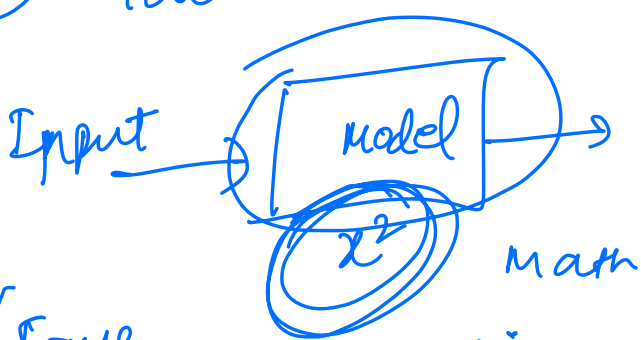
1. why? ✓
2. what?
3. How?

| I | O |
|---|---|
| 2 | 4 |
| 5 | 25 |
| 9 | 81 |
| 11 | |




Fact → Automation of task that requires human Intelligence

10 Lectures

1. Linear Algebra — 6 hours
2. Cordinate Geometry — 6hr
3. Optimization — 6hr
4. Calculus — 6hr

① Intuition

Flow — Concept → Visualize → math → code

How

Daily → 10 → 30 min — 1 hour

10 lectures

L6 — L10

Optimization.

