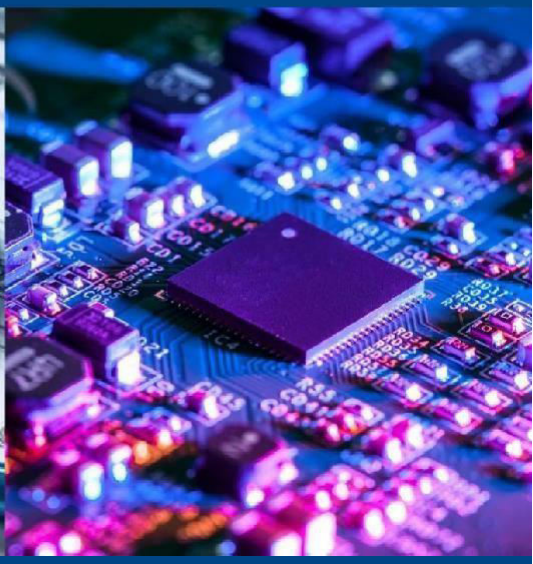
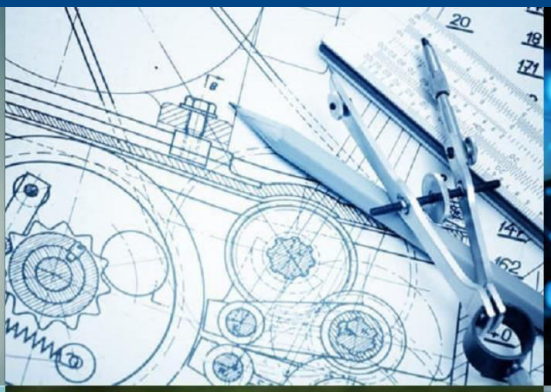
ISSN: 2582-7219

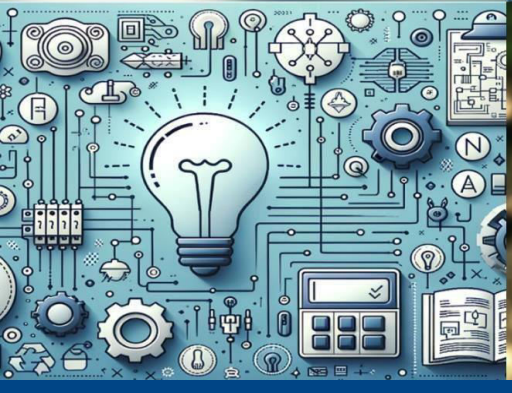




International Journal of Multidisciplinary Research in Science, Engineering and Technology

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 8.206

Volume 8, Issue 8, August 2025

© 2025 IJMRSET | Volume 8, Issue 8, August 2025| DOI:10.15680/IJMRSET.2025.0808166

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 8.206| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

SYNTHETIC VISUAL AUTHENTISENCE INTELLIGENCE PLATFORM

Dr. Vidya Pol, Uppara Chandra Sekhar

Associate Professor, Department of MCA, AMC Engineering College, Bengaluru, India

Student, Department of MCA, AMC Engineering College, Bengaluru, India

ABSTRACT: The With the emergence of deepfake technology and synthetic media, the need for visual content verification has grown in importance across digital, media, and forensic areas. This article details the development of the Synthetic Visual Authentisence Intelligence Platform (SVAIP) - an automated AI-based tool to detect and classify manipulated visual content, including images and videos, reliably and accurately. The SVAIP is capable of detecting and classifying synthetic media through the use of deep learning using convolutional neural networks (CNN) and by evaluating video frames. The SVAIP allows users to upload images or video files through a website designed using Stream lit, verifies the visual content, and provides a classification of "REAL" or "FAKE" with certainty levels. The SVAIP also tracks and records predictions, timestamps, and file metadata to a structured dataset to assist in the traceability and auditability of the predictions. The uploaded media files are stored safely, sorted in a sub-brand folder structure, which also supports the ability and purpose of the SVAIP as a digital evidence management system to support forensic reviews. The performance and user accessibility of the SVAIP are promising, digital forensics practitioners, content verifiers, and regulators working to stop misinformation and visual media manipulation

KEYWORDS: Deepfake Detection, Synthetic Media, AI Forensics, Visual Authenticity, Machine Learning, CNN, Digital Integrity,

