Texture

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Same histogram. different images.

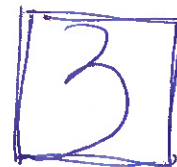
Model database

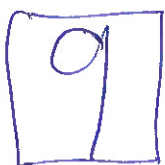|	8	Label
8	O	'0'
	1	'1'
	2	'2'
	3	'3'
	9	'9'

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test image

3   output '3'

* template matching

* KNN

TRANSFORMATIONS

2   2   9

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1

2 ——— 0

3

$0 \to 3 \qquad 2 \to 1$

3   3   3   3
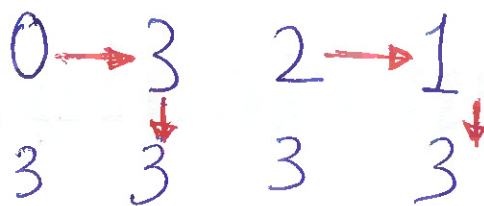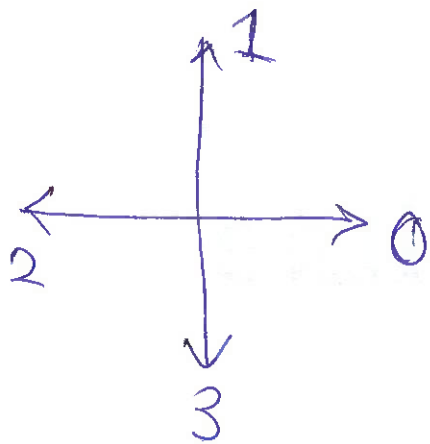
From previous to the current in Counter-Clock direction

$0 \to 0 \quad 3 \quad 2 \quad 2 \quad 1$

0

1   0

3   2

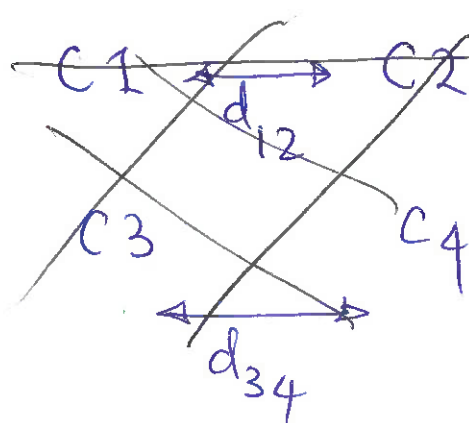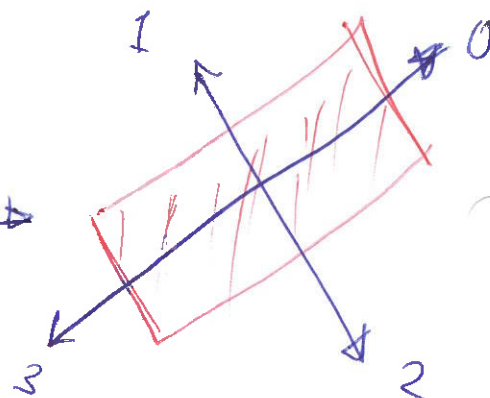C1 → C2

d_{12}

C3   C4

d_{34}
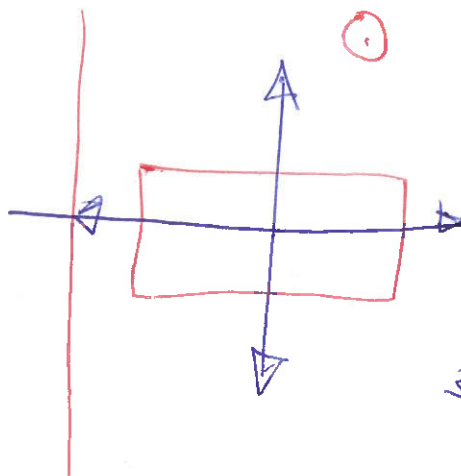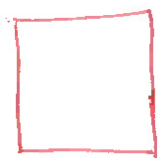
$(x_1, x_2) \quad (y_1, y_2)$

$(x_1 - y_1)^2 + (x_2 - y_2)^0$

$\begin{bmatrix} x_1 - y_1 \\ x_2 - y_2 \end{bmatrix} \begin{bmatrix} (x_1 - y_1) & (x_2 - y_2) \end{bmatrix}$

$$\left[(x_1 - y_1), (x_2 - y_2)\right] \begin{pmatrix} x_1 - y_1 \\ x_2 - y_2 \end{pmatrix}$$

$$= (x_1 - y_1)^2 + (x_2 - y_2)^2$$

$$a^T a, \quad x^T x$$

$$m = \begin{bmatrix} m_1 \\ m_2 \end{bmatrix} \quad x = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

