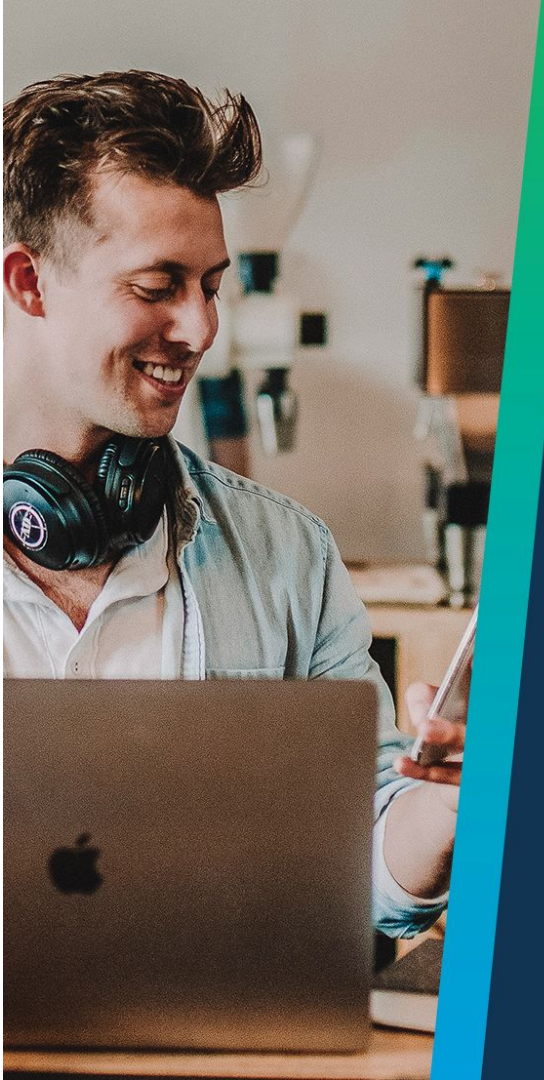


DS Bootcamp

Hyperiondev

Exploring Neural Networks

Welcome

Your Lecturer for this session

Sanana Mwanawina

Lecture - Housekeeping

- The use of disrespectful language is prohibited in the questions, this is a supportive, learning environment for all - please engage accordingly.
- No question is daft or silly - **ask them!**
- There are Q/A sessions midway and at the end of the session, should you wish to ask any follow-up questions.
- You can also submit questions here: hyperiondev.com/sbc4-ds-questions
- For all non-academic questions, please submit a query: hyperiondev.com/support
- Report a safeguarding incident: hyperiondev.com/safeguardreporting
- We would love your feedback on lectures: https://hyperionde.wufoo.com/forms/zsgv4m40ui4i0g/

Lecture - Code Repo

Go to: github.com/HyperionDevBootcamps

Then click on the "**C4_DS_lecture_examples**" repository, do view or download the code.

Objectives

1. Understand what Neural Networks are
2. Get a good sense of how Neural Networks work

What is a Neural Network?

- We want to build a program that can identify hand-drawn digits
- A 28x28 grid of pixels showing the number 9:

What is a Neural Network?

- This is not difficult for you to do. For example, you can easily identify that all three of these images show the number 3:

What is a Neural Network?

