WEEK 4: MODEL BUILDING AND DEEP LEARNING

DAY 18 (16/07/2025)

Training a Neural Network:

Training a neural network is like **teaching a student to get better at a test**. The process happens in **repeated rounds**, called epochs, where the network tries, checks, and improves step by step.

Step 1: Forward Pass (Making a Prediction)

- The network **takes the input data** and sends it forward through all the layers: from the input layer → hidden layers → output layer.
- At each neuron, the input values are combined, and a simple calculation is done to produce a result.
- The final result from the output layer is the network's initial guess or prediction.

Step 2: Checking Mistakes (Calculating Error)

- After the network makes a prediction, we **compare it to the correct answer**.
- The difference between the network's guess and the true answer is called the **error**.
- The goal of training is to make this error as small as possible so the network predicts more accurately next time.

Step 3: Learning from Mistakes (Backpropagation)

- The network then works backward, checking how much each neuron contributed to the error.
- It **adjusts the connections (weights)** a little bit to reduce mistakes in the next round.
- This process is repeated over many rounds, helping the network gradually improve.

Step 4: Guiding the Adjustments (Optimizer)

- The optimizer is like a coach or guide that decides **how big each adjustment should be**.
- If changes are too small, the network learns very slowly.
- If changes are too big, it might overshoot and make new mistakes.
- The optimizer helps the network find the **best path to improve steadily**.

Reflection:

Training a neural network is like a **continuous cycle of trying, checking, and improving**. Even though each neuron only does a small calculation, millions of neurons learning together can solve very complex problems, like recognizing images, voices, or handwriting.