ARKA Educational &Cultural Trust(R)

JAIN INSTITUTE OF TECHNOLOGY,DAVANAGERE

(A unit of Jain Group of Institution, Bengaluru)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Major project On

"Advanced Image Detection and Classification"

PROJECT ASSOCIATES:

Bhoomika S V(4JD22EC012)
Manjula A(4JD22EC030)
Amulya G (4JD23EC400)
Niveditha B(4JD23EC405)

UNDER THE GUIDANCE OF:

Mr.Santosh Kumar G S
Assisstant Professor
Dept. of E&CE,
JIT, Davangere

ABSTRACT

- This project builds an image detection and classification systems that identifies whether an images is real or fake using deep learning, the model processes images, extracts features, and gives results quickly and accurately.
- Techniques like openCV preprocessing, MobileNetV2 feature extraction, Binary Cross-Entropy loss, Adam optimizer, and hyperparameter tuning are used to improve accuracy and performance the system also shows which features in the image were manipulated.
- An auto retrain features updates the model only when accuracy improves, making it suitable for reliable media authentication, digital forensics, and security-sensitive applications.

1 INTRODUCTION

- Digital image manipulation and AI-generated content have become widespread, causing challenges in verifying authenticity. Fake or modified images can mislead people, spread misinformation, or be used for fraud.
- This project implements a real-time automated forensic system that detects manipulated images using a trained CNN model and forensic techniques.It also features:
- AI vs REAL classification

- Explainable heatmaps
- Metadata & ELA detection
- Deepfake face checks
- Admin-only analytics dashboard
- CSV/PDF reporting
- This system provides a fast, accurate, and user-friendly solution for image authenticity verification.

1.1 PROBLEM STATEMENT

- With the rise of AI image generators, deepfakes, and mobile editing tools, it has become difficult to visually identify manipulated images.There is no simple and accessible tool for:
- Detecting AI-generated images
- Identifying tampering or edits
- Understanding what part of the image is suspicious
- Verifying authenticity with forensic proof
- Tracking analytics across large datasets
- Hence, a smart and automated image authenticity detection system is required.

1.2 OBJECTIVES

- Develop a deep-learning model for detecting real vs fake images
- Provide explainable results using Grad-CAM
- Analyze metadata, file structure, and ELA mismatches
- Detect deepfake faces
- Track results with a logging system
- Provide an admin dashboard with visual analytics
- Generate downloadable reports in PDF & CSV
- Allow batch image checking

2 LITERATURE SURVEY

Authors	Publication Year	Paper Title	Contribution	Drawback
Syed Sahil Abbas Zaidi, Mohammad Samar Ansari	2021	"A Survey of Modern Deep Learning based Object Detection Models"	Provides a comprehensive overview of recent developments in deep learning-based object detection models.	**The survey may not cover the most recent advancements in the rapidly evolving field of deep learning-based object detection.**
Xiongwei Wu, Doyen Sahoo, Steven C. Hoi	2020	"Recent Advances in Deep Learning for Object Detection"	Offers a systematic analysis of existing object detection frame-works.	**Limited exploration of the scalability and efficiency of discussed models.**
Kavi B. Obaid, Subhi R. M. Zeebaree, Omar M. Ahmed	**2019**	**"Deep Learning Models Based on Image Classification: A Review"**	**Reviews the latest deep learning models used for image classification tasks.**	**The review may not address the limitations of these models.**

