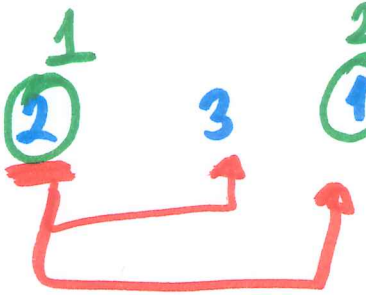
Given a list of numbers



7 13 9 4 .....

for ( )

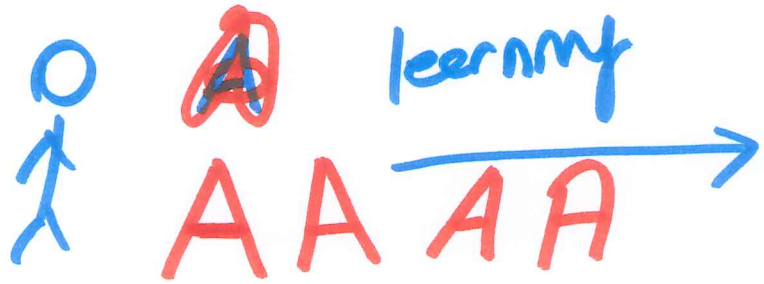
for ( )

4 3 0 7 13 8 2 . . . . .

algorithm vs learning algorithm

- fixed set of rules
- deterministic

- subjectivity (example data, past experience)

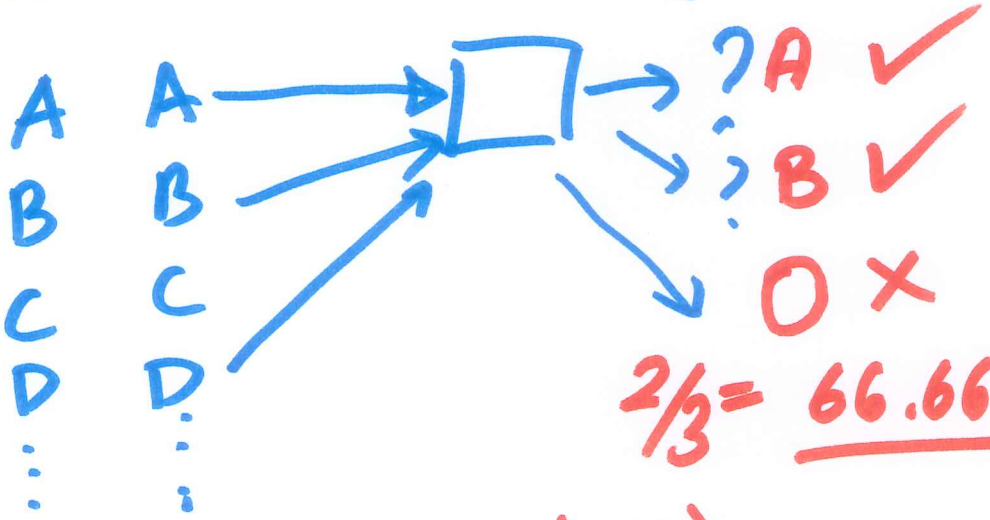


- training data collect & store past experience.

(1)

Machine Learning: programming computers to optimize a performance criterion using example data or past experience.

depends on the application



$2/3 = 66.66\%$

32 °C → 32.5 °C / 31.5 °C

0.5 °C

absolute error $|y - \hat{y}|$

Association (Basket Analysis)

$P(A|B)$ ⇒ conditional probability

$P(\text{product 1} | \text{product 2}, \text{product 3})$

$P(\text{product 1} | \text{product 2}, \text{gender})$

$P(\text{product 1} | \text{product 2}) = \frac{\#\text{ of baskets that contain both products}}{\#\text{ of baskets that contain product \#2}}$

Supervised Learning:

$\mathcal{X} = \{(x_i, y_i)\}_{i=1}^{N}$ *

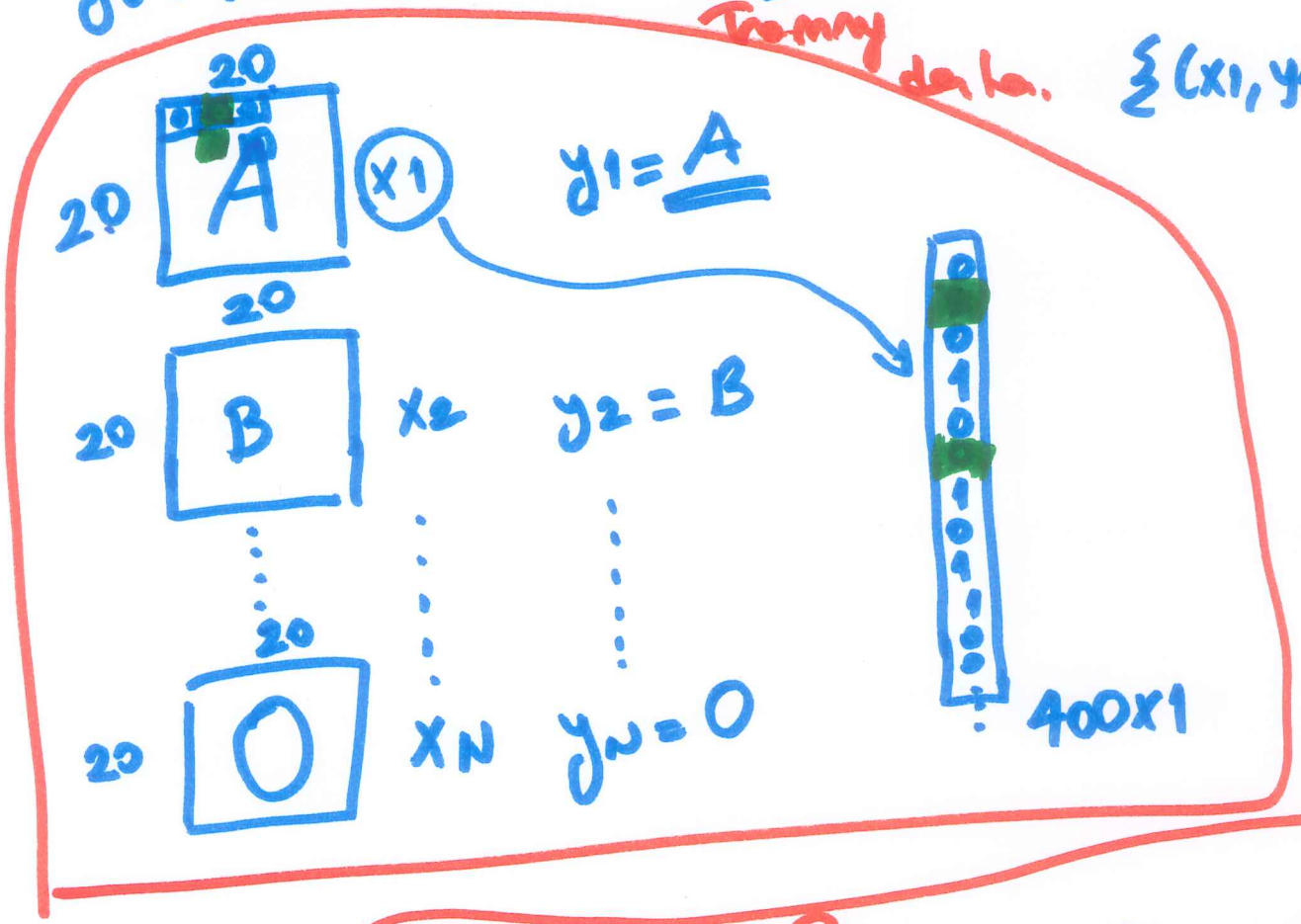
$\mathcal{X}$ ↙ dataset ⇒ a set of pairs

x_i : ith data point

y_i : ith label.

Training data.

