Project Description: Real vs. Fake Media Classification Using Neural Networks

1. Overview

In this project, you are required to design and implement a neural network capable of distinguishing between **real** and **fake** media content. The model should classify one chosen modality from the following options:

- **Images** (e.g., detecting manipulated or AI-generated images)
- **Audio** (e.g., detecting deepfake voices)
- **Video** (e.g., detecting deepfake or digitally manipulated video)

you must **build the neural network architecture by yourself**, without relying on pre-trained models. The project aims to develop practical skills in neural network design, training, evaluation, and documentation.

2. Project Requirements

2.1 Data Preparation

- Choose a dataset containing both **real** and **fake** samples in the selected media type.
- Perform necessary preprocessing steps (e.g., resizing, normalization, noise removal, feature extraction).
- Split the dataset into **training**, **validation**, and **testing** sets.

2.2 Model Design

- Build a neural network manually
- Clearly define the architecture:
    - Number of layers
    - Activation functions
    - Loss function
    - Optimization method
    - Hyperparameters (learning rate, batch size, epochs, etc.)

2.3 Training and Evaluation

- Train the model using the prepared dataset.
- Validate the model during training to avoid overfitting.
- Evaluate final performance using metrics such as:
    - **Accuracy**
    - **Precision / Recall / F1-Score**
    - **Confusion Matrix**
- Provide a discussion of the results.

2.4 Implementation

- The code must be fully written by the students (Python, MATLAB, or any approved framework).
- No pre-trained models should be used.

3. Deliverables

3.1 Source Code

- Complete and clean implementation
- Proper comments and modular structure
- Separate training, testing, and preprocessing scripts if possible

3.2 Presentation

- 5–8 minute presentation summarizing the project
- Slides should highlight the methodology, model structure, and results