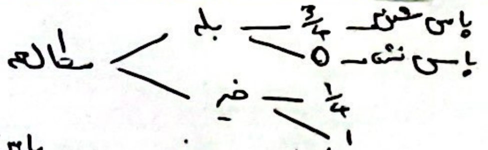
تمرین سری ۳ - علی ایالو 9831322



پاس / حضور	بله	خیر
بله	3/4	0
خیر	1/4	1

پاس / عمل	بله	خیر
ضعیف	1/4	1/2
متوسط	1/4	1/2
عالی	1/2	0

→ $P(\text{yes} \mid \text{عالی}, \text{بله}, \text{خیر}) = \frac{4}{6} \cdot \frac{2}{4} \cdot \frac{3}{4} \cdot \frac{1}{4} = \frac{1}{16}$

$P(\text{No} \mid \text{عالی}, \text{بله}, \text{خیر}) = \frac{2}{6} \cdot 0 \cdot 0 \cdot 1 = 0$

$P(\text{No} \mid \text{مطالعه بله}) = \frac{0+1}{3+1\cdot 2} = \frac{1}{5}$

$P(\text{No} \mid \text{عمل عالی}) = \frac{0+1}{4+1\cdot 3} = \frac{1}{7}$

$P(\text{No} \mid \text{حضور خیر}) = \frac{2+1}{2+1\cdot 2} = \frac{3}{4}$

→ Laplace Smoothing

$\frac{2}{6} \cdot \frac{1}{5} \cdot \frac{1}{7} \cdot \frac{3}{4} = \frac{1}{140}$

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2) الف)

A / کلاس	+	−
1	4/5	2/5
0	1/5	3/5

B	+	−
1	1/5	2/5
0	4/5	3/5

C	+	−
1	4/5	1
0	1/5	0

→ $P(A=0, B=0, C=0)$:

$P(+ \mid \dots) = P(+) P(A \mid +) \dots = \frac{1}{2} \cdot \frac{2}{5} \cdot \frac{1}{5} \cdot \frac{1}{5} = \frac{1}{125}$

$P(- \mid \dots) = 0 \rightarrow P(A=0, B=1, C=0) = \frac{1}{125}$

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3) [((2,4),B), ((4,6),B), ((4,4),R), ((4,2),B), ((6,4),B), ((6,2),R)]

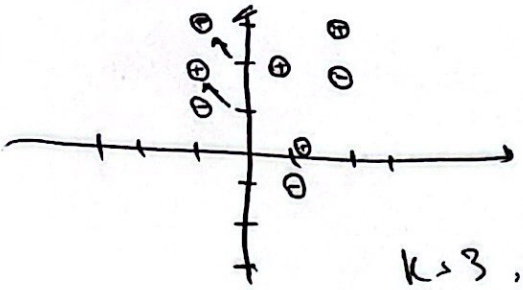
$$D_{\text{distance}} = \begin{bmatrix} 0 & 2\sqrt{2} & 2 & 2\sqrt{2} & 4 & 2\sqrt{5} \\ 2\sqrt{2} & 0 & 2 & 4 & 2\sqrt{2} & 2\sqrt{5} \\ 2 & 2 & 0 & 2 & 2 & 2\sqrt{2} \\ 2\sqrt{2} & 4 & 2 & 0 & 2\sqrt{2} & 2 \\ 4 & 2\sqrt{2} & 2 & 2\sqrt{2} & 0 & 2 \\ 2\sqrt{5} & 2\sqrt{5} & 2\sqrt{2} & 2 & 2 & 0 \end{bmatrix}$$

for each point identify the index of min distance

=> A line separating blue & red region can be drawn between points (4,4), (6,2)

ب) خیر

ج) بله حل شده ولی پیمایش که بعلت حجم محاسبات زیاد



$(1,+1) \rightarrow$ Distances: $\begin{cases} (-1,1), 2 \\ (0,1), 1 \\ (0,2), \sqrt{2} \\ (1,-1), 2 \\ (1,0), 1 \\ (1,2), 1 \\ (2,2), \sqrt{2} \\ (2,3), \sqrt{5} \end{cases}$

$k=3$: $\begin{cases} (0,1) \rightarrow + \\ (1,0) \rightarrow + \\ (1,2) \rightarrow + \end{cases} \rightarrow \oplus$

$k=7$: $\begin{cases} (-1,1), - \\ (0,1) \rightarrow + \\ (0,2), - \\ (1,-1), - \\ (1,0), + \\ (1,2), + \\ (2,3), - \end{cases} \rightarrow \ominus$

ب) $k=3$: $\frac{1}{1} + \frac{1}{1} + \frac{1}{1} \rightarrow \oplus$

$k=7$: $-: \frac{1}{2} + \frac{1}{\sqrt{2}} + \frac{1}{1} - \frac{1}{\sqrt{2}} \rightarrow \oplus$

$+: \frac{1}{1} + \frac{1}{1} + \frac{1}{1} = 3$

5) ب) مرزهای تصمیم هیچ misclassification وجود ندارد