WEEK 1 ASSESSMENT

Q1. What is DL?

Ans: Deep Learning is a branch of Machine Learning, which itself is a part of Artificial Intelligence (AI). It focuses on using large neural networks to solve complex problems by learning patterns from huge amounts of data.

Instead of manually telling the system what to look for, deep learning lets the computer figure that out on its own. It uses something called neural networks—kind of like how our brain works—to learn directly from images, text, audio, or other data.

You'll see deep learning being used in things like:

- Image recognition (e.g., identifying people or objects in photos)
- Voice assistants like Alexa or Siri
- Self-driving cars
- Chatbots and language translation tools

Q2. What is Neural Network and its types?

Ans: There isn't just one type of neural network—there are many, each designed for a different kind of problem:

- **Feedforward Neural Network (FNN)**: The most basic type. Information flows straight from input to output. Good for simple tasks like predicting numbers or categories.
- **Convolutional Neural Network (CNN)**: Great for working with images.
- **Recurrent Neural Network (RNN)**: These networks have memory, so they're good for things like text, speech, or time-series data (like stock prices).
- **LSTM (Long Short-Term Memory)**: A better version of RNN that remembers things for longer periods.
- **GANs (Generative Adversarial Networks)**: These are super cool—they can actually create new images, art, or faces by learning from real ones.
- **Autoencoders**: These compress and reconstruct data. Used in things like image denoising or anomaly detection.
- **Transformers**: The newest and most powerful models (like what powers ChatGPT). They're great at understanding and generating language.

Q3. What is CNN?

Ans: CNN stands for Convolutional Neural Network. It's a type of deep learning model that works especially well with images. When we give an image to a CNN, it breaks it down layer by layer—starting from simple patterns like edges and lines, and slowly understanding more complex shapes like faces or objects.

Here's how it works in simple terms:

- It scans the image with filters (like looking at it through a magnifying glass).
- It picks out important features.
- It reduces the image size without losing the key information.
- Finally, it connects everything and makes a prediction—like "this is a cat" or "this is a dog."

CNNs are used in:

- Face unlock on phones
- Detecting diseases from medical scans
- Security cameras that recognize people or objects

Q4. Write short note on our project pipeline.

Ans: **Step 1: Data Collection and Loading**

The first step involves gathering and loading the dataset, typically from sources like Kaggle.com.
During this phase, we also focus on two important concepts:

- **Validation** – This happens during the training stage of the CNN model to monitor performance on unseen data and avoid overfitting.
- **Evaluation** – This is carried out after training, during the testing phase, to assess the model's final accuracy and generalization.

Step 2: Image Classification and Data Augmentation

- **Image Classification** refers to training the model to recognize patterns in images and assign the correct labels or categories to them.
- **Image Augmentation** helps improve model performance by increasing the size and variety of the dataset. Techniques include rotating, flipping, zooming, cropping, and adjusting brightness—this makes the model more robust and less sensitive to overfitting.

Step 3: Building the CNN Model

In this step, we build the actual Convolutional Neural Network using deep learning libraries such as **TensorFlow** or **Keras**.
The model learns from the training data, using different layers (convolutional, pooling, fully connected, etc.) to extract meaningful features from the images.

Step 4: Testing and Evaluation

Once the model is trained, we test it on unseen data to evaluate its accuracy, precision, recall, and other performance metrics.
This step helps us understand how well our model performs in real-world scenarios and whether any improvements are needed.