$$\underline{\underline{m^T x}} = \begin{bmatrix} m_1 & m_2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \underline{\underline{x^T m}}$$
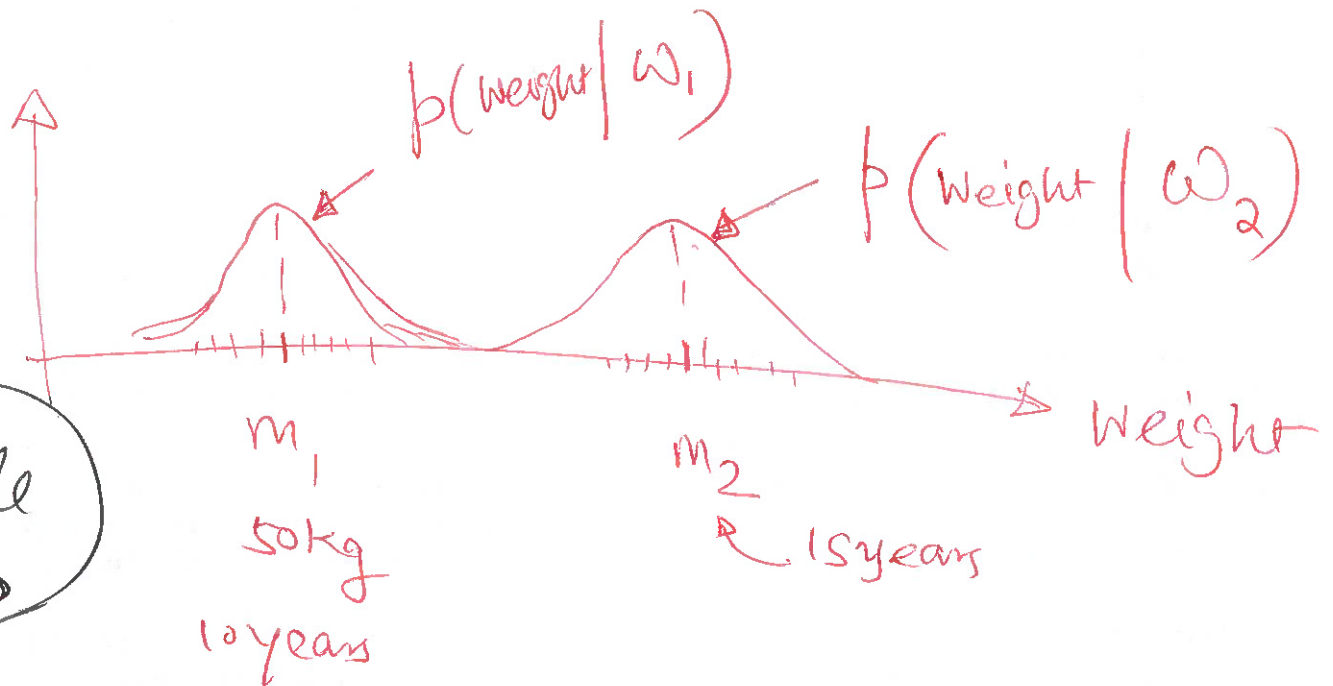
$$P(A, B) = \boxed{P(A|B) \, P(B) = P(B|A) \, P(A)}$$

$$\Rightarrow \quad P(A|B) = \frac{P(B|A) \, P(A)}{P(B)}$$

$w_1 = 10 \text{ yrs}$

$w_2 = 15 \text{ yrs}$

1000s children

1000s children

weights. 50,000

60,000

$p(\text{weight} \mid w_1)$

$p(\text{weight} \mid w_2)$

weight

m_1

m_2

50kg

15 years

10 years

10 years

$p(w_k) \longrightarrow ?$

$p(w_1) = \dfrac{5}{11}$

$p(w_2) = \dfrac{6}{11}$

$d_1(x) = p(x \mid w_1)\, p(w_1) = p(x \mid w_2)\, p(w_2)$
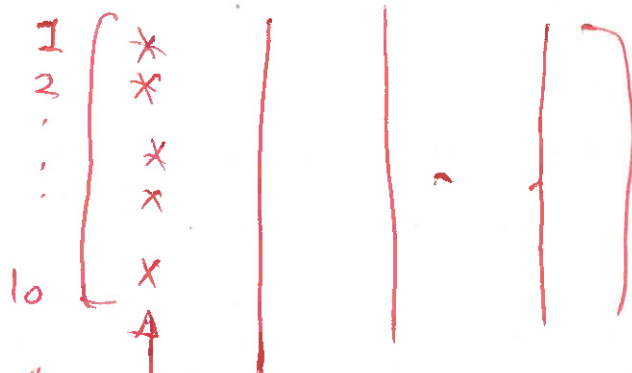
x_2

