**Real and Fake Image Identification**

**Overview**

I developed this project to identify real and AI-generated (fake) images using a deep learning model based on **InceptionV3**. I used the **CIFake** dataset from Kaggle, which contains both real and synthetic images.

**Dataset**

I downloaded the dataset from Kaggle:

* **Source**: [CIFake - Real and AI-Generated Synthetic Images](https://www.kaggle.com/datasets/birdy654/cifake-real-and-ai-generated-synthetic-images)
* **Structure**:
  + train/ - Training images (real and fake)
  + test/ - Testing images (real and fake)

**Requirements**

To set up the environment, install the necessary dependencies using:

pip install tensorflow numpy opencv-python matplotlib scikit-learn kagglehub

**Model Architecture**

For this project, I used **InceptionV3** with transfer learning:

* **Base Model**: Pretrained **InceptionV3** (ImageNet weights)
* **Trainable Layers**: I unfroze the last 50 layers for fine-tuning
* **Additional Layers**:
  + GlobalAveragePooling2D
  + Dense layers for classification
  + Dropout to prevent overfitting

**Training & Preprocessing**

* **Image Processing**: I resized images to 224x224 and normalized them using preprocess\_input
* **Augmentation**: I applied horizontal flips, zoom, and a validation split of 20%
* **Batch Size**: 64
* **Optimizer**: Adam
* **Loss Function**: Binary Crossentropy
* **Training**: I fine-tuned the model using model.fit()

**Usage**

To run the notebook:

1. **Load the dataset**
2. **Preprocess and augment images**
3. **Train the InceptionV3-based model**
4. **Evaluate performance using classification reports and confusion matrix**

**Evaluation Metrics**

I evaluated the model using:

* **Accuracy=0.9480 or 94%**
* Precision: Real=0.94 or 94%, Fake=0.95 or 95%
* Recall= Real=0.95 or 95%, Fake=0.94 or 94%
* F1-score= Real=0.95 or 95%, Fake=0.95 or 95%

**Results**

The final model achieved good accuracy in distinguishing real and fake images. To improve it further, I could:

* **Use a larger dataset**
* **Fine-tune more layers in InceptionV3**
* **GitHub URL: https://github.com/Dibyajyotisahu/Ai\_Fake\_Image\_prediction.git**

**Credits**

Dataset: [CIFake - Real and AI-Generated Synthetic Images](https://www.kaggle.com/datasets/birdy654/cifake-real-and-ai-generated-synthetic-images)

Pre-Trained Model: InceptionV3 based Architecture(CNN model).