DAY 1

30 January 2023 11:23 AM

Introduction to Neural Network

Natural Intelligence → Humans Innate Ability

MIMIC this via machine → A.I.

↳ Tools → ML, DL

Tabular Data → ML ✓

Image / Text / Speech → DL ✓ (N.N.)

} Practical use case

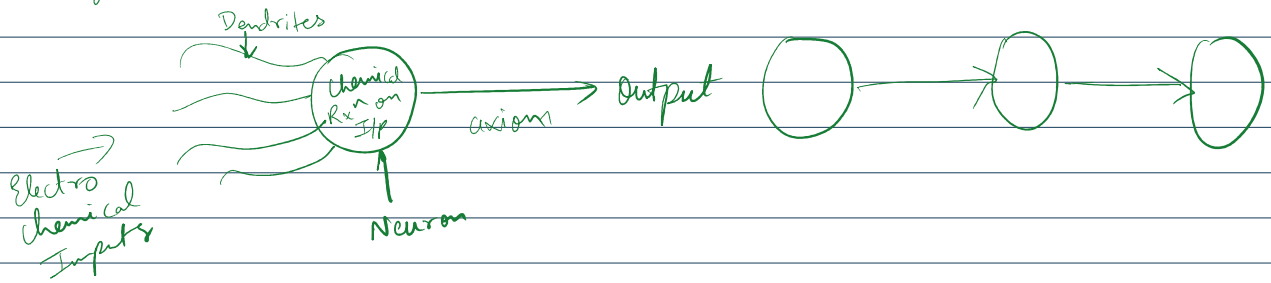
Neural Network (NN)

1957 → first NN build → Perceptron → Simplest Neural Network by Frank Rosenblatt

Idea → Biological Neuron

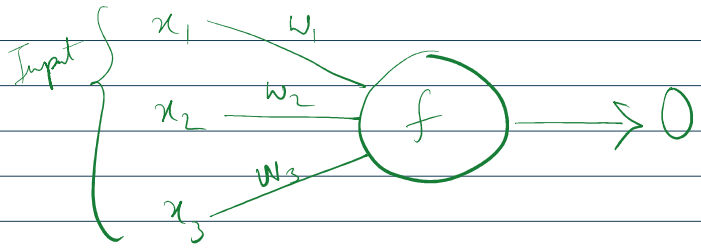
NN is approximation of Biological Neuron.

→ Biological Neuron



Simple Biological Neuron.

Artificial Neuron



Input → x_1, x_2, x_3

for each I/p there will be weight → so that Importance of I/p's can be understood.

f → Activation function (fires a neuron)

$$O = f(x_1 w_1 + x_2 w_2 + x_3 w_3)$$

(Dot Product & Summation)

Weighted sum of I/p's

$$\Rightarrow \boxed{O = f\left(\sum_{i=1}^{n} x_i w_i\right)} \quad \text{eq}^{n} \text{ of Single Neuron.}$$

1980's → Back Propogation Algo → (Jeff hinton) → father of AI

2006 → Modern DL → Build a Proper NN

2012 → AlexNet

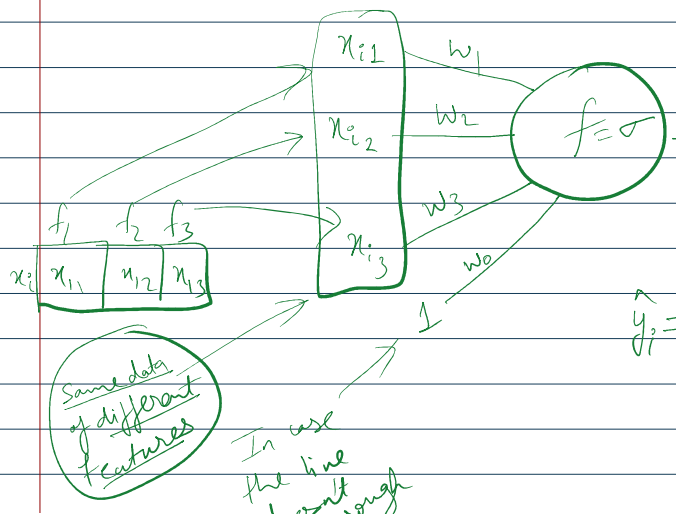
Logistic Regression: $\{x_i, y_i\}$

$$\hat{y} = \sigma\left(\sum_{i=1} w^T x_i\right) \qquad \hat{y} = \sigma\left(\sum_{i=1} w^T x_i + w_0\right)$$

Intercept

for a NN: $O = f\left(\sum_{i=1} w^T x\right)$

Represent LR in NN:



when f = sigmoid

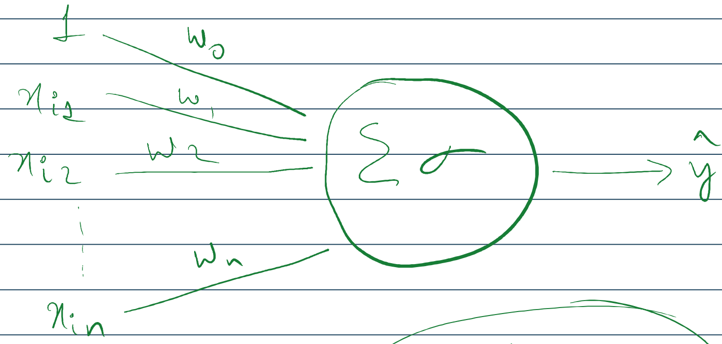
$$\hat{y}_i = \sigma(x_{i1} w_1 + x_{i2} w_2 + x_{i3} w_3)$$

sigmoid f^n (o/p b/w 0 & 1) can squash outliers

of any features

In case the line doesn't pass through origin

sigmoid f^n (o/p b/w 0 - 1) can squash outliers



general Neuron

* A neuron with activat^n f^n as perceptron f^n is perceptron

Not good with outliers

$$f\left(W^T x > 0 \rightarrow 1 \quad \rightarrow 0\right)$$

o/p 0 or 1

Self Notes

* threshold f^n is sometimes used to quantify the o/p of a neuron in the o/p layer.

* bias adjusts the boundary away from origin without any dependence on the i/p value