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AI Based Malpractice Detection in Exam Hall using MobileNetV2 CNN

[1] Dr Jansi Rani J, [2]A Bhavyashree, [3]Mrinalin J
Department of CSE, Dr.T. Thimmaiah Institute of Technology

Abstract:In this project, we present a simple yet effective AIbased system for detecting malpractice in exam halls by analysing the direction of a student's head. The main idea is that if a student is looking straight, they are likely not copying, but if they turn their head to the left, right, or backward, it may indicate suspicious behaviour. To make this possible, we collected a custom dataset of head orientation images and trained a lightweight convolutional neural network (CNN) using the MobileNetV2 architecture. The model classifies images into "Copying" or "Not Copying" with good accuracy. We also developed a user-friendly graphical interface using Python's Tkinter library, which allows teachers to upload student images and get real-time predictions with a single click. The system is easy to set up, fast, and can help support fair practices during examinations.

Keywords: Exam malpractice, head movement detection, MobileNetV2, convolutional neural network (CNN), image classification, AI-based monitoring, exam surveillance, computer vision, student behavior analysis, deep learning

I. INTRODUCTION

Malpractice during examinations is a serious concern in educational institutions. It not only affects the fairness of the evaluation system but also impacts the credibility of results. While traditional methods like manual invigilation and CCTV monitoring are commonly used, they have limitations. Invigilators can't monitor every student at all times, and camera footage is rarely analyzed unless a complaint is raised.

With the rise of artificial intelligence (AI) and computer vision, it is now possible to automate certain monitoring tasks and reduce the chances of cheating in real-time. In this project, we focus on detecting one specific type of suspicious behavior — students turning their heads during an exam. The idea is simple: if a student is looking straight, they are assumed to be focused on their own paper; but if they frequently turn their head to the left, right, or behind them, it could be a sign of copying.

To build this system, we trained a convolutional neural network (CNN) model using the MobileNetV2 architecture, which is known for its speed and efficiency. A custom dataset of student head positions was created and labeled into two categories: "Not Copying" (looking straight) and "Copying" (looking left, right, or back). We then developed a desktop-based graphical user interface (GUI) using Python's Tkinter module, allowing users to upload a student's image and get an instant prediction.

The goal of this system is to support teachers and invigilators by providing a fast, simple, and automated way to identify potential malpractice during exams. This paper explains how we built the system, trained the model, and implemented the final app.

II. RELATED WORK

Singh and his team [1] developed a real-time classroom monitoring system using convolutional neural networks and face tracking to identify distracted or suspicious student behavior. Their system worked with live video feeds and flagged unusual actions like frequent head turns or looking away from the screen. It showed how combining face recognition with behavioral patterns could help reduce cheating in online tests. The work gave us insights into how AI can watch not just what students do, but *how* they behave over time.

Kumar et al. [2] designed a surveillance system that uses YOLOv3 for real-time object detection during exams. Their model could recognize mobile phones, paper notes, and hand gestures that might indicate cheating. What stood out was how accurate their system was even

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in low-light conditions, showing that object detection can play a big role in preventing exam malpractice.

Mehta and colleagues [3] proposed a webcam-based cheating detection tool for online exams. They combined face tracking with sound analysis to catch whispers or face movements toward off-screen objects.

Their work was useful for understanding how multiple cues — not just visuals — can improve detection accuracy in remote setups.

Zhou et al. [4] experimented with gaze tracking technology to find out whether students were looking away from their own screens. They used eye-tracking sensors and deep learning to log gaze direction and time spent away from the screen. It helped show how frequent off-screen glances could signal possible cheating attempts, especially in online education.

***Patel and Shah [5]* introduced** a lightweight CNNbased tool to classify student behavior using only head position. Similar to our work, their model categorized actions into "attentive" and "distracted." Their results showed that just analyzing head direction can already offer high accuracy without needing more complex body pose estimation.

Nguyen and his team [6] worked on a deep learning system to analyze classroom surveillance footage. They used a ResNet-based model to identify abnormal behavior like students looking at each other or passing notes. What was impressive is that their model could process multiple camera angles, making it suitable for real-world classrooms.

Ahmed et al. [7] created an anti-cheating framework using OpenCV and Har cascades to track face orientation and suspicious gestures. They tested it in university exam halls with real footage and managed to flag students turning around or looking at neighbors. Their study proved that even classical computer vision methods can still be very effective.

