13-06-2023

Deep learning

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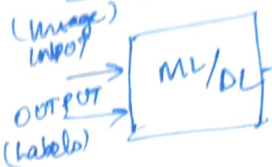
Neural Networks:

→ Traditional approach

ML/DL way



→ Applications:-

* Use of tensorflow lite to deploy

* Face detection / Gender and Age estimation, Facial emotion recognition, Image tagging in Face book

playground.tensorflow.org

→ Intro:-

Training phase (offline) → Testing phase.

Computer vision - applications.

① Image classification ; ② Object localization ; ③ Segmentation

④ Semantic segmentation ; ⑤ Instant segmentation.

→ * Jetson Nano developer kit

→ Usual image representation H × W × D

example: 18 × 18 × 1 → 1 for grayscale.

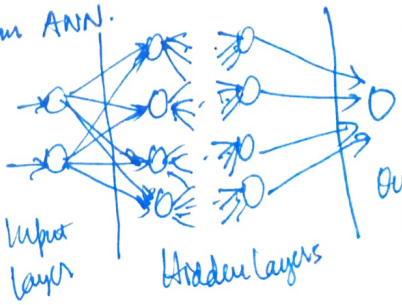
18 × 18 × 3 → 3 for RGB colors.

→ Need for Deep learning:-

Key concepts:

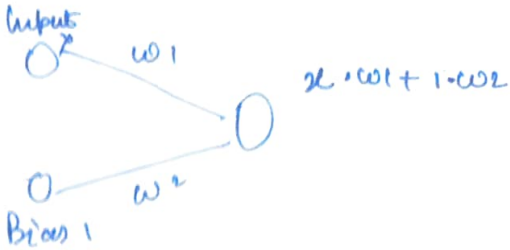
* Neurons: Neurons are the fundamental building blocks of a neural network.

* Layers (Input / Hidden / output): The neurons are organized in the form of layers in an ANN.



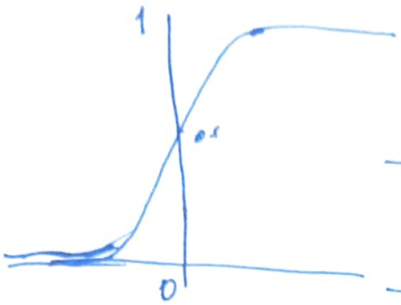
Binary classification has 1 output layer we fix a threshold for probability

→ weights and biases :-



→ Activation function. for non-linear functions.

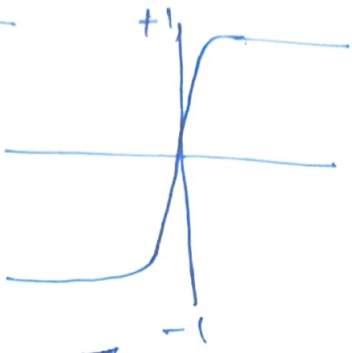
0 to 1



Sigmoid

$$f(x) = \frac{1}{1+e^{-x}}$$

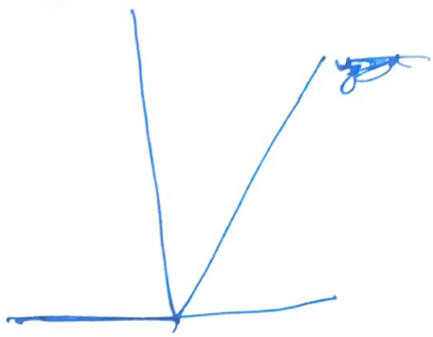
−1 to +1



Tanh

$$f(x) = \frac{e^{x} - e^{-x}}{e^{x} + e^{-x}}$$

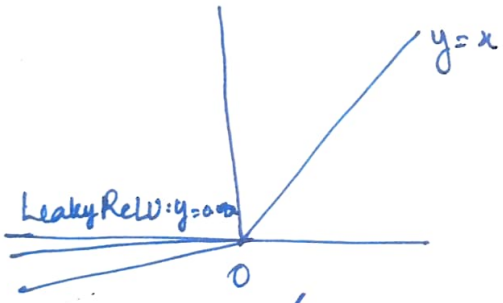
f(x) max of (0, x)



ReLU

$$f(x) = \max(0, x)$$

Leaky ReLU



$$f(x) = \begin{cases} x & x > 0 \\ \alpha x & x < 0 \end{cases}$$

→ Consider, $f(w_1 x_1 + w_2 x_2 + \dots + w_n x_n)$ where, $x_1, x_2 \dots x_n$ are the inputs to our NN. $w_1, w_2 \dots w_n$ are weights of the weight vector.

$$net = \sum_{i=1}^{n} w_i x_i \Rightarrow f\left(\sum_{i=1}^{n} w_i x_i\right)$$

$$f(net) = \begin{cases} 1 \text{ if } net > 0 \\ 0 \text{ if otherwise.} \end{cases}$$