L1

L2

L4

L5

Linear Algebra

L2

L1

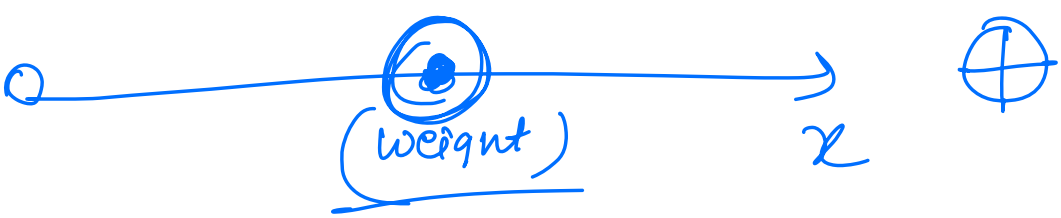
Remember X

Understanding ✓

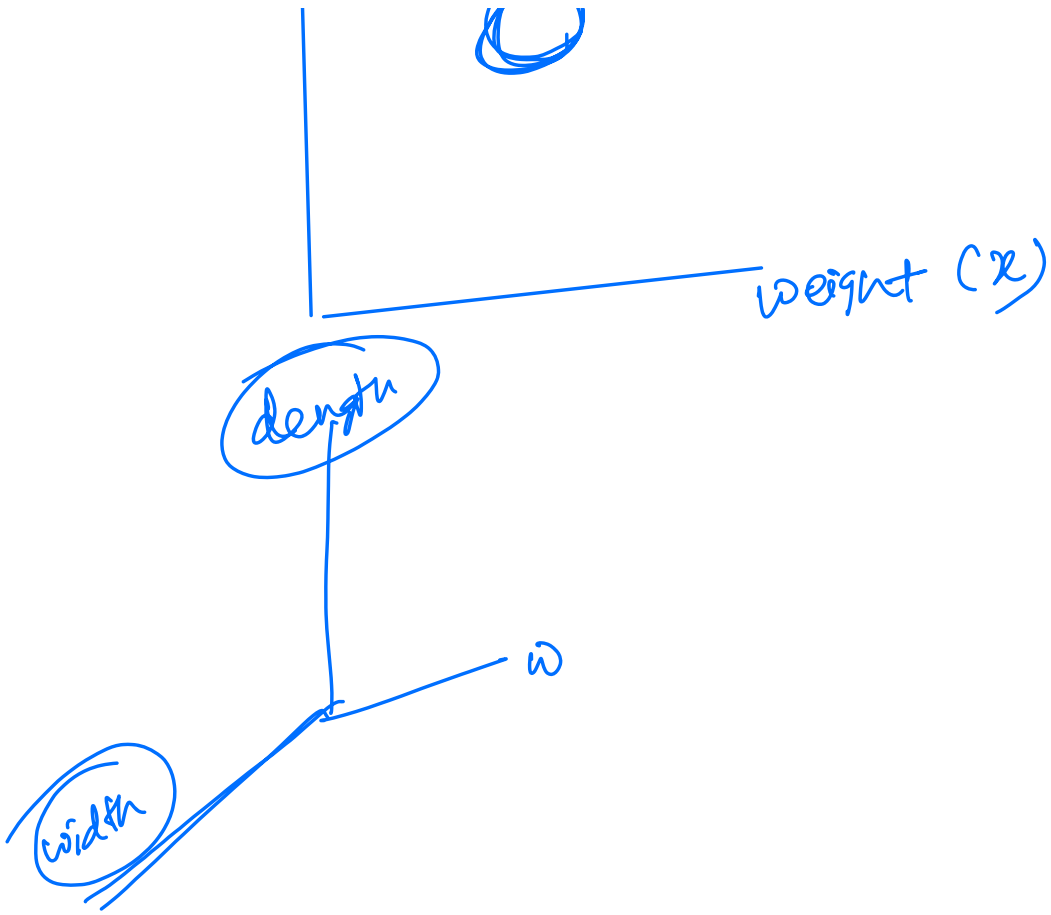
Agenda

1D, 2D, 3D

Generic Eqn of a line

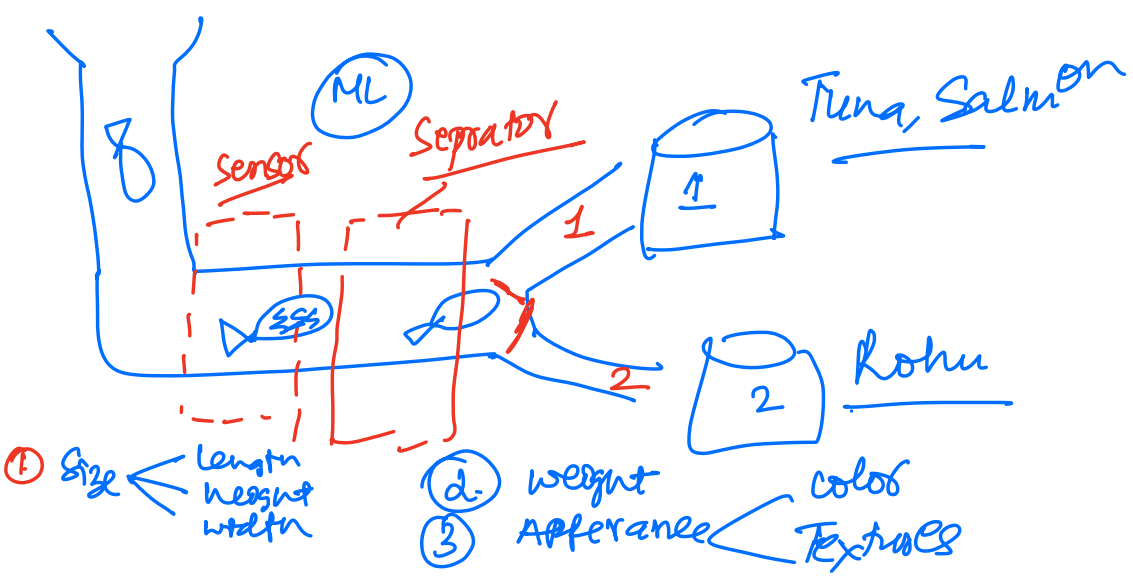



diameter




## ML Application

### E1: Fish Sorting Machine



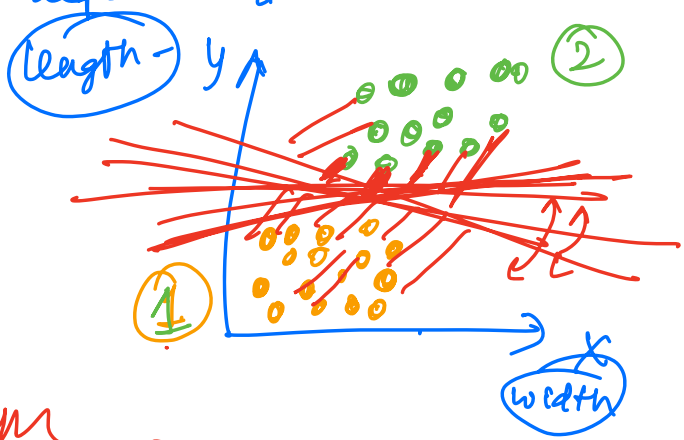
Dataset

Independent variables / Features / attributes

| width | length | weight | Type |
|---|---|---|---|
| 30 | 50 | 80 | 1 |
| 11 | 23 | 28 | 2 |
| 27 | 43 | 72 | 1 |
| 16 | 31 | 36 | 2 |

Rows / Records

Target variables
outcome
dependent



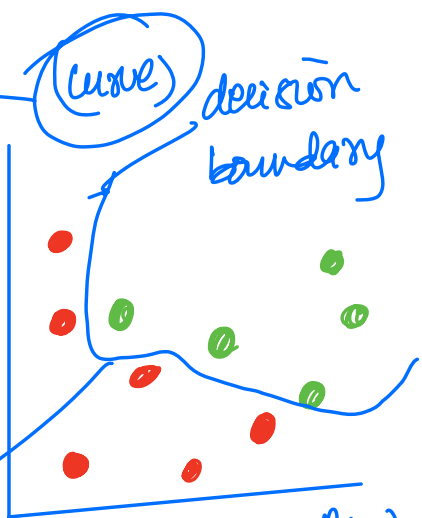

