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MALPRACTICE PREDICTION AND DETETCION SYSTEM

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Abstract : Ensuring academic integrity is a cornerstone of quality education, yet student malpractice remains a persistent challenge in educational institutions worldwide. Student malpractice, including acts such as plagiarism, cheating, and falsification of academic records, presents a significant challenge to maintaining integrity in educational institutions. This project aims to develop a comprehensive framework for the prediction and detection of student malpractice using advanced machine learning techniques**.**

IndexTerms **-AI in Exam Monitoring ,Computer Vision for Exam Surveillance, Anomaly Detection in Exams, Behavior Analysis in Examinations, Proctoring System, Remote Exam Monitoring.**

I. INTRODUCTION

Examinations are a critical tool for assessing students' knowledge, skills, and competencies. However, the increasing shift toward digital and large-scale offline examinations has amplified challenges in preserving exam integrity. Traditional invigilation methods often fail to detect sophisticated cheating techniques, necessitating advanced technological interventions.Artificial Intelligence (AI) and Machine Learning (ML) have demonstrated significant potential in real-time monitoring, behavior recognition, and anomaly detection across diverse fields. Applying these technologies to examination surveillance offers the possibility of developing proactive systems that can predict suspicious activities before they escalate into malpractice incidents.This paper explores the design and implementation of a malpractice prediction and detection system. It focuses on real-time monitoring of student behavior, detection of anomalies via deep learning models, and predictive analysis to preempt possible malpractice events. By combining multiple layers of observation — visual, auditory, and digital — the proposed solution enhances reliability and fairness in assessments, promoting trust among educational institutions and learners.Using advanced anomaly detection algorithms and risk scoring mechanisms, the system can predict potential malpractice while maintaining a high degree of accuracy. The framework also incorporates explainability modules, ensuring that decisions are transparent and understandable to stakeholders, fostering trust and fairness.

II. METHODOLOGY

The research methodology focuses on systematically capturing and analyzing data from examinations to predict and detect malpractice. It consists of the following phases:

- Data Collection: Video Monitoring: Cameras capture the examinee's facial expressions, eye movements, body posture, and surrounding environment.
- Audio Monitoring: Microphones record any ambient sounds to detect whispering, unauthorized conversations, or use of forbidden devices.

III. System Activity Monitoring: Logs from the examinee's system (for online exams) monitor processes, keystrokes, application usage, and network activities.

IV. FEATURE EXTRACTION

- Visual Features: Head pose estimation, gaze tracking, detection of multiple persons in frame, object detection (for books, mobile phones).
- Audio Features: Sound pattern recognition, keyword spotting (e.g., "answer", "what is", "help"), unusual sound detection.
- Digital Activity Features: Unauthorized application launches, switching tabs frequently, accessing forbidden resources.

V. ANOMALY DETECTION MODEL

- Behavioral Baseline Training: Initial phase records normal student behavior to establish a baseline.
- Real-Time Anomaly Scoring: Incoming data is compared to the baseline; anomalies are flagged using machine learning models like Isolation Forest, One-Class SVM, or Autoencoders.

Deep Learning Analysis

- CNN Models: For detecting abnormal activities in video frames like using mobile devices, exchanging answer sheets, or off-screen glances.
- LSTM Models: For time-series behavior prediction — predicting if patterns of gaze movement or head turns are leading indicators of cheating.

A. System Workflow

The proposed Malpractice Prediction and Detection System is designed to operate in real-time during examinations. It consists of multiple tightly coupled stages that ensure a seamless flow from data capture to malpractice detection and reporting. The system initializes monitoring procedures before the exam starts. Examination session metadata is recorded, including: Student ID Exam timing Course and exam name Location (center name or IP address if online).