$\{(x_1, y_1), (x_2, y_2), \ldots, (x_N, y_N)\}$



$\{(\square, \square), (\square, \square), \ldots\}$

$f(\square) = ?$

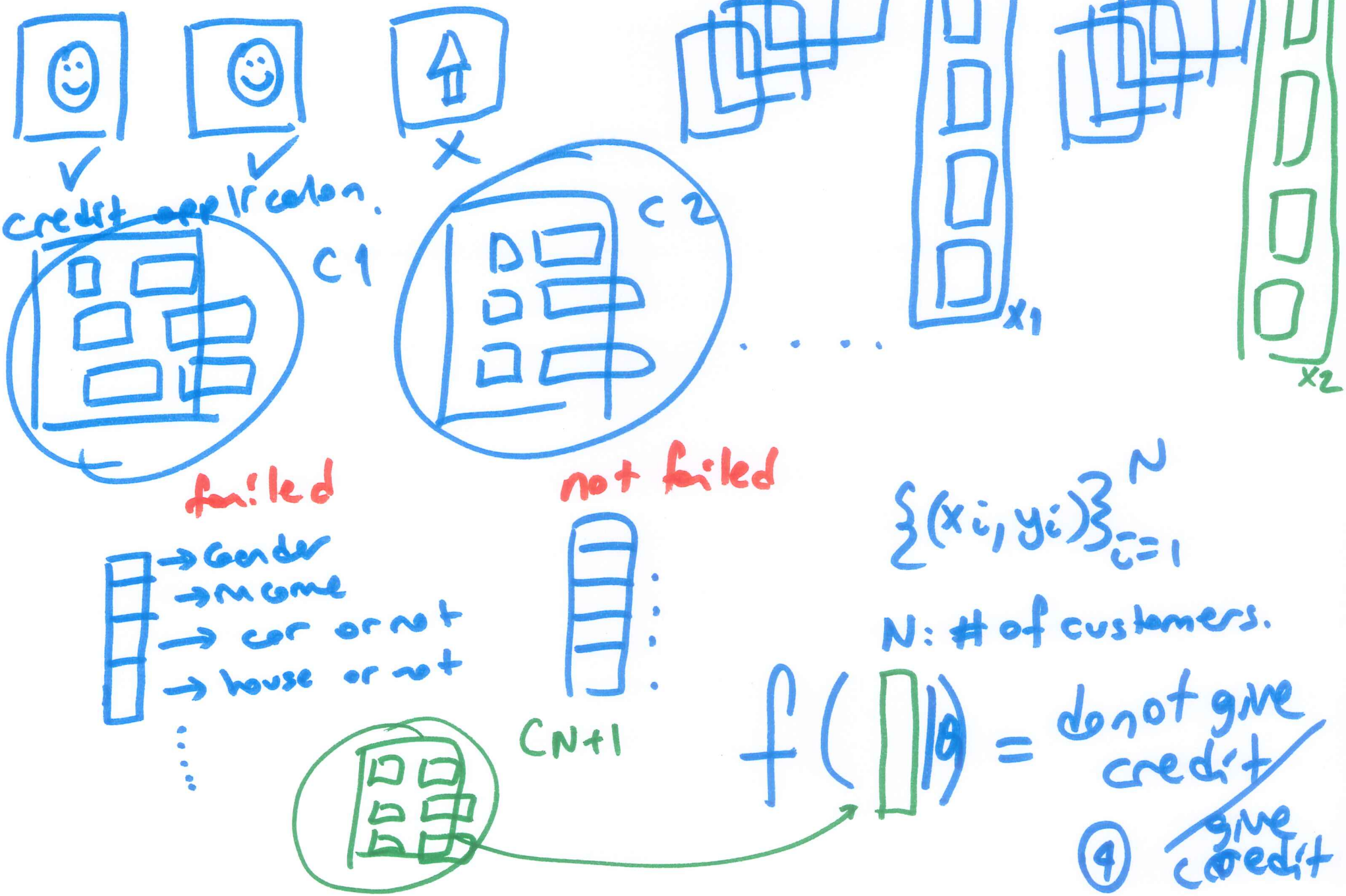
$f(\square) =$ ═ D-dimensional real vector

$x_i \in \mathbb{R}^D$

③ $y_i \in \{1, 2, \ldots, 23\}$

S $y_{N+1} = ?$ Multi-Classification

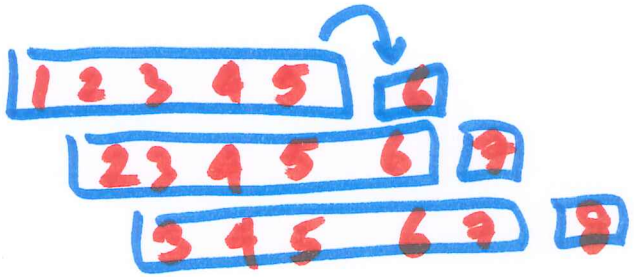
$y_i \in \{1, 2\}$ ⇒ binary classification

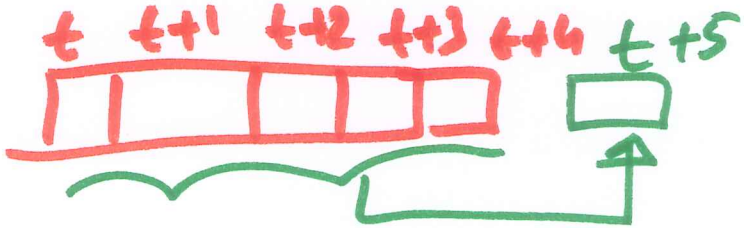


Regression : $\chi = \{(x_i, y_i)\}_{i=1}^{N}$ $\quad x_i \in \mathbb{R}^D$, $\boxed{y_i \in \mathbb{R}}$

$x_i \in \mathbb{R}^5$

$y_i \in \mathbb{R}^1$





Unsupervised Learning: $\chi = \{x_i\}_{i=1}^{N}$

$\Rightarrow$ customer segmentation