Agenda

✓ 1. Intro D.L.
✓ 2. Content
✓ 3. ANN + Bio.

DS. DL ML AI

ML^X

x_1 x_2 x_3 y
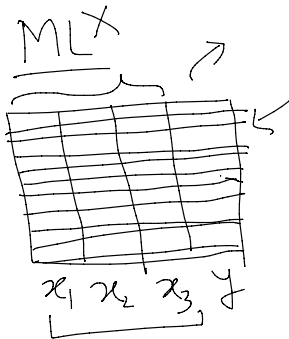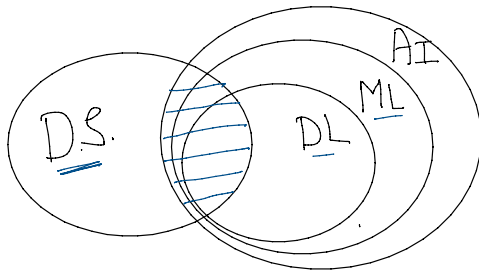
U.S. DL ✓

images, video, audio, text

Content
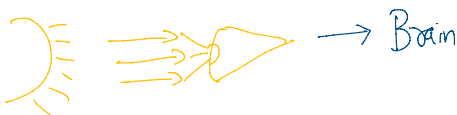
ANN → image clf
CNN → image clf
RNN → text clf

Human nervous system

Stimulus → | Receptors | → | N.N /brain | → | Effectors | → Response

bright light   eye   retina   eyelid muscles → Close eyes

→ Brain

Neuron

Neuron
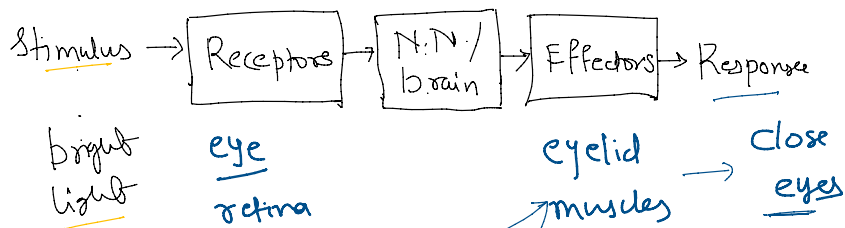
Dentrites, Axon, Axon tips, Cell body, Synaptic gap, Neuron
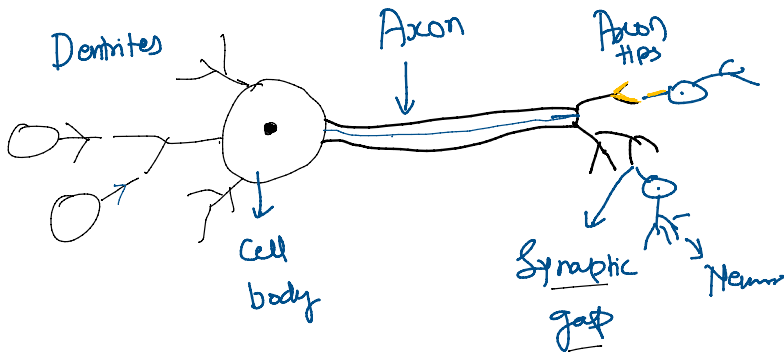
neurons → 10^6 to 10^8 # 1 neuron → upto 5000

connect^n → 10^{11}

Artificial neuron

x_1, w_1, x_2, w_2, x_n, w_n, b

Z | f → y → O/P

i/p, weights, bias, Summat^n f^n, Activat^n f^n
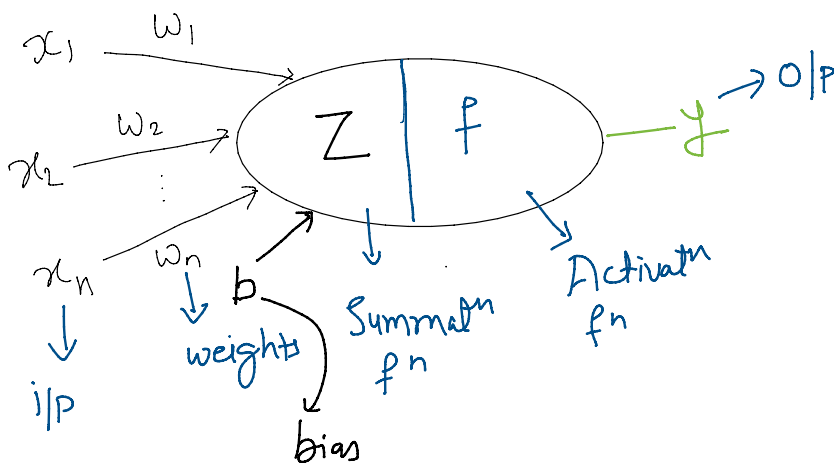
Summat^n f^n