3 METHODOLOGY

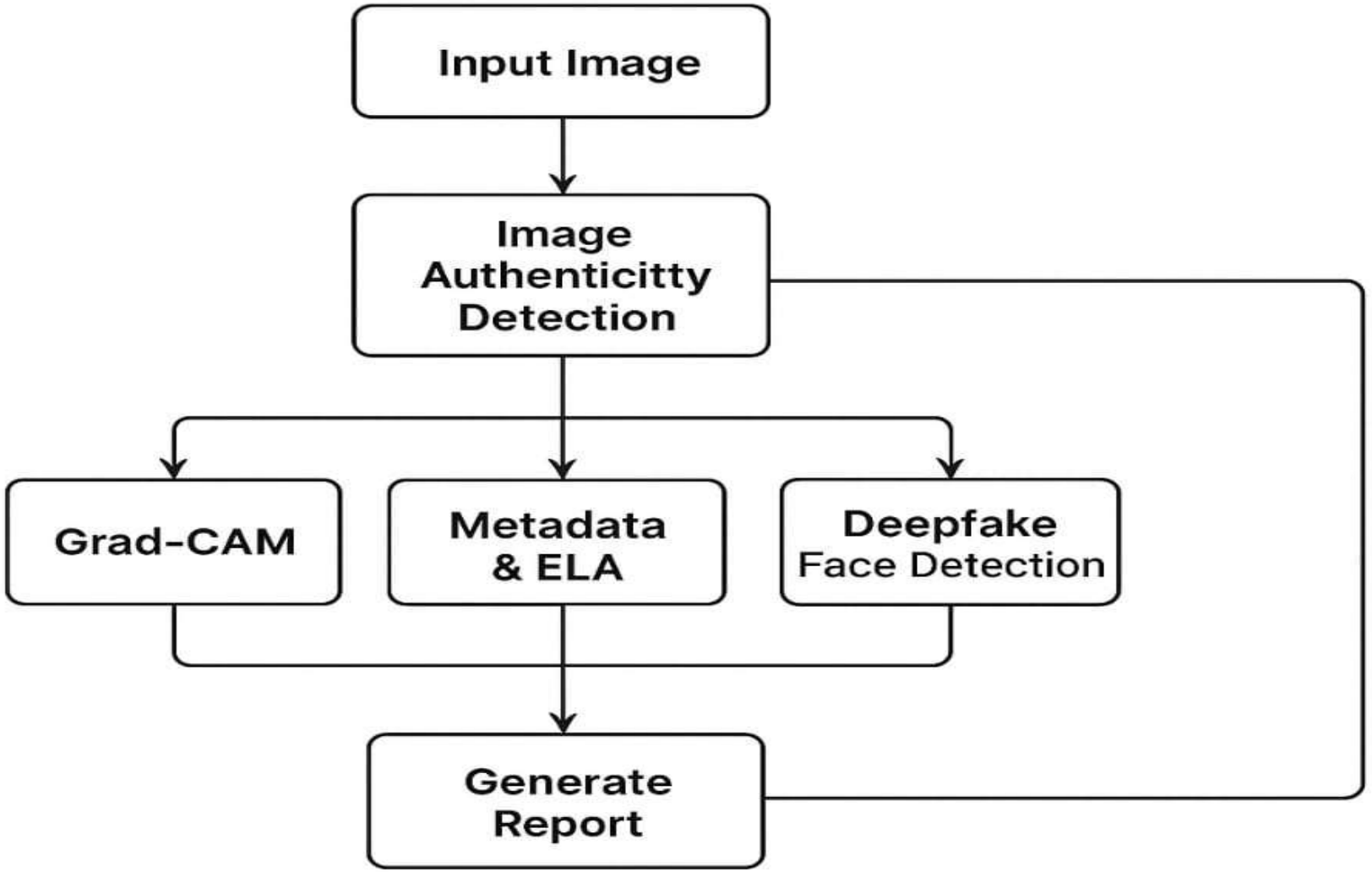

Figure1: Advanced Image Detection And Classification

4 SOFTWARE REQUIREMENTS

- Python 3.7 / 3.9
- TensorFlow / Keras
- Flask
- OpenCV
- NumPy
- Pillow
- Chart.js
- FPDF
- Werkzeug
- Matplotlib (optional for GradCAM)
- Jinja2 Templates

5 ADVANTAGES, DISADVANTAGES AND APPLICATIONS

5.1 ADVANTAGES

- Real-time AI-based detection
- Explainable forensics (heatmaps + metadata)
- High accuracy due to multiple techniques
- Easy-to-use web interface
- Admin dashboard with trends
- Works without GPU
- Batch scanning supported

5.2 DISADVANTAGES

- Accuracy depends on training dataset quality
- Cannot detect extremely subtle forgeries
- Large images increase processing time
- Deepfake detection limited by face quality

5.3 APPLICATION

- Cybersecurity
- Police & Forensic Departments
- Media houses / journalism
- Social media monitoring
- Fake news detection
- Legal evidence verification
- Educational & research purposes
- Digital content authenticity platforms

6 EXPECTED OUTCOMES

- High accuracy in image authenticity detection
- Clear forensic proof (EXIF, ELA, GradCAM)
- An intuitive UI with detailed results
- Analytics dashboard for admins
- Automated report downloads
- Prevention of misinformation and fraud

REFERENCES

1.Syed Sahil Abbas Zaidi, Mohammad Samar Ansari, Asra Aslam, Nadia Kanwal, Mamoona Asghar, and Brian Lee, “A Survey of Modern Deep Learning Based Object Detection Models,” IEEE Access, vol. 9, pp. 110363–110395, 2021.2.

2.Xiongwei Wu, Doyen Sahoo, and Steven C. H. Hoi, “Recent Advances in Deep Learning for Object Detection,” Neurocomputing, vol. 396, pp. 39–64, 2020.3.

3.Kavi B. Obaid, Subhi R. M. Zeebaree, and Omar M. Ahmed, “Deep Learning Models Based on Image Classification: A Review,” in International Conference on Advanced Science and Engineering (ICOASE), pp. 110–115, 2020.

THANK YOU