ELEC 425 – Assignment 1

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**1.2 Training**

Class Conditional Gaussian

Maximum Likelihood Estimation for each class k using the formula:

Graphical user interface, text, application

Description automatically generated

Shared σ2 can be estimated with the equation:

Text, letter

Description automatically generated

The value obtained was:

Here are the 10 plots of each mean μk (maximum likelihood estimation) with the pixel noise standard deviation:

A picture containing graphical user interface

Description automatically generated

2 Naïve Bayes Classifier

Convert real-valued features **x** into binary features **b** by thresholding:



Get parameters :



Plots of each image for each vector ηk

A picture containing diagram

Description automatically generated

3 Test Performance

Gaussian Classifier

Graphical user interface, text, application, email

Description automatically generated

Naïve Bayes Classifier

Graphical user interface, text, application

Description automatically generated

Results Table

Code to calculate overall error rate:



|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Classifier\ Digit | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | Overall Error Rate |
| Gaussian | 69 | 81 | 63 | 61 | 68 | 44 | 63 | 109 | 110 | 53 | 18.03% |
| Naive | 87 | 104 | 91 | 85 | 111 | 60 | 89 | 121 | 133 | 58 | 23.48% |