 |
| CI-PCA | /train | 0.9634 | 0.2798 | 0.9747 |
| QDA | /train | 0.9687 | 0.9713 | 0.9304 |
| LDA | /train | 0.9620 | 0.9144 | 0.9803 |
| CI-PCA | /train + /dev | 0.9475 | 0.9182 | 0.04115 |
| QDA | /train + /dev | 0.9715 | 0.9605 | 0.9668 |
| LDA | /train + /dev | 0.9620 | 0.9144 | 0.9803 |
| #10 | KNN | /train | 7.63 | 38.83 | 33.44 |
| RNF | /train | 2.15 | 39.74 | 33.28 |
| CI-PCA | /train | 0.5301 | 0.5270 | 0.4892 |
| QDA | /train | 0.8392 | 0.5524 | 0.6589 |
| LDA | /train | 0.5301 | 0.5534 | 0.4893 |
| CI-PCA | /train + /dev | 0.5282 | 0.5074 | 0.5092 |
| QDA | /train + /dev | 0.8503 | 0.8247 | 0.6530 |
| LDA | /train + /dev | 0.5301 | 0.5534 | 0.4893 |

One important thing to notice