Example:

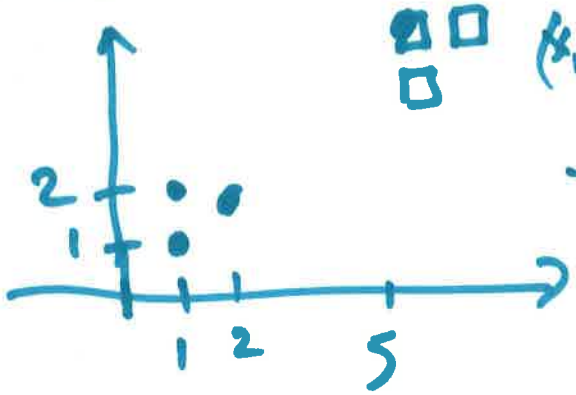
Training data Class 1 Class 2

Output $Y = \{y_1, y_2\}$

$x_1 = \begin{bmatrix} 5 \\ 10 \end{bmatrix}$, $x_2 = \begin{bmatrix} 6 \\ 10 \end{bmatrix}$, $x_3 = \begin{bmatrix} 5 \\ 9 \end{bmatrix}$ ⋮ $\begin{bmatrix} 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 2 \\ 2 \end{bmatrix}, \begin{bmatrix} 1 \\ 2 \end{bmatrix}$

$(x_1, y_1), (x_2, y_1), (x_3, y_2)$ $(y_2\ y_2\ y_2$

← feature space: $\mathbb{R}^2$



Training: Do nothing. Just store the training data

Testing: Given $x = \begin{bmatrix} 5 \\ 9 \end{bmatrix}$. class 1 or class 2?

Heavy computing load:

$c_{11} = \left\| \begin{bmatrix} 5 \\ 10 \end{bmatrix} - \begin{bmatrix} 6 \\ 9 \end{bmatrix} \right\|^2 = 1^2 + 1^2 = 2 = c_{11}$; $c_{21} = \left\| \begin{bmatrix} 5 \\ 9 \end{bmatrix} - \begin{bmatrix} 1 \\ 1 \end{bmatrix} \right\|^2 = 4^2 + 8^2$

$c_{12} = \left\| \begin{bmatrix} 5 \\ 10 \end{bmatrix} - \begin{bmatrix} 6 \\ 9 \end{bmatrix} \right\|^2 = 1^2 = 1$; $c_{22} = \left\| \begin{bmatrix} 5 \\ 9 \end{bmatrix} - \begin{bmatrix} 2 \\ 2 \end{bmatrix} \right\| = 4^2 + 7^2$

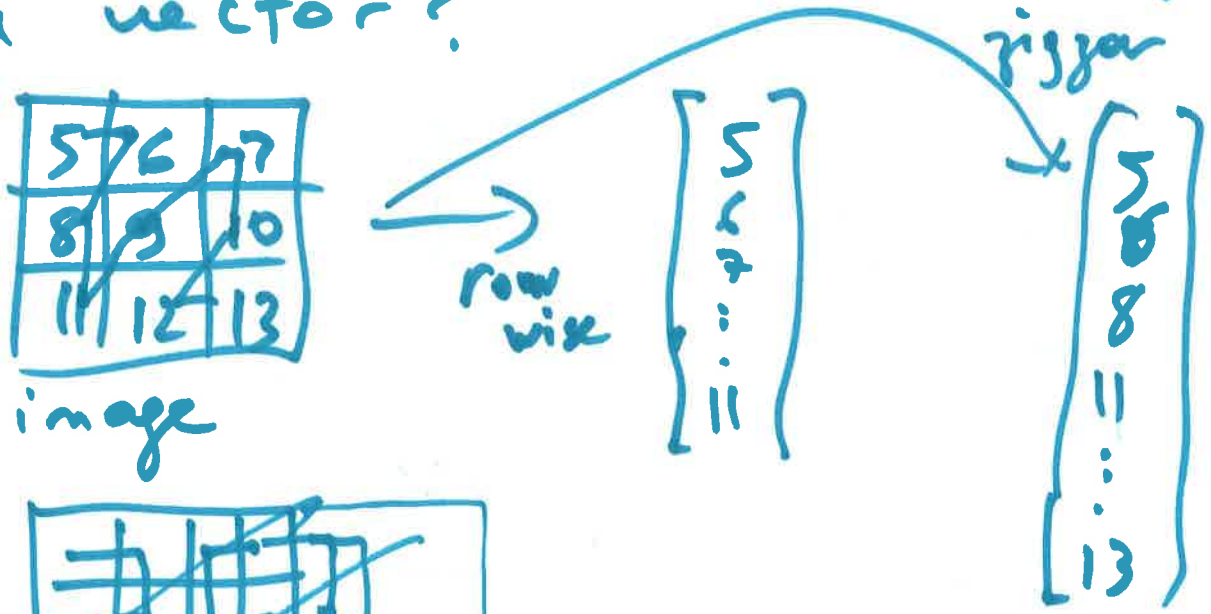
$c_{13} \left\| \begin{bmatrix} 5 \\ 9 \end{bmatrix} - \begin{bmatrix} 6 \\ 9 \end{bmatrix} \right\|^2 = 1$; $c_{23} = \left\| \begin{bmatrix} 5 \\ 9 \end{bmatrix} - \begin{bmatrix} 1 \\ 2 \end{bmatrix} \right\| = 5^2 + 7$

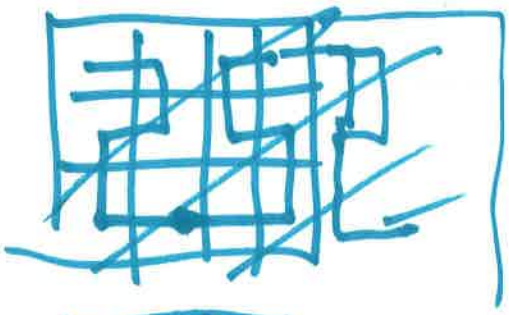
Find the smallest of c_{ij} : c_{12} & $c_3 = 1$

Answer: Class 1

Problem: If you have 100000 feature vectors and the vector length is high!

How to convert an image to a vector?





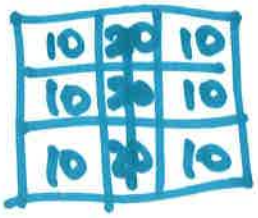
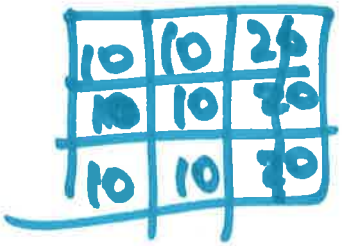


image of 1



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