

Pattern Recognition Report3

Chapter3

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1 Question1

In my program of this question,function u1.m compute question(a),u2.m for question(b) ,u3.m for question(c),u4.m for question(d).

1.1 (a)

According to the maximum likelihood estimation on the Gaussian distribution,we can get :

$$\hat{\mu} = \frac{1}{N} \sum_{k=1}^N x_k \quad (1)$$

$$\hat{\Sigma} = \frac{1}{N} \sum_{k=1}^N (x_k - \hat{\mu})(x_k - \hat{\mu})^T \quad (2)$$

In terms of (1) and (2),we could compute the value of the parameters by the program . The results are as follows:

feature	$\hat{\mu}$	$\hat{\sigma}^2$
x_1	-0.0709	0.9062
x_2	-0.6047	4.2007
x_3	-0.9110	4.5419

1.2 (b)

Similar with (1) and (2),we can get the results as follows:

$$\begin{aligned} \mu_{12} &= (-0.0709, -0.6047)^T & \Sigma_{12} &= \begin{matrix} 0.9062 & 0.5678 \\ 0.5678 & 4.2007 \end{matrix} \\ \mu_{23} &= (-0.6047, -0.9110)^T & \Sigma_{23} &= \begin{matrix} 4.2007 & 0.7337 \\ 0.7337 & 4.5419 \end{matrix} \\ \mu_{13} &= (-0.0709, -0.9110)^T & \Sigma_{13} &= \begin{matrix} 0.9062 & 0.3941 \\ 0.3941 & 4.5419 \end{matrix} \end{aligned}$$

1.3 (c)

According to (1) and (2), we get the results as follows:

$$\mu = (-0.0709, -0.6047, -0.9110)^T$$

$$\Sigma = \begin{matrix} & \begin{matrix} 0.9062 & 0.5678 & -0.9110 \end{matrix} \\ \begin{matrix} 0.5678 \\ 0.3941 \end{matrix} & \begin{matrix} 4.2007 & 0.7337 \\ 0.7337 & 4.5419 \end{matrix} \end{matrix}$$

1.4 (d)

1.5 (e)

1.6 (f)