Lab-10

07/05/2025

feature	example1	eg2	eg3	eg4
x_1	4	8	13	7
x_2	11	4	5	14

Consider eigen value $\lambda_1 = 30.3849$

$\lambda_2 = 6.6151$

Consider eigen vectors e_1

$$e_1 \begin{bmatrix} 0.5590 \\ -0.8303 \end{bmatrix}$$

$$e_2 = \begin{bmatrix} 0.5303 \\ 0.5974 \end{bmatrix}$$

① data matrix =

$$\begin{bmatrix} 4 & 8 & 13 & 7 \\ 11 & 4 & 5 & 14 \end{bmatrix}$$

② mean can be data

$$\text{mean}_{x_1} = \frac{4+8+13+7}{4} = 8$$

$$\text{mean}_{x_2} = \frac{11+4+9+14}{4} = 8.5$$

$$X_{centred} = \begin{bmatrix} 4-8 & 8-8 & 13-8 & 7-8 \\ 11-8.5 & 4-8.5 & 5-8.5 & 10-8.5 \end{bmatrix}$$

$$= \begin{bmatrix} -4 & 0 & 5 & -1 \\ 2.5 & 4.5 & -3.5 & -5.5 \end{bmatrix}$$

(3) using projections data onto principle components

$Z = e^T \cdot X_{centred}$

$z_1 = (0.56744)(-4) + (-0.8303)(2.5)$
$= -4.30535$

$z_2 = (0.53744)(0) + (-0.8303)(-4.5) =$
$= 3.73535$

$z_3 = (0.55744)(5) + (0.8303)(-3.5)$
$= 5.69305$

$z_4 = (0.55744)(-1) + (-0.8303)(5.3)$
$= -5.12405$

$= [-4.30535, 3.73635, 5.69305$
$-5.12405]$

Model accuracy:

Before	After
logistic : 0.8833	logistic : 0.8667
Svm = 0.8778	Svm : 0.8556
Random : 0.889.	Random : 0.8722
forest	forest