Classification Problem → T/F Y/N → 0/1

Binary class.
1
2

Ex → T20 IPL Win Prediction

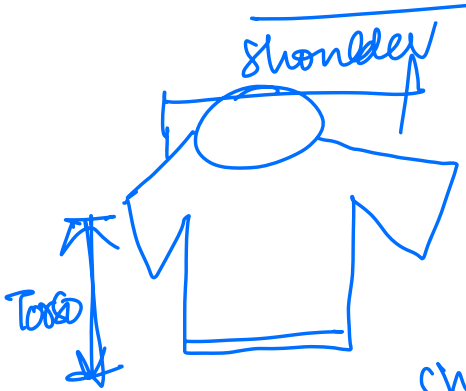
| Runs | Over | Outcome |
|---|---|---|
| 90 | 6 | WIN |
| 90 | 15 | LOSS |
| 25 | 1 | WIN |

Over



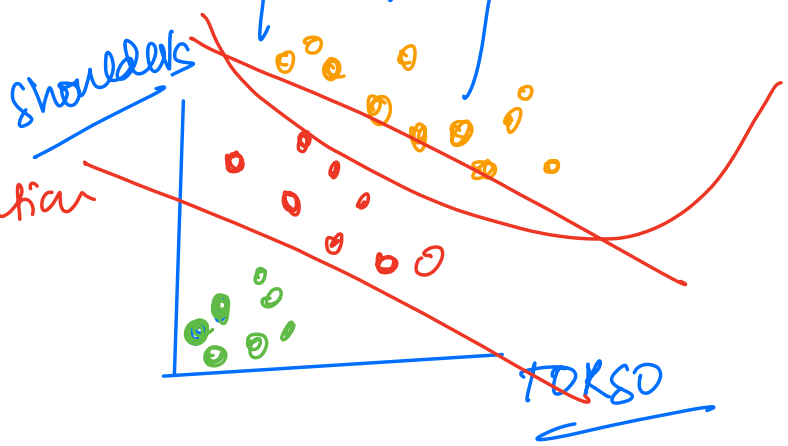

model → Classifier → curve

## Example 3 – T shirt Size Prediction




| TORSO | Shoulder | SIZE |
|---|---|---|
| 61 | 40 | S |
| 63 | 42 | M |

S, M, L




Multi Classification Problem

## Process of building ML Algorithm

1. Data collection → labelled data
2. Data Visualization ← Plot (2D)
   PCA, tSNE → 2D
3. Geometrical structure to separate classes
4. choosing a loss function which...

