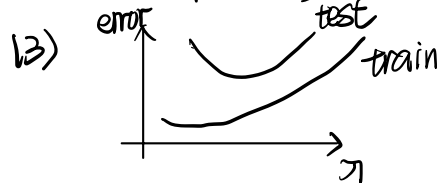


Quiz 6

1. T F T F

2. (1) 线性为连续, 逻辑为离散

(2) KNN 有 label, K-Means 无 label



3. (1) D

(2) A

(3) A

$$4. a) \hat{w} = \underset{w}{\operatorname{argmin}} \|y - Xw\|^2 + \lambda \|w\|^2 \triangleq \underset{w}{\operatorname{argmin}} L(w)$$

$$\text{let } 0 = \frac{\partial L}{\partial w} = -2X^T(y - Xw) + 2\lambda w$$

$$\Rightarrow \hat{w} = (X^T X + \lambda I)^{-1} X^T y$$

$$b) E(\hat{w}) = (X^T X + \lambda I)^{-1} X^T X w \neq w$$

Not unbiased

5. (a) (i) After centralization $X = \begin{bmatrix} -1 & 1 \\ 0 & 0 \\ 1 & 1 \end{bmatrix}$

$$C = \frac{1}{n-1} X^T X = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}, \lambda_1 = 2, \lambda_2 = 0$$

$$v_1 = \frac{1}{\sqrt{2}} \begin{bmatrix} 1 \\ 1 \end{bmatrix}, v_2 = \frac{1}{\sqrt{2}} \begin{bmatrix} 1 \\ -1 \end{bmatrix}$$

The first is $v_1 = \frac{1}{\sqrt{2}} \begin{bmatrix} 1 \\ 1 \end{bmatrix}$

(ii) $\text{var} = \lambda_1 = 2$

(b) 上 NMF

下 PCA