$$Z = x_1 \cdot w_1 + x_2 \cdot w_2 + \cdots + x_n w_n + b$$

$$Z = \sum_{i=1}^{n} x_i \cdot w_i + b = 0$$

$$f(z) \Rightarrow \quad \begin{array}{l} 1. \text{ Convert i/p into value} \\ 2. \text{ Ensure activat}^n \text{ of neuron} \end{array}$$

$$f(x^2) \rightarrow \text{ square f}^n$$

$f(2^2) \rightarrow 4$

$f(10^2) \rightarrow 100$

$f(x^3) \rightarrow f(2^3) \rightarrow 8$

$\underline{MBA(\text{☺}) \rightarrow Manager}$

Ht.	Wt.	Outcome
170	80	1
160	60	0

$x_1 \quad x_2$

$\rightarrow$

$0.5 \rightarrow 0.45$

$\underline{170}$

O

$0.8 \leftarrow 0.4$

80

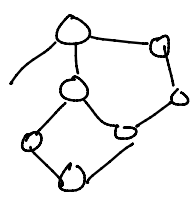$b=0$

$\begin{matrix} Z \\ 117 \end{matrix} \Big| f$

$y = 1$
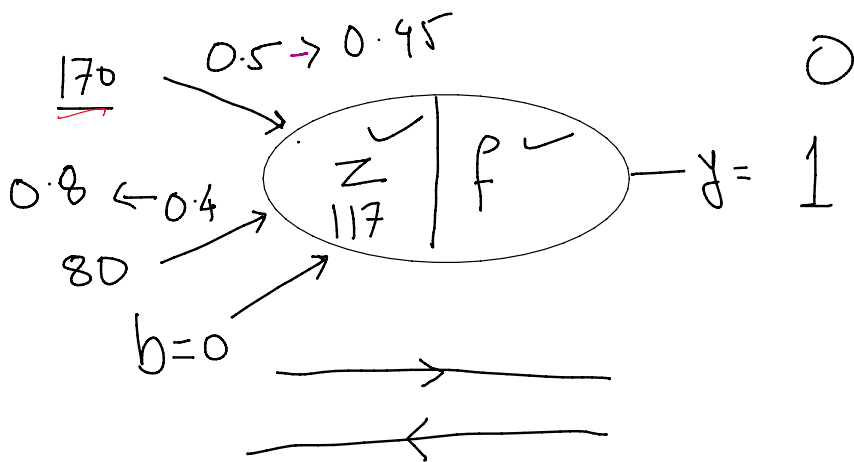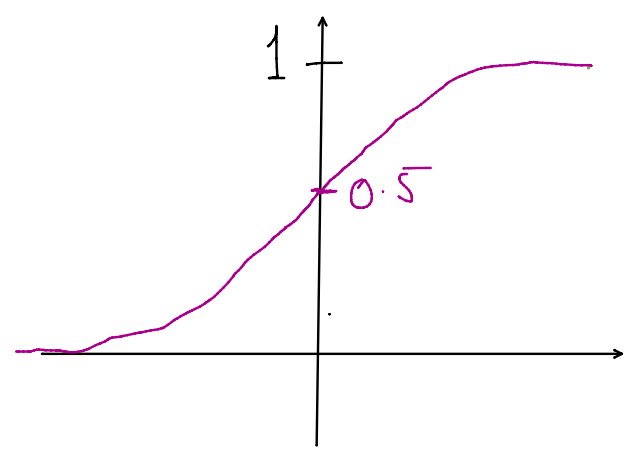
$Z = x_1 \omega_1 + x_2 \cdot \omega_2 + b$
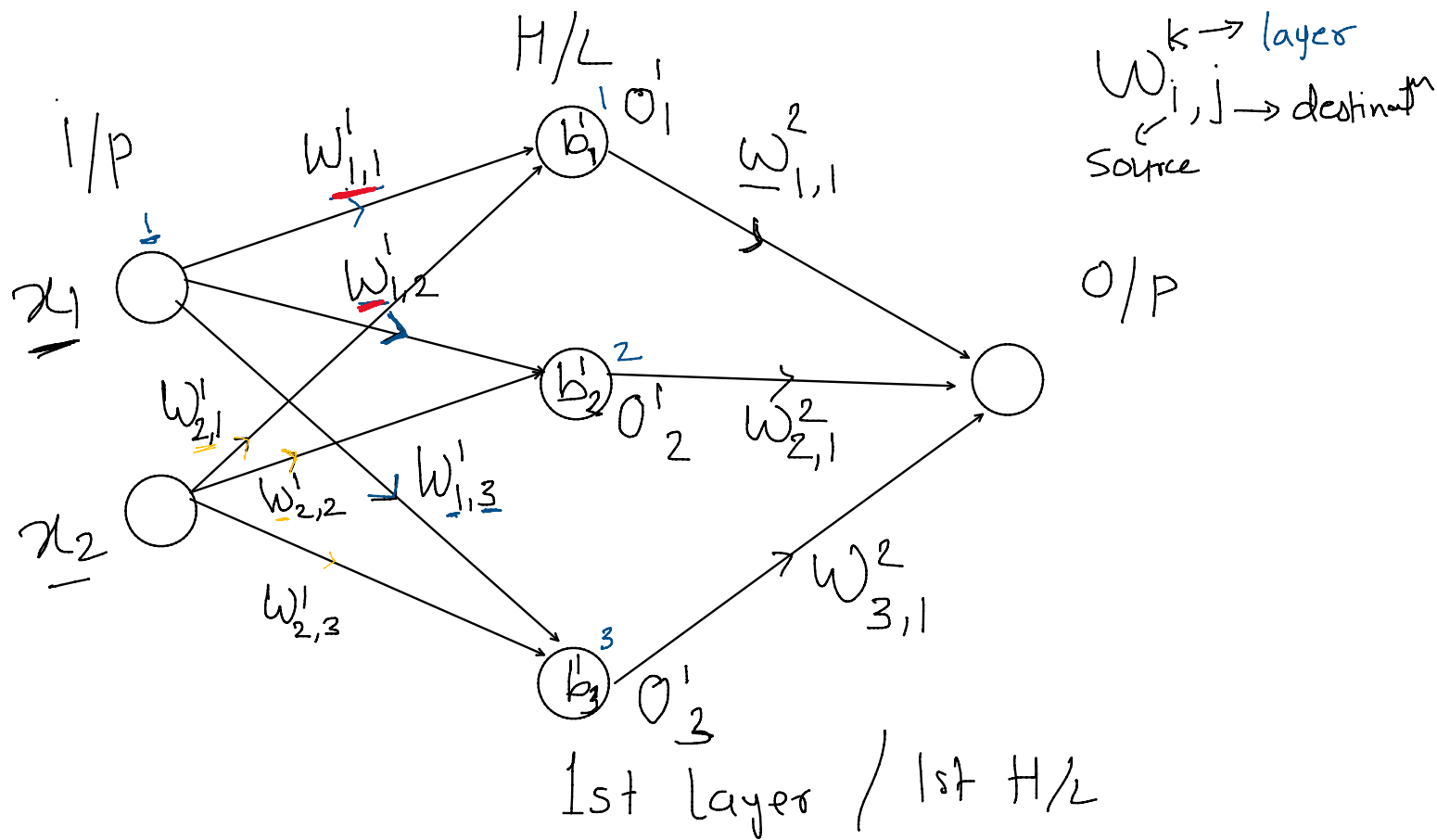
$Z = (170 \times 0.5) + (80 \times 0.4) = 117$

$Sigmoid \quad y = \dfrac{1}{1+e^{-x}} = \dfrac{1}{1+e^{-117}}$

$$= \frac{0.1}{\Downarrow}$$
$$0$$

$$f(x) = 0 \text{ to } 1$$

Ht $\bigcirc$ $\bigcirc$ $\bigcirc$

wt $\bigcirc$ $\bigcirc$

i/p   H/L   o/p

I/P

x_1

x_2

H/L

$W_{1,1}^1$

$W_{1,2}^1$

$W_{2,1}^1$

$W_{2,2}^1$

$W_{1,3}^1$

$W_{2,3}^1$

b_1^1 O_1^1

b_2^1 O_2^1

b_3^1 O_3^1

$W_{1,1}^2$

$W_{2,1}^2$

$W_{3,1}^2$

O/P

$W_{i,j}^{k \rightarrow layer}$ → destination

source

1st layer / 1st H/L

$$Z_1^1 = x_1 \cdot W_{1,1}^1 + x_2 \cdot W_{2,1}^1 + b_1^1$$