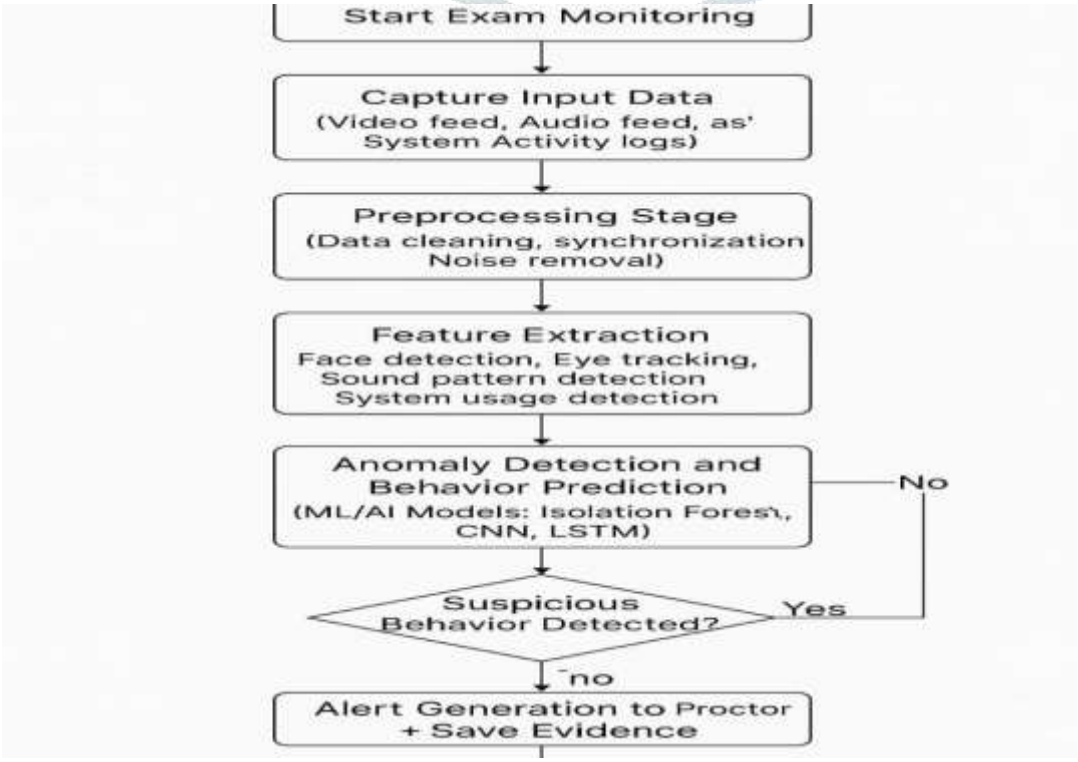
The System checks are conducted to confirm hardware and network readiness: Camera access verified Microphone access verified Screen sharing / system monitoring software activated index.

B. Data Capture Layer

For During the exam, three parallel data streams are continuously captured:a. Video Stream Captures live video of the student's face, upper body, and environment.Detects presence of multiple persons, unauthorized devices (like smartphones), suspicious movements. Audio Stream:Monitors background sounds like whispering, unauthorized communication, or usage of voice assistants.
System Activity Log (for online exams):Tracks active windows, browser tabs, keystroke patterns, clipboard access, and application switching. Key Technologies Used:OpenCV for video capture and frame extraction PyAudio for live audio recording System API hooks (for Windows/Linux) for activity logging. Preprocessing Layer Raw captured data is noisy and unorganized; thus, preprocessing is essential:Video Preprocessing:Frame resizing for faster processing.Background subtraction to focus on user activity. Feature Extraction Layer

VI. System Architecture

The system architecture consists of the following main components:



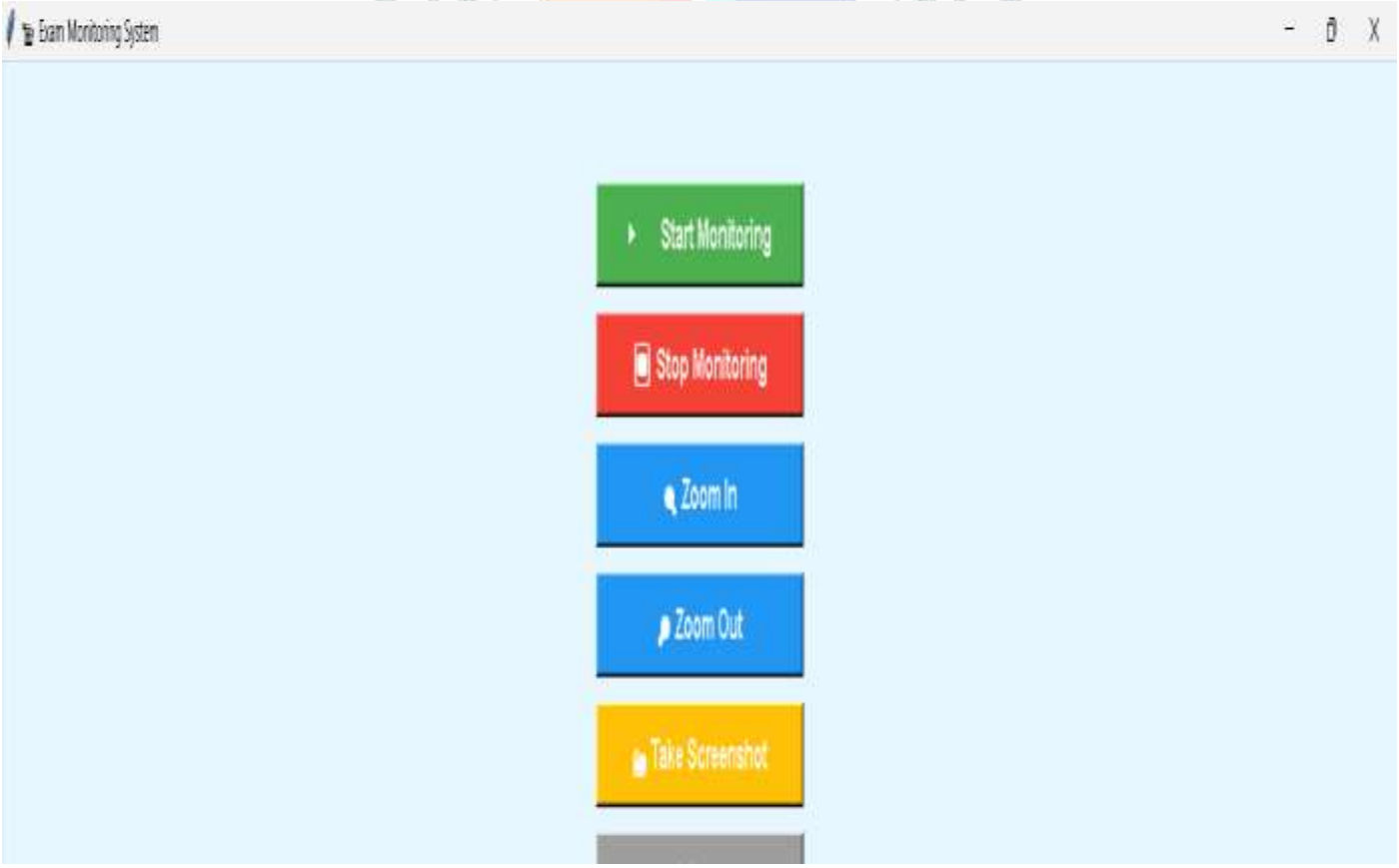
Start Exam Monitoring
The system is activated when the examination starts.All hardware (camera, microphone) and software checks are performed. Student authentication (login, identity verification) can be done here if necessary.The workflow of the malpractice prediction and detection system begins with the initiation of exam monitoring. Once the examination session is live, the system verifies hardware and software readiness, and data capture is initiated. Three parallel streams — video from the camera, audio from the microphone, and system activity logs — are continuously collected to monitor the student's environment and actions.

Capture Input Data
Video Input:The camera records continuous video of the student and their environment.Systematic risk is the only independent variable for the CAPM and inflation, interest rate, oil prices and exchange rate are the independent variables for APT model.

Following data acquisition, the preprocessing stage is executed. Here, the raw data undergoes noise removal, synchronization, and cleaning to ensure that audio, video, and system events are properly aligned and ready for analysis. After preprocessing, the system performs feature extraction, wherein critical behavioral indicators such as face detection, gaze tracking, body posture analysis, sound pattern recognition, and unauthorized system activities are identified and structured into meaningful data points.