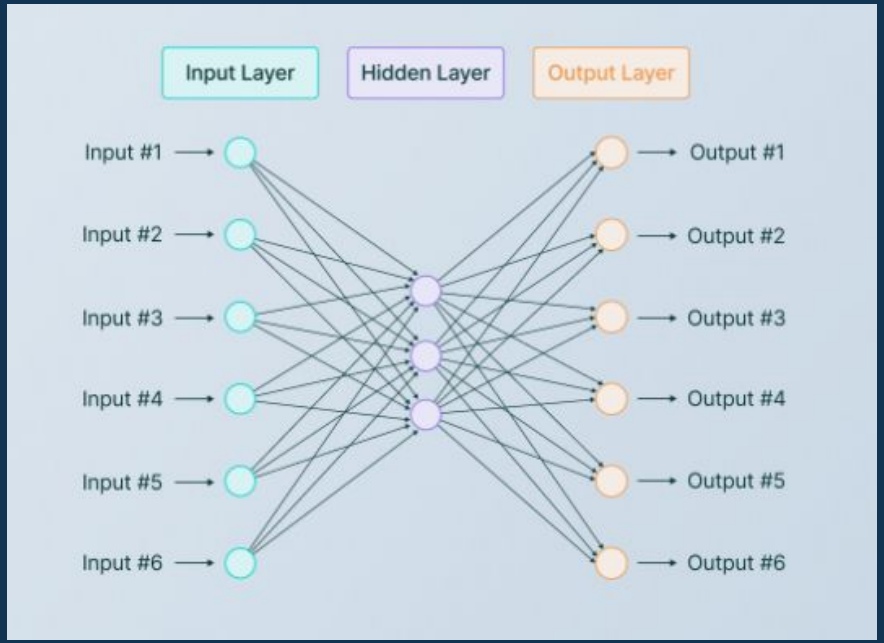
- If we were to program this the traditional way, we would need to create a program that takes in a grid of 28x28 pixels, incorporate if statements, for loops, objects, functions etc.
- What started as a “simple” task (digit recognition) becomes much more complex. It seems like the way our brains go about processing this is easier.
- That is the basis of Neural Networking

What is a Neural Network?

- Neural Networks are a subset of machine learning that mimic the way biological neurons signal one another

