♦

Neurons

Difficulty	Easy 🍋
Select	main

📌Title : Neurons

🐇 **Summary**

- Neurons are functions that input previous neurons, gets processed by weighted sum, bias and activation, then gives an output.
- The mathematical representation of a neural network is

  $f_i(x) = a(w_i x + b_i)$
- Hidden layers represent features divided

▼ Google Collab Practice 💻

▼ Further research 🔎

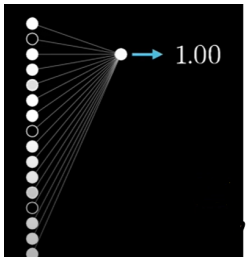
- what is MLP and why in the video he referred that it is the simplest DL

▼ Resources used 🖇️

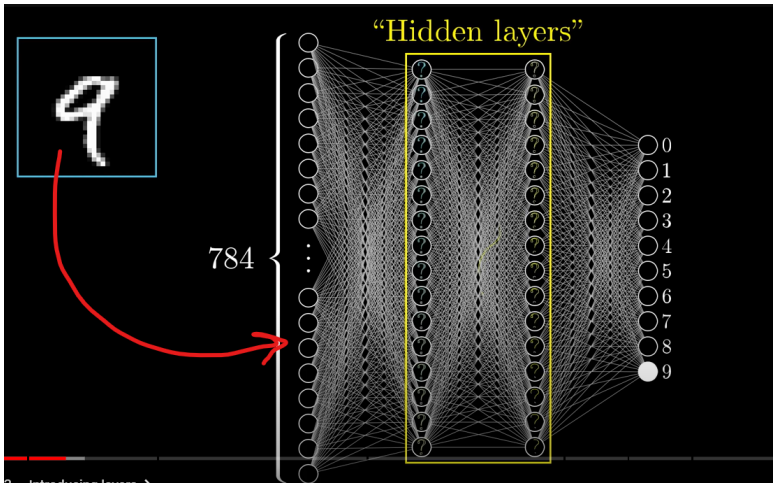
But what is a neural network? | Chapter 1, Deep learning - YouTube

🧠 How to visualize a neuron?

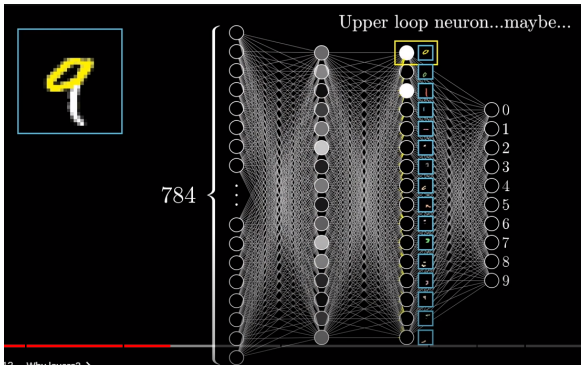
- A function that takes **input of all neurons in previous** layers and maps it accordingly to get an output



📰 What are the layers in a neural network?



1. **Input layer**
    - if it is an image it gets flattened.
2. **Hidden layer**
    - Neurons corresponds to features or subcomponents
    - As you go further into the hidden layers, the more coherent the features are

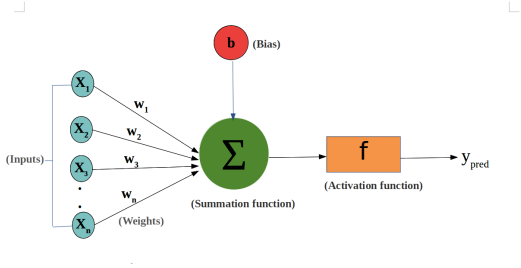


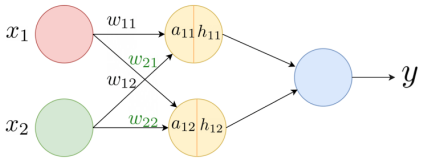
3. ***Output layer***

- The neuron numbers will depend on the number of solutions possible
- For example in digit recognition we have 10 neurons, because we can identify from 0 to 9

⚖️ What are weights ?

- a way to be able to tune features effect. The activation increases when the output is similar to what we want it to look like





$$a_{11} = w_{11}x_1 + w_{12}x_2$$
$$a_{12} = w_{21}x_1 + w_{22}x_2$$

➕ What are bias ?

- When we want the weighted sum to be greater than a threshold

https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcSFzGTUeyX8p1txSgcOvt6uvxicK0qdCkVvFg&usqp=CAU

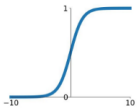
0️⃣What is activation function ?

- when we want the output of a neuron to look a specific way
- Adds non-linearity
- How positive the relative weighted sum is to what we want it to be ?

Activation Functions

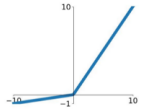
Sigmoid

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



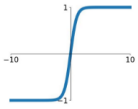
Leaky ReLU

$\max(0.1x, x)$



tanh

$\tanh(x)$

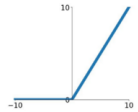


Maxout

$\max(w_1^T x + b_1, w_2^T x + b_2)$

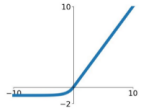
ReLU

$\max(0, x)$

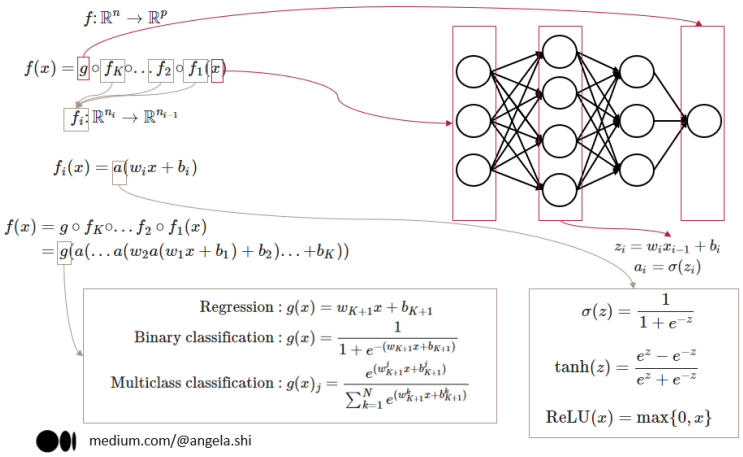


ELU

$$\begin{cases} x & x \geq 0 \\ \alpha(e^x - 1) & x < 0 \end{cases}$$



👩‍🔬Mathematical way to represent it ?



🎯In a nutshell what is our main aim?

Find the right **weights and biases** that solves the problem at hand