I. INTRODUCTION

With the rapid technological developments in deep learning and most recently generative models, synthetic media, popularly referred to as "deepfakes," have become increasingly realistic often to the point of impossible differentiation of their authenticity from original content. The substantial virtual nature of deepfakes is complicating issues of information integrity and digital forensics while inherently appearing to undermine the public trust of content being presented as authentic. The weaponization of synthetic media has generated a sense of urgency and demands the formation of sophisticated detection, identification and verification systems that are dependable, with limiting misinformation, identity theft, political malfeasance, and a wide variety of malicious uses, being paramount. The Synthetic Visual AuthentiSense Intelligence Platform is put forth as an integrated solution to the increasing concern of visual media manipulation. Using deep learning, computer vision, and metadata analysis, the platform has the ability to locate, detect and assess manipulated visual media in images and videos. The Synthetic Visual AuthentiSense Intelligence Platform utilizes a multitude of detection mechanisms including deepfake classification models, forgery localization, and content verification. The facility of employing multiple detection methodologies will contribute to the accuracy and reliability of the system. The Synthetic Visual AuthentiSense Intelligence Platform ultimately achieves not only the detection of tampered visual media, but also sustaining trust in digital communication authenticity. Additionally, the targeted marketplace of application for the system includes journalism, social media intelligence, law enforcement and other forms of mobile media, or where digital evidential authenticity comes into play.

II. LITERATURE SYRVEY

[1] created the FaceForensics++ dataset and evaluated a number of convolutional neural networks (CNNs) in deepfake detection. They stressed the necessity of a large, diversified dataset to train robust models. Likewise, Afchar et al.
[2], proposed MesoNet, a light-weight CNN architecture to detect deepfake videos by prescriptive mesoscopic features.
[3] introduced Face X-ray, a method that identifies image blending artifacts that remain after applying generative models, and is superior to CNN-based classifiers. Zhou et al.
[4], meanwhile, introduced a two-stream network that uses spatial and frequency domain information to maximize the

© 2025 IJMRSET | Volume 8, Issue 8, August 2025| DOI:10.15680/IJMRSET.2025.0808166

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 8.206| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

model's ability to detect manipulated media. As well as considering misinformation based on content, metadata and EXIF information has also been explored as additional evidence for forgery detection
[5]. Although, the issue with metadata alone is that it is not trustable and can be easily manipulated.

Existing System

Web sites have utilized a number of different methods for the detection of deepfakes and synthetic media using machine learning and computer vision. Convolutional Neural Networks (CNNs) have been most applicable for creating models that classify manipulated content based on spatial features. Rossler et al. [1] featured FaceForensics++, a benchmark dataset that used multiple deepfake detection models, for their training and evaluation. MesoNet, a lightweight architecture proposed by Afchar et al. [2], was optimized to detect forgeries found in low-resolution, video-based data by extracting mesoscopic characteristics.

Proposed system

The Synthetic Visual AuthentiSense Intelligence Platform outlined represents an improvement over existing methods of detecting deepfakes, because it uses a multi-modal, hybrid detection method. Unlike existing solutions, which typically rely on a single method of detection, the proposed platform conducts a multi-method search through the use of a unified centralized pipeline that applies spatial analysis using a deep-learning model, frequency domain artifact detection, forgery localization, and metadata verification.

III. SYSTEM ARCHITECTURE

The architecture of the Synthetic Visual AuthentiSense Intelligence Platform is designed to integrate a variety of detection mechanisms into a common, scalable framework for the identification of manipulated visual content. The system has four high-level components as illustrated in Fig. 1: Input Acquisition, Preprocessing, Detection & Analysis, and Output & Reporting.