C1

W_2

x_1

C2

W_1
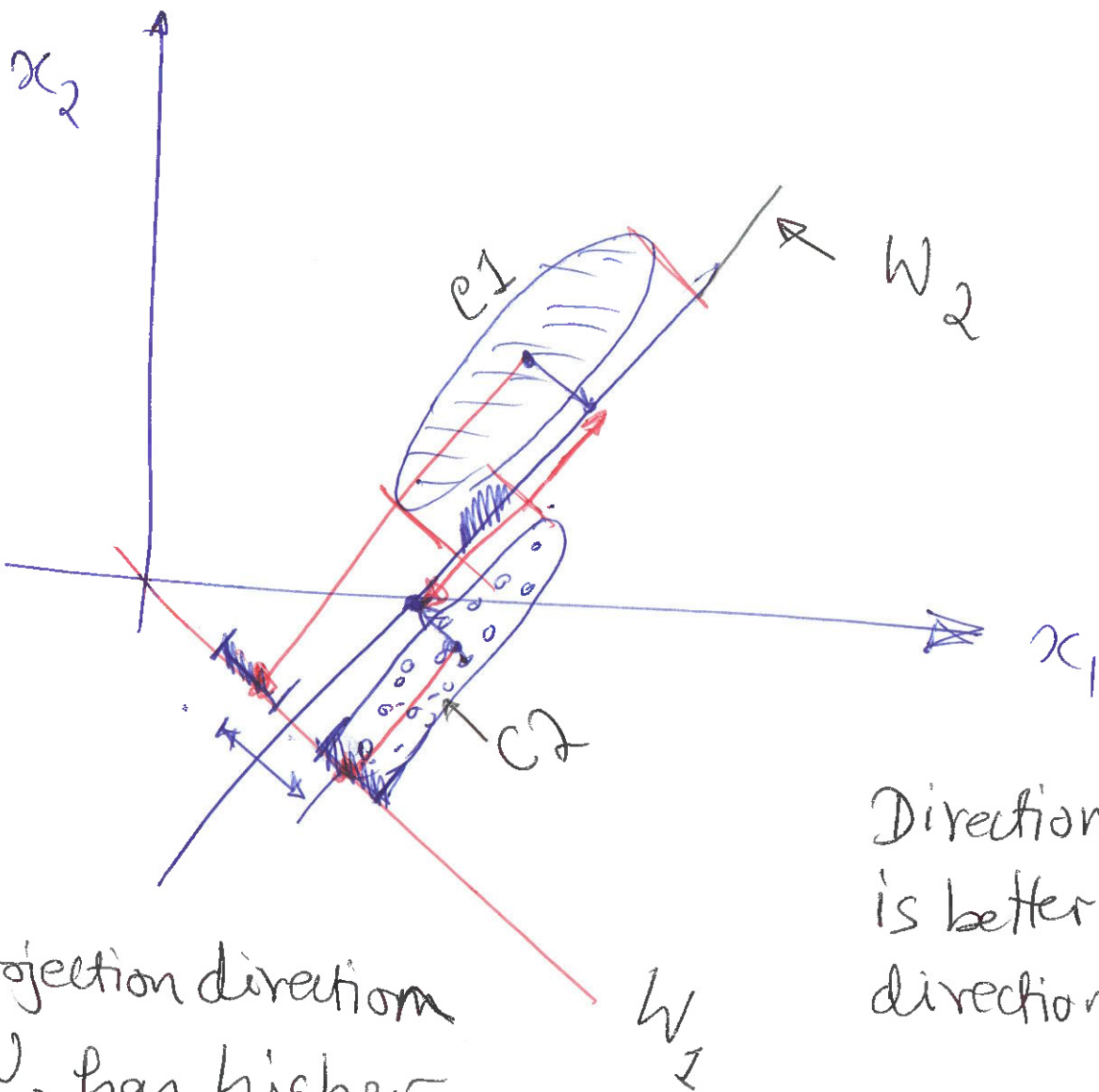
Direction W_1 is better than direction W_2

Projection direction W_2 has higher separation of centres of classes. But they overlap.

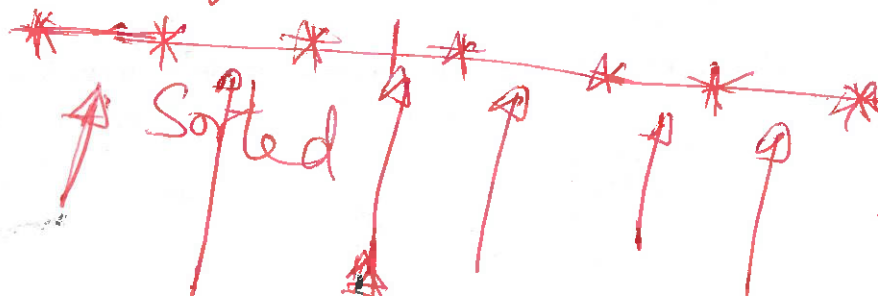Projection direction W_1 has lower separation of centers of classes after projection. But they do not overlap.