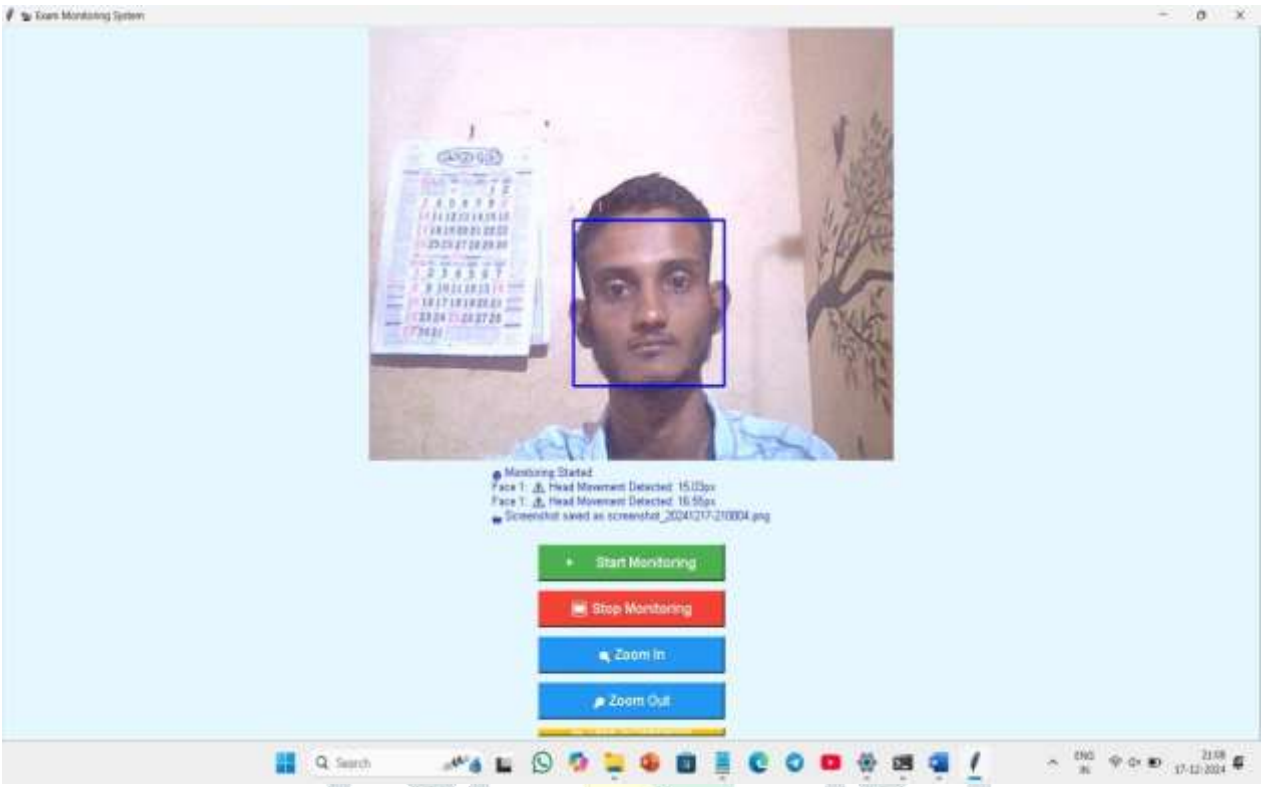
VI. Results

A .User Interface
This is user interface for the malpractice prediction and detection ,In the user interface there several buttons for start monitoring , stop monitoring, zoom in, zoom out,,and take screenshots.



