WEEK 1-ASSIGNMENT

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1.what is Deep Learning?

Deep learning is a type of machine learning that uses artificial neural networks with many layers (hence "deep") to model and understand complex patterns in data.

Key Features:

- Inspired by the brain: Deep learning models are loosely based on the structure and function of the human brain, particularly how neurons communicate.

- Layered structure: Deep learning uses multiple layers of neurons (units) that transform input data through weights and activations to produce an output.

- Learns features automatically: Unlike traditional machine learning, deep learning can automatically learn useful features from raw data (e.g., images, text, or sound), reducing the need for manual feature engineering.

2.What is CNN?

A CNN (Convolutional Neural Network) is a special type of deep learning model particularly well-suited for analyzing visual data, like images or videos.

Key Concepts in CNNs:

1. Convolutional Layers:

    o These layers apply filters (kernels) to the input image to detect features such as edges, textures, or shapes.

    o The result is a feature map that highlights specific patterns in the image.

2. ReLU (Rectified Linear Unit):

    o A nonlinear function applied after each convolution to introduce non-linearity, allowing the network to learn complex patterns.

3. Pooling Layers:

    o These layers reduce the spatial size of the feature maps (e.g., using max pooling), which helps to:

        ▪ Reduce computation

        ▪ Prevent overfitting

        ▪ Capture dominant features

4. Fully Connected Layers:

    o Near the end of the network, these layers take the high-level features detected and use them to make a final classification or prediction.

5. Softmax/Output Layer:

    -This layer gives probabilities for each class.

3.DIFFERENT TYPES OF NEUTRAL NETWORKS-

1. Feedforward Neural Network (FNN)

- Information flows in one direction: input $\rightarrow$ hidden layers $\rightarrow$ output.

- Used for basic tasks like classification and regression.

2. Convolutional Neural Network (CNN)

- Excellent at processing image and spatial data using convolutional layers.

- Captures local patterns like edges and textures in images.

3. Recurrent Neural Network (RNN)

- Has memory: outputs depend on previous inputs (good for sequences).

- Used in time-series, language, and speech data.

4. Long Short-Term Memory (LSTM)

- A special RNN that remembers information over long periods.

- Solves the vanishing gradient problem in standard RNNs.

5. Generative Adversarial Network (GAN)

- Has two competing networks: Generator and Discriminator.

- Used to generate realistic synthetic data (e.g., images, deepfakes).

4.PIPLELINE OF PROJECT(FOREST FIRE DETECTION USING DEEP LEARNING)

STEPS:-

1.Data collection

2.Data processing

3.Build CNN

4.Testing and model evaluation