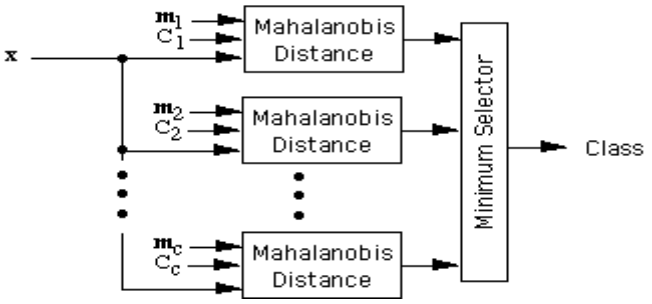
Mahalanobis distance Classifier:

Mahalanobis distance in a minimum-distance classifier as follows. Let $\mathbf{m}_1$, $\mathbf{m}_2$, ... , $\mathbf{m}_c$ be the means (templates) for the c classes, and let C_1, C_2, ... , C_c be the corresponding covariance matrices. We classify a feature vector **x** by measuring the Mahalanobis distance from **x** to each of the means, and assigning **x** to the class for which the Mahalanobis distance is minimum.



The use of the Mahalanobis metric removes several of the limitations of the Euclidean metric:

1. It automatically accounts for the scaling of the coordinate axes
2. It corrects for correlation between the different features
3. It can provide curved as well as linear decision boundaries

Disadvantages:

1. The covariance matrices can be hard to determine accurately, and the memory and time requirements grow quadratically rather than linearly with the number of features. These problems may be insignificant when only a few features are needed, but they can become quite serious when the number of features becomes large.

Euclidean distance Classifier:

The **minimum distance classifier** is used to classify unknown image data to classes which minimize the distance between the image data and the class in multi-feature space. The distance is defined as an index of similarity so that the minimum distance is identical to the maximum similarity.

Euclidean Distance: is defined as the square root of the difference between squares of dimensions.