# **DEEP FAKE DETECTION ON IMAGES AND VIDEOS**

## **Overview**

This project focuses on developing machine learning models for video processing with applications in detecting fake videos. The core technology leverages deep learning architectures such as GRU (Gated Recurrent Units) for sequence modeling and InceptionV3 and ResNet50 for feature extraction from video frames. The project is designed to preprocess videos, train models to recognize patterns indicative of video authenticity, and evaluate model performance, highlighting key metrics such as training and validation accuracy.

## **Features**

* **Video Preprocessing**: Standardize video frames to a fixed size and format to feed into the neural network.
* **Feature Extraction**: Utilize InceptionV3 and ResNet architecture to extract meaningful features from each video frame.
* **Sequence Modeling**: Implement GRU layers to capture temporal dependencies between consecutive video frames.
* **Model Training and Validation**:
  + Train models on a labeled dataset with metrics displayed each epoch for monitoring.
  + Detailed tracking of training and validation accuracy to assess performance and generalizability.
  + Use callbacks like ModelCheckpoint and EarlyStopping to optimize training and prevent overfitting.
* **Model Optimization**: Adjust learning rates and model architecture based on performance metrics.

## **Model Performance**

the model demonstrated consistent improvement in both training and validation loss, indicating effective learning and adaptation to the training data. Here is a summary of the model's performance over the training period:

* **Training Accuracy**: Started at 68.05% and improved to 80.60% by the end of the training.
* **Validation Accuracy**: Remained consistent at 81.25%, suggesting that the model generalizes well to new data.

This performance trajectory indicates that the model is stable and effectively learns the distinguishing features between classes without overfitting, as evidenced by the parallel improvement in validation metrics.

## **Dependencies**

* TensorFlow
* Keras
* NumPy
* OpenCV
* Pandas

**References:**

https://www.researchgate.net/publication/368589748\_Detection\_of\_Deepfake\_Video\_Using\_Residual\_Neural\_Network\_and\_Long\_Short-Term\_Memory