helps to find the right/best structure

(5) Training | Optimization

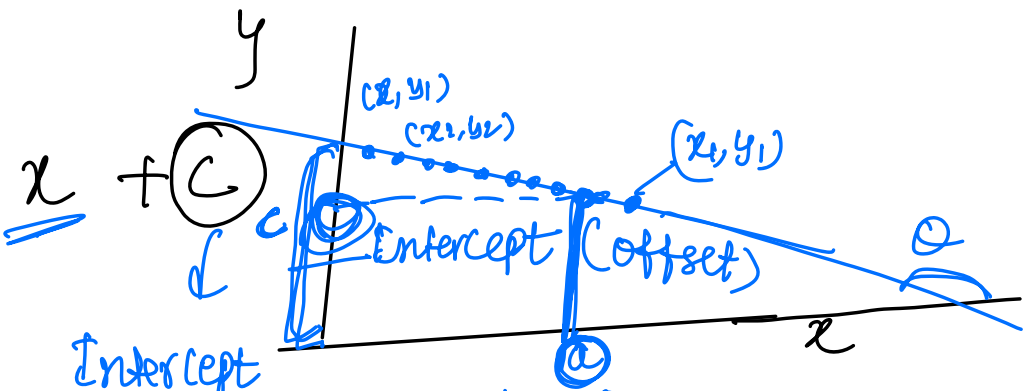
Coordinate Geometry

Line

$y = mx + c$

m → Slope

c → Intercept




$m = \tan\theta$

$-\infty \leq \tan\theta \leq +\infty$

$y = mx + C$


$\theta = 90$

$\tan\theta \to \infty$

$Ax_1 + Bx_2 + C$

$x_1 \quad Ax_1 + Bx_2 + C$

11.

Bias

$\rightarrow w_1 x_1 + w_2 x_2 + w_0$

$\rightarrow w_1 x_1 + w_2 x_2 + w_3 x_3 + w_0$

$\rightarrow w_1 x_1 + w_2 x_2 + w_3 x_3 + w_4 x_4 + w_0$

$w_1 x_1 + w_2 x_2 + w_0$ $\quad y = mx + c$

$w_1 x + w_2 y + w_0 = 0$ $\quad y = mx + c$

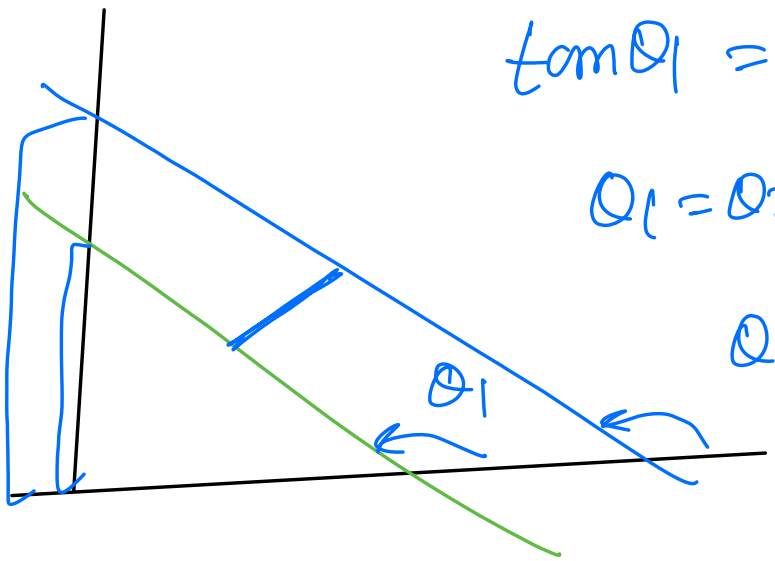
$w_2 y = -w_0 - w_1 x$

$y = \frac{-w_0}{w_2} - \frac{w_1}{w_2} x$ $\quad m = -\frac{w_1}{w_2}$

$c = \frac{-w_0}{w_2}$

$y = mx + c$ 2D $\rightarrow w_1 x + w_2 y + w_0 = 0$

3D $\rightarrow w_1 x_1 + w_2 x_2 + w_3 x_3 + w_0$




$$\tan\theta_1 = \tan\theta_2$$

$$\theta_1 = \theta_2$$