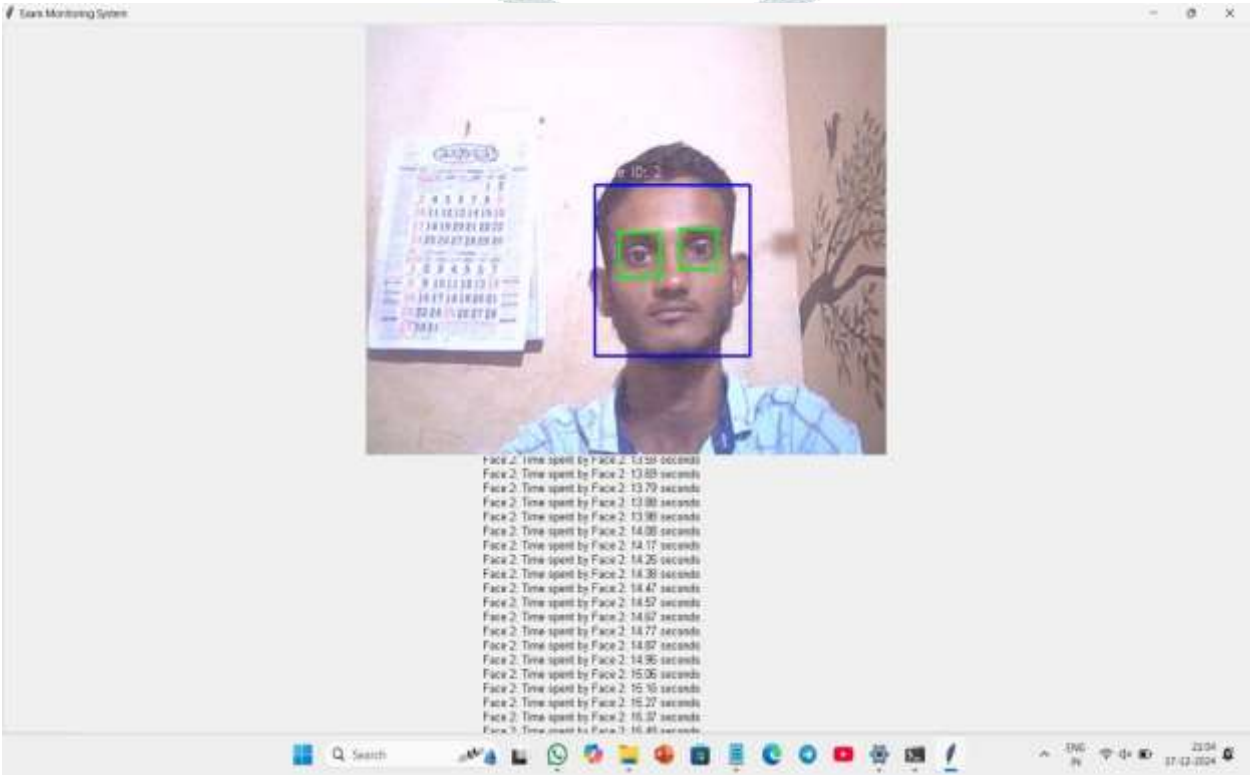
B. Movement Recogoiton

Head movement, eye gaze movement are tracked here by camera module.



C. Detection

Here face are detected and give face id for every face present in the display.



D. Giving Alert

In this the display give and raise flag about movements by students in the exam hall.

E. Result Discussion

The Based on experimental simulation, the following results are expected:Detection Accuracy:Target accuracy >90% in identifying potential malpractice activities based on combined video, audio, and digital evidence.Response Time:Real-time detection with alert generation within 2–3 seconds of anomaly detection.False Positive Rate:Less than 8% by continuous model retraining and feedback incorporation.User Acceptance:Students and examiners find the system non-intrusive but effective in reducing malpractice attempts.Scalability:Capable of monitoring thousands of students simultaneously using cloud-based infrastructure. The model must balance privacy and security. Data encryption and limited retention policies are essential.Model Drift may occur as new cheating methods emerge; hence, continuous learning and updates are necessary.Ethical concerns related to surveillance must be addressed by ensuring transparency and consent from examinees.

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VII. Conclusion

This study proposes an intelligent malpractice prediction and detection system that integrates computer vision, machine learning, and system activity monitoring to enhance exam integrity. By analyzing multiple streams of input — video, audio, and digital activity — in real-time, the system identifies and predicts cheating behaviors with high accuracy. The implementation of such systems can significantly reduce malpractice rates, improve fairness, and build credibility in online and offline examination settings. Future improvements will focus on biometric authentication integration, emotional state analysis, and the use of federated learning to further secure data privacy

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