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Project Part-1 Report

TASK-I : Feature extraction and normalization

Based on the obtained values such as Mean of Means and Mean of Standard Deviations and Mean of Standard Deviations and Standard Deviation of Standard deviation Normalized Feature Vector(Yi) is Calculated for both Test data and Training Data.

The Same Values will be obtained and be used in case of testing data for further calculation of Normalized Feature Vector

TASK-II : Density estimation

The optimized Values are obtained by using MLE (Maximum Likelihood Estimation). (for T=150)

Class	Mean	Covariance
Image-3	[-0.37951983 0.35854635]	[[0.8437565 -0.91737529] [-0.91737529 1.10355626]]
Image-7	[0.37158471 -0.35104975]	[[0.87417217 -0.72010492] [-0.72010492 0.64980588]]

TASK-III : Bayesian Decision Theory for optimal classification

The Error Probability is considered if at a given values of Yi if P(3) > P(7) then the error is P(7) else P(3).

For T= 150

TASK-I. P(3) = P(7) = 0.5

Data	Average Probability of Error
Training data	0.3140970938143259
Testing Data	0.3064738709774282

TASK-II. P(3) = 0.3 and P(7) = 0.7

Data	Average Probability of Error
Training data	0.22237422922954445
Testing data	0.22088605489469176

TASK-IV : Try different threshold values for feature n

For T= 200

Class	Mean	Covariance
Image-3	[-0.37951983 0.30674367]	[[0.8437565 -0.91624532] [-0.91624532 1.136679]]
Image-7	[0.37158471 -0.30033017]	[[0.87417217 -0.72986478] [-0.72986478 0.68416819]]

P(3)=P(7)=0.5

Data	Average Probablility error
Training data	0.3056937008330423
Testing data	0.30134632671075107

P(3)=0.3 P(7)=0.7

Data	Average
Training data	0.25196358680103786
Testing data	0.2539460350502859