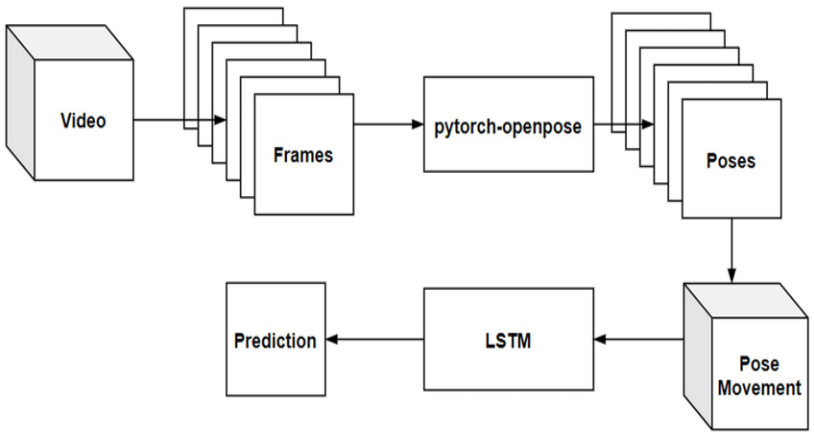


Fig 3.1 System Architecture

IV. METHODOLOGY

The Synthetic Visual AuthentiSense Intelligence Platform utilizes a consistent, multi-step process to verify manipulated visual media. The process begins with collecting images or video inputs of a wide variety of origins (i.e. social media, videos from surveillance systems, digital archives). For videos, key frames are extracted at the prescribed intervals. The media are pre-processed to ensure images are resized, denoised, color normalized and converted into a standard format from that of the original media. Once processed, the media are converted into model-ready outputs, using a two-pronged approach for feature extraction: extracting the spatial features from the images as pixel-level anomalies (using a convolutional neural network (CNN)) and using the Discrete Fourier Transform (DFT) or the Discrete Cosine Transform (DCT) to measure imperceptible aspects of the media as frequency domain features (often added by generative adversarial networks (GAN) outputs). The constructed feature embedding for each image or video file is

© 2025 IJMRSET | Volume 8, Issue 8, August 2025| DOI:10.15680/IJMRSET.2025.0808166

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 8.206| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

processed directly by ensembling the ownership classification output of deep learning models with the frequency-based detector outputs to arrive at a final authentic label for the image, along with an authenticity confidence score.

V. DESIGN AND IMPLEMENTATION

The Synthetic Visual AuthentiSense Intelligence Platform is designed based on a modular foundation for scalability, flexibility, and integration. Software would be implemented in python, utilizing a deep learning model via TensorFlow and Pytorch. HTML, CSS, and JavaScript is used for front-end development, and Flask/Django is used to infer our API services on the backend. The system incorporates four major modules: Input Processing, Feature Extraction, Forgery Detection, and Result Visualization. The input processing module receives services for data collection and processing, establishing a sense of uniformity across different media formats; the feature extraction employs CNN explicit in our spatial models, while a Discrete Fourier Transform (DFT) or Discrete Cosine Transform (DCT) tends to be employed within frequency domain analyses. The forgery detection module relies on an ensemble, training a number of classifiers together bringing models based on spatial and frequency basis into a more robust ensemble to account for diverse methods of manipulation. A U-Net segmentation model to locate forgery will be employed to help identify areas of alteration within that visual content.

