

# An AI-Based Deepfake Detection System for Authenticity Verification of Digital Images and Videos

## Abstract

The rapid growth of artificial intelligence and deep learning technologies has enabled the creation of highly realistic deepfake images and videos, posing serious threats to cybersecurity, digital trust, and information integrity. Deepfake media can be misused for identity impersonation, misinformation, financial fraud, and reputational damage, making their detection a critical real-world problem. This project aims to design and develop an AI-based deepfake detection system that can automatically classify digital media as real or manipulated, thereby supporting digital media forensics and cybersecurity applications. The primary objective of the proposed system is to accurately identify deepfake content using deep learning techniques while providing a scalable and efficient deployment framework. The system employs a convolutional neural network (CNN) model trained to analyze facial features and detect subtle artifacts introduced during media manipulation. Image and video data undergo preprocessing and feature extraction before being passed to the trained model for binary classification. The deepfake detection model is integrated with a FastAPI-based backend to enable real-time inference through a RESTful web service, allowing users to upload media files and receive classification results efficiently. The proposed solution is designed to be lightweight, modular, and feasible within limited computational resources. Experimental evaluation demonstrates that the system can distinguish real and fake media with reliable accuracy, making it suitable for academic and practical use. This project contributes to enhancing digital content authenticity verification and provides a foundation for future advancements in automated deepfake detection systems for secure digital environments.

## Keywords

Deepfake Detection, Deep Learning, Convolutional Neural Networks (CNN), Image Classification, Video Analysis, FastAPI, Artificial Intelligence, Digital Media Forensics, Face Manipulation Detection, Computer Vision