Bangladesh University of Engineering and Technology

CSE472: Machine Learning Sessional

Assignment 3: Dimensionality Reduction using PCA and Clustering using EM Algorithm

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1 Means, Covariances and Mixing Coefficients

1.1 Means (μ_k)

Cluster	Mean
1	$(-0 \cdot 65488598, -0 \cdot 91102564)$
2	$(14 \cdot 23274289, 0 \cdot 67617285)$
3	$(-10 \cdot 41178164, 0 \cdot 85633098)$

1.2 Covariances (Σ_k)

Cluster	Covariance
1	$\begin{bmatrix} 22 \cdot 04691119 & 0 \cdot 83025689 \\ 0 \cdot 83025689 & 0 \cdot 26002067 \end{bmatrix}$
2	$\begin{bmatrix} 6 \cdot 92264661 & -0 \cdot 47561729 \\ -0 \cdot 47561729 & 0 \cdot 66883359 \end{bmatrix}$
3	$\begin{bmatrix} 16 \cdot 48508518 & -0 \cdot 61333502 \\ -0 \cdot 61333502 & 0 \cdot 24985926 \end{bmatrix}$

1.3 Mixing Coefficients (w_k)

Cluster	Mixing Coefficient
1	$0 \cdot 46002579622034795$
2	$0 \cdot 2403518856961506$
3	$0 \cdot 2996223180835015$

2   PCA plot

EM algorithm with 3 Gaussian distributions