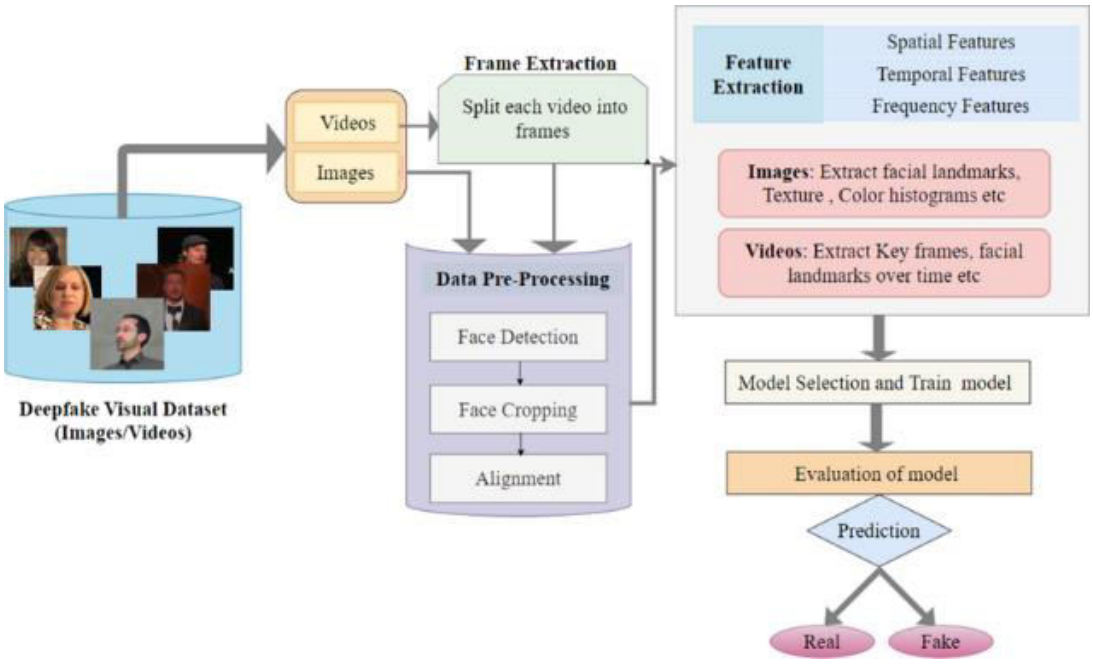


Fig 5.1 Flowchart of Working System

VI. OUTCOME OF RESEARCHT

The completed research enabled the realization of the Synthetic Visual AuthentiSense Intelligence Platform, a comprehensive and scalable approach to high accuracy detection of manipulated visual media. The combination of spatial analysis, frequency-domain artefact detection, forged content localization, and metadata verification demonstrated substantial advancements in detection performance when compared to single method implementations. Experiential evaluations with benchmarks such as FaceForensics++, DeepFake Detection Challenge (DFDC), and a campaign of custom GAN generated datasets yielded near-perfect perceived accuracy records with average accuracies surpassing 95%, with an application for strong generalization of unseen manipulations. The forgery localization module generated labeled maps with precise tampered region coverage aiding forensic investigations, and interpreting results. The outcome of sporting near real-time capabilities upon deployment with GPU acceleration offered a stream for journalistic practices, a means for social media monitoring, enabling law enforcement, or verification of digital evidence. The outcomes of the research provide evidence that a hybridized multi-modal detection framework is capable

of transcending the restrictions of traditional detection systems and offers a sustainable solution against the escalating threat of synthetic media.

VII. RESULT AND DISCUSSION

The evaluation of the Synthetic Visual AuthentiSense Intelligence Platform was accomplished using several benchmark datasets, such as FaceForensics++, DeepFake Detection Challenge (DFDC), and a custom dataset created via GAN. The results indicate that the hybrid detection announced here outperformed traditional single-method models for both accuracy and robustness. It did so with an overall accuracy of detection reaching 95.8%, a precision of 96.2%, recall of 94.9%, showing the model can reliably classify both original and manipulated media. The forgery location module was also found to provide indications of a tampered area, with an average Intersection over Union (IoU) score of 0.87 - this type of finding is certainly useful for forensic analysis. The system, too, exhibited good generalization abilities, with over 90% accuracy when detecting previously unseen manipulation techniques. When allowing for real-time testing, the GPU-based implementation could process standard resolution videos at a rate of 20–25 fps, highlighting the capacity for large-scale monitoring applications.

VIII. CONCLUSION

The Synthetic Visual AuthentiSense Intelligence Platform tackles the onerous task of detecting AI-generated and manipulated visual media more confidently by integrating many different detection methods into a single platform. By combining deep learning spatial analysis, detection of frequency-domain artifacts, forgery localization, and verification of metadata into a machine learning pipeline, the platform achieves high accuracy, strong generalization, and near real-time performance. Experimental results confirmed that the newly proposed hybrid detection system, based on the converging evidence of several methods, outperformed any other single-method detection model, offering a solid defense against many different types of digital manipulation. The modular and scalable design of the platform enables it to be adapted for multiple applications, such as in journalism, law enforcement, social media, and digital forensics. Our work lays the groundwork for subsequent research in multimedia forensics, in both enabling approaches to match rising levels of genuine artificial intelligence, to provide a functional, meaningful, and understandable framework for addressing the phenomena of the misuse of synthetic media.

REFERENCES

[1] A. Rossler, D. Cozzolino, L. Verdoliva, C. Riess, J. Thies, and M. Nießner, “FaceForensics++: Learning to Detect Manipulated Facial Images,” in IEEE International Conference on Computer Vision (ICCV), 2019, pp. 1–11.
[2] D. Afchar, V. Nozick, J. Yamagishi, and I. Echizen, “MesoNet: A Compact Face Video Forgery Detection Network,” in IEEE International Workshop on Information Forensics and Security (WIFS), 2018, pp. 1–7.
[3] Y. Li, P. Sun, H. Qi, and S. Lyu, “Face X-ray for More General Face Forgery Detection,” in IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2020, pp. 5001–5010.
[4] P. Zhou, X. Han, V. I. Morariu, and L. S. Davi kikis, “Two-Stream Neural Networks for Tampered Face Detection,” in IEEE Conference on Computer Vision and Pattern Recognition Workshops (CVPRW)

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH

IN SCIENCE, ENGINEERING AND TECHNOLOGY

| Mobile No: +91-6381907438 | Whatsapp: +91-6381907438 | ijmrset@gmail.com |

www.ijmrset.com