

### Assignment-3

EE-626

1. Develop a Learning vector quantization (LVQ) model to classify three cardiac diseases such as myocardial Infarction (MI), ventricular hypertrophy (VH) and Atrial fibrillation (AF). The training and the test feature matrices are given in the Matlab files such as 'training.mat' and 'test.mat', respectively. The columns and rows of the feature matrix are features and instances, respectively.

(a) In the training phase, you can use K-means clustering to develop the codebook for each cardiac disease case.

(b) Then, in the testing phase, you have to find out the class label for the test instances. You can use either 'Euclidean' or 'mahalonovis' distance measure in the testing phase.

2. Generate a random sequence of states and observations of length,  $L=100$  using MATLAB for HMM model. The state transition matrix, the observation matrix and the initial state probability vector for this model are given as

$$A = \begin{pmatrix} 0.75 & 0.25 \\ 0.20 & 0.80 \end{pmatrix}$$
$$B = \begin{pmatrix} \frac{1}{6} & \frac{1}{6} & \frac{1}{6} & \frac{1}{6} & \frac{1}{6} & \frac{1}{6} \\ \frac{5}{12} & \frac{2}{12} & \frac{1}{12} & \frac{1}{12} & \frac{2}{12} & \frac{1}{12} \end{pmatrix}$$
$$pi = [ 0.45 \quad 0.55 ]$$

Implement Viterbi algorithm to compute the most likely state sequence for the random observation sequence.