

Experiment 3 Report- Bayes'Classifier

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1 Bayes Classifier

1. Created a test data x_d with dimensions of $x_d \in R^{3000 \times 882}$ by sampling the signal at sampling rate of 44100 HZ
2. Here the determinant of covariance matrix of x_d is zero. This occurs when the variables in the data set are linearly dependent, meaning that one variable can be expressed as a linear combination of the others i.e., the feature vectors may be correlated to each other.
3. If there are too many variables in the data set, it may be difficult to identify which variables are causing the linear dependence. So consider Principal Component Analysis to reduce the dimensionality of the data set while retaining the maximum information.
4. The eigen vectors corresponding to largest eigen value is nothing but First Principal Component in PCA and eigen vector corresponding to second largest eigen value is called Second Principal Component in PCA and so on.
5. We Apply PCA on the training data, calculating the covariance matrix of the training data and finding the eigen vectors to the covariance matrix, by keeping the error to 1 percent so that the number of principal components to be taken are 73 which means that we reduced the dimension of the each feature vector from 882 to 73
6. DCT is applied on x_d as DCT can be used for denoising noisy signals. By transforming a noisy signal into its DCT coefficients, it is possible to filter out the high-frequency components that correspond to the noise, resulting in a cleaner signal. DCT is also used for compression.
7. Calculated accuracy by
$$\frac{\text{Number of correct predictions}}{\text{Total number of predictions}}$$
8. The accuracy during training is 92.7
9. The accuracy during training is 49.5