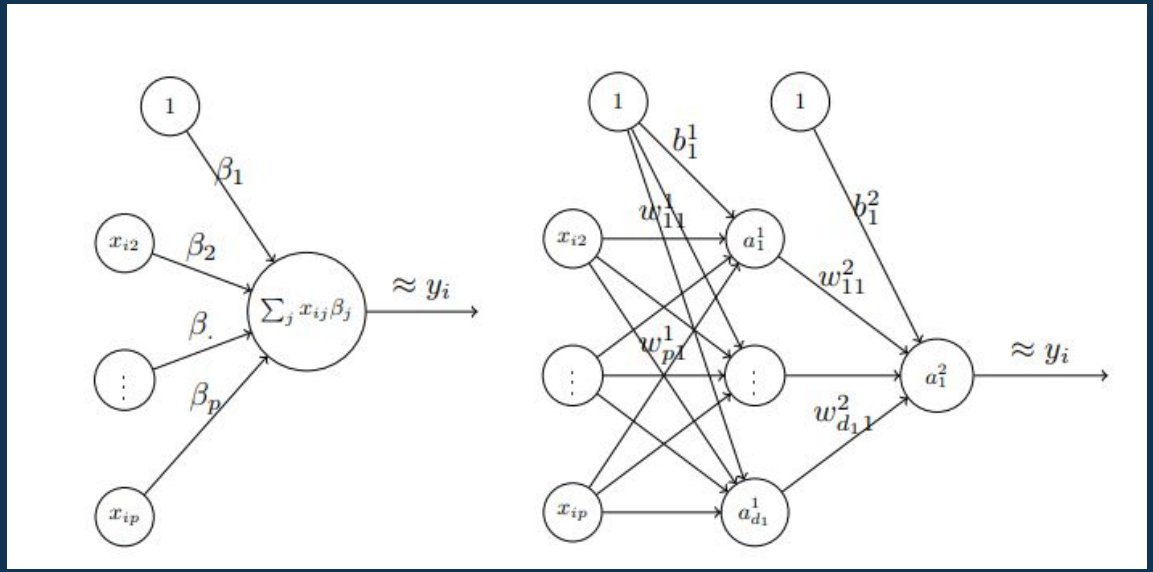
Structure of Neural Networks

- General structure of a neural network

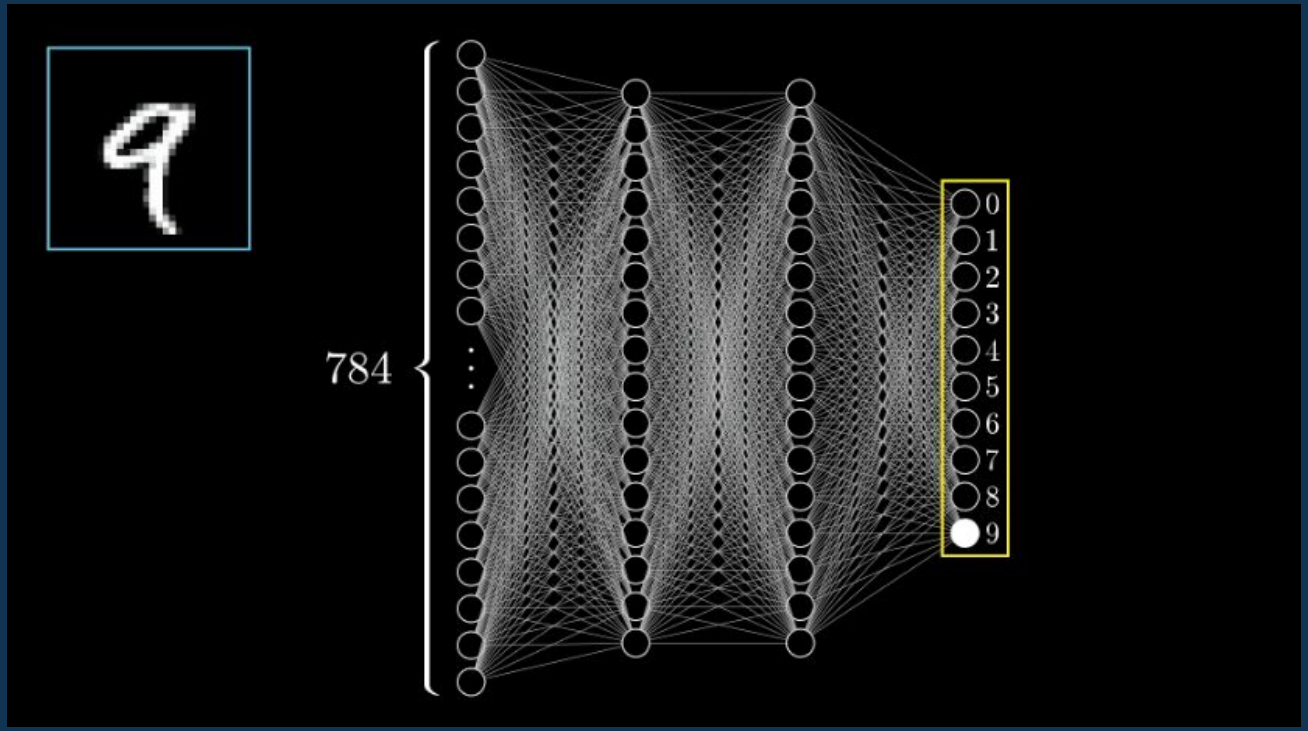


Structure of Neural Networks

- On the left, we have a normal linear model and on the right we have a standard neural network