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$$
\begin{array}{ccccc}
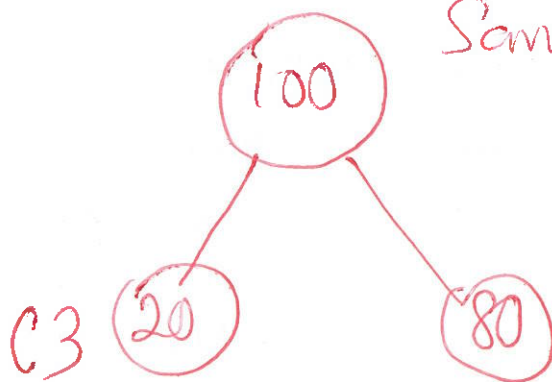 & 1 & 2 & 3 & m \\
1 & * & | & | & | \\
2 & * & | & | & | \\
\vdots & * & | & | & | \\
 & * & | & | & | \\
10 & * & | & | & |
\end{array}
$$

Smallest

Sorted

largest

$m * (n-1)$

← Left Branch

Right Branch →

Samples 5 classes

20, 20, 20, 20, 20

C1 C2 C3 C4 C5

C3 (20)   (80)

C1, C2, C4, C5

$$
\left[1 - \sum_{i=1}^{1} \left(\frac{20}{20} \right)^2 \right]
$$

Left branch

Z_3

larger

Z_2

Px

selected - Saved

Z_1
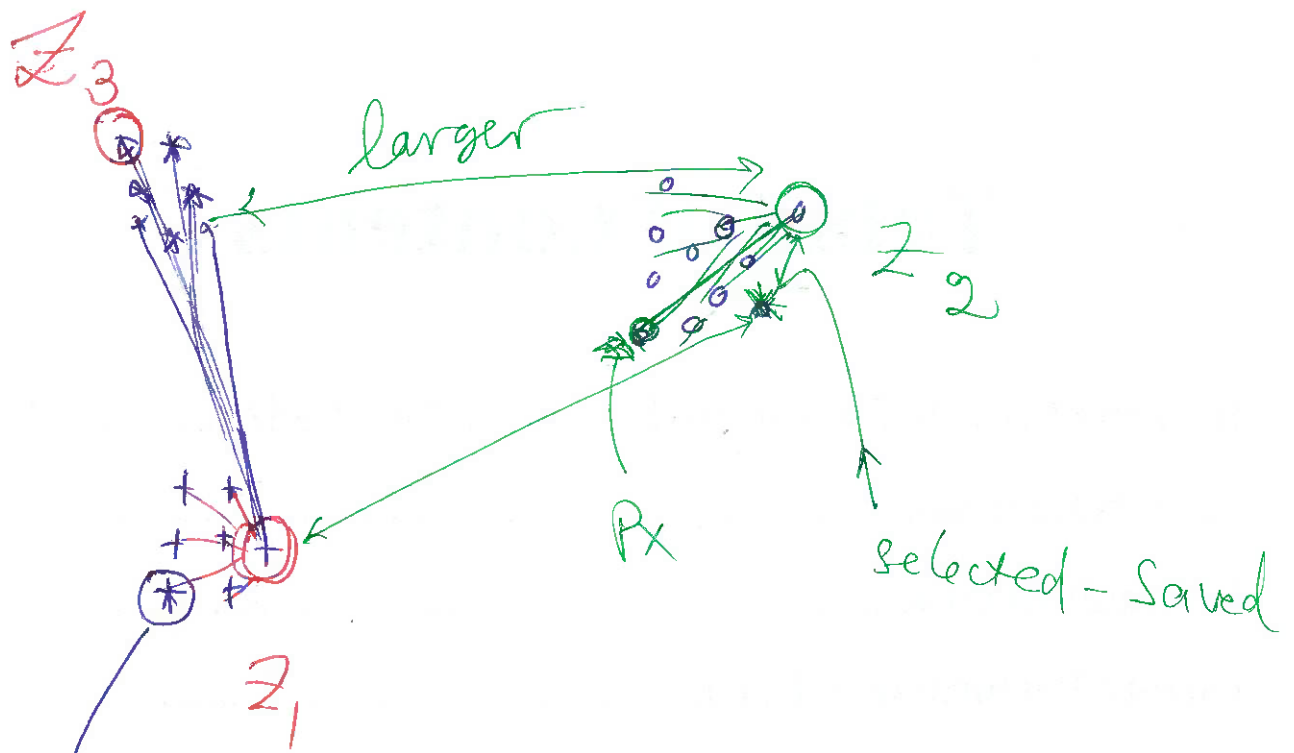
Compute distance between Z_1, Z_2, Z_3
& pick the smallest

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