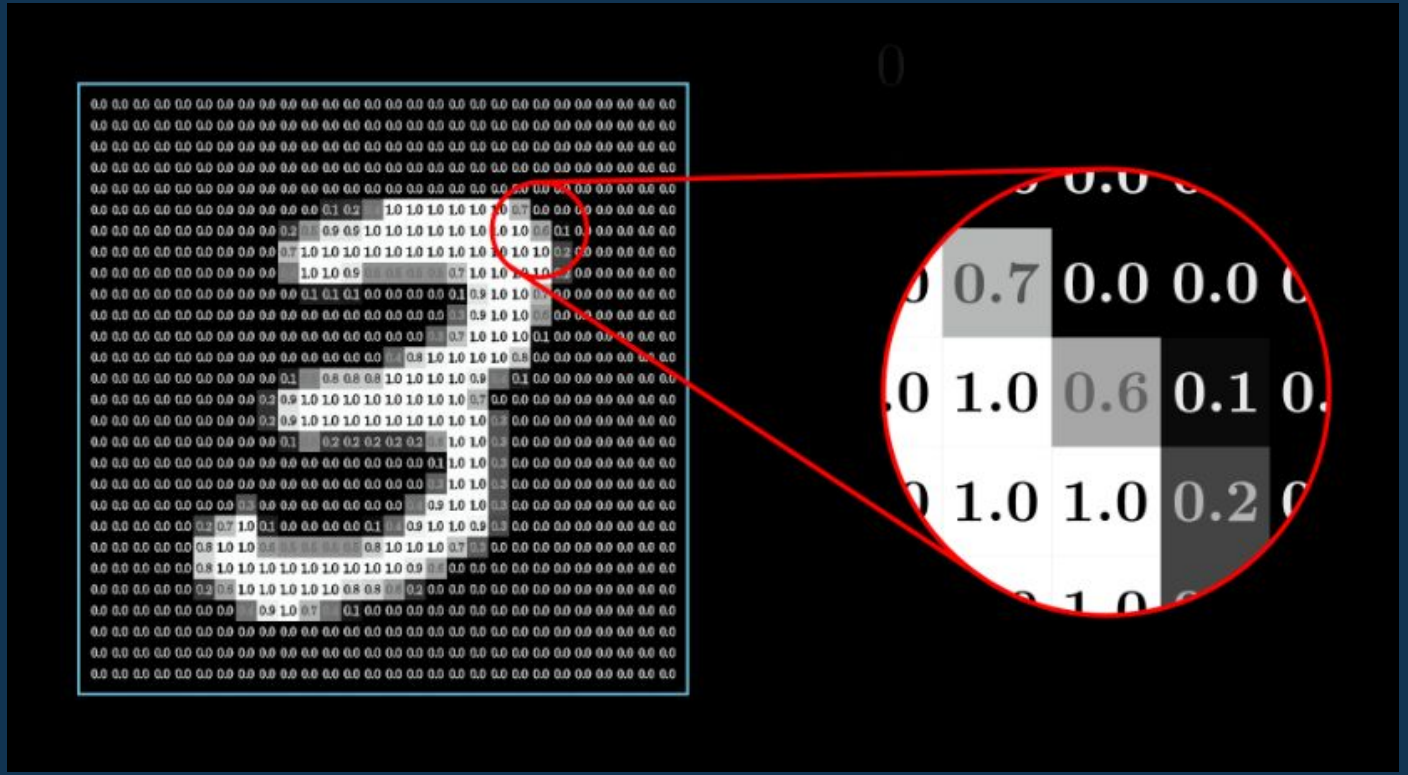
How do they work?



Neurons

- Neurons contain numbers inside them called activations
- When the activation number is high, the neuron “lights up”

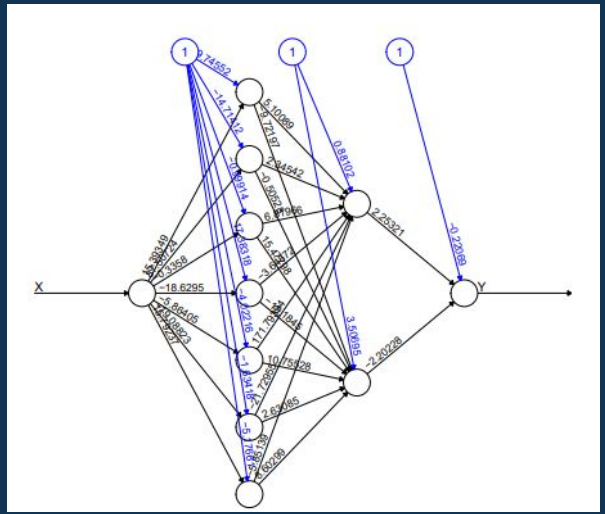
Neurons



Neural Network step-by-step

Step 1: Input layer
Receives input features such as pixel values in an image

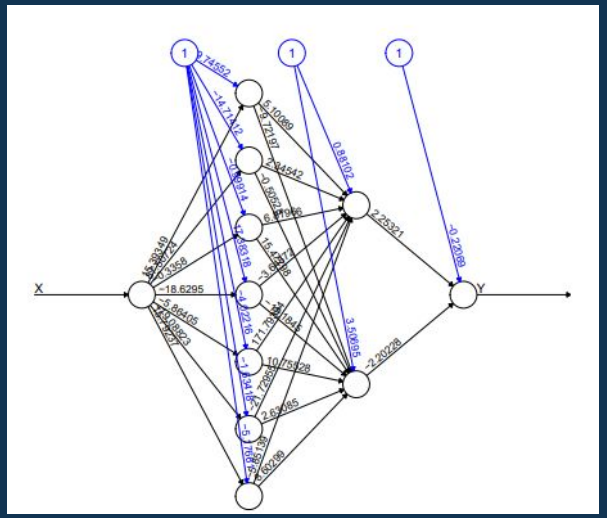
Step 2 : Hidden layers
Processes the input data from the neurons of the previous layer and produces an output based on weights and biases



Neural Network step-by-step

Step 3: Activation function

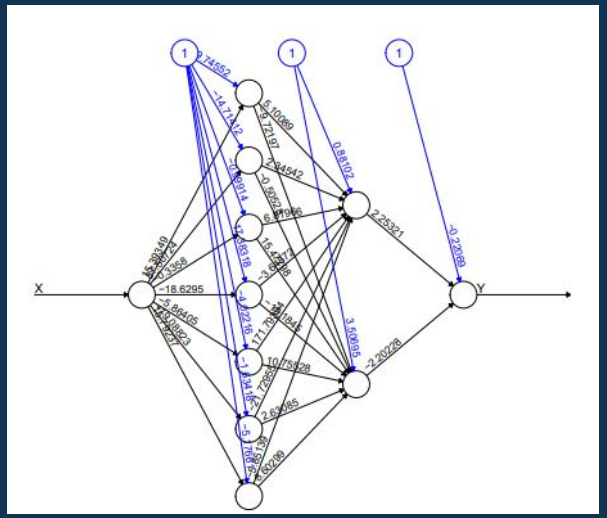
Applied to the output of each neuron in the hidden layers. It determines whether a nearon should be activated or not



Neural Network step-by-step

Step 4: Output layer

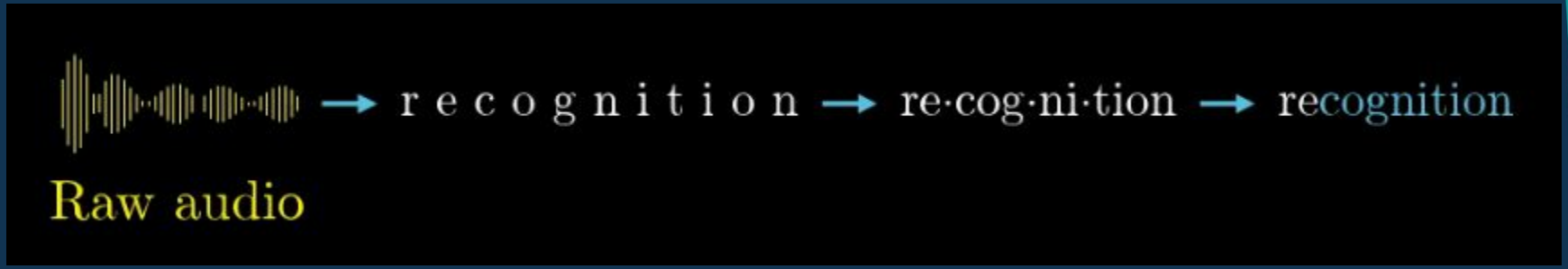
FInal predictions or outputs of the neural network. In classification problems, the number of neurons in the output layer will be the number of classes



Applications of Neural Networks

- Automatic Speech Recognition:

  Parsing raw audio into distinct sounds, which combine to form syllables, which combine to form words



Applications of Neural Networks

- Recommendation Systems:

  Analyse user behaviour, preferences, and historical data to provide personalized recommendations. Relevant fields: e-commerce, entertainment, and content streaming platforms

- Healthcare:

  Medical image classification, drug response modeling, drug discovery etc.

This is far from an exhaustive list.

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Q & A Section

Please use this time to ask any questions relating to the topic explained, should you have any

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Thank you for joining us