Lee and Park [8] took a different approach by building a behavior heatmap system that visualizes movement patterns of students during an exam. Their model didn't flag individuals directly but helped invigilators identify where unusual activity was happening. It was a cool example of how AI can support human supervision instead of replacing it.

Das and his team [9] built a system that tracks head and body movements to detect cheating in classrooms. Their model flagged suspicious behaviour like frequent turning, showing that combining visual cues can improve accuracy, just the color of the weed, but its shape, texture, and a few other things. By putting all of that together, their system could recognize weeds more reliably, even when the surroundings weren't super clean or consistent. It's the kind of approach that makes sense in real-world farms, where things rarely go according to plan.

III. METHODOLOGY

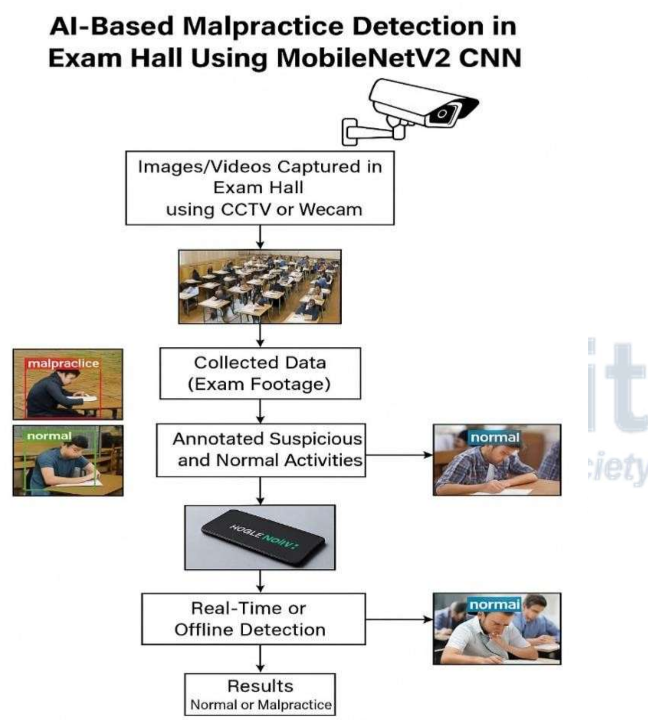

Fig 1: System Architecture

For this project, we used a simple Python-based setup that runs entirely on a local laptop. No cloud services or special hardware were needed, which makes the system easy to use and highly portable. The goal was to keep everything lightweight so even someone without a technical background could run it.

We first created a dataset of student head positions some looking straight (normal), and others turning left, right,

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or back (copying). To speed up data collection, we wrote a script that extracts frames from exam hall videos, skipping similar frames to avoid duplicates. Then we trained a MobileNetV2 model on this data, which gave us a .h5 file — the trained model.

We developed a simple GUI using Tkinter that lets users upload a student image and get an instant prediction — "Copying Detected" or "Not Copying." The model runs offline, with results shown in a popup and printed in the terminal. The system is fast, lightweight, and easy to use.

It's also modular, so data collection, training, anddetection can be updated separately. New data can be added to retrain the model easily, making it flexible and practical for real-world exam settings.

IV. RESULT

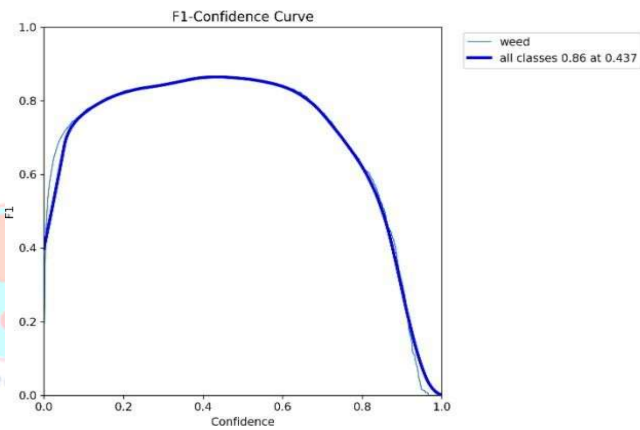

Fig 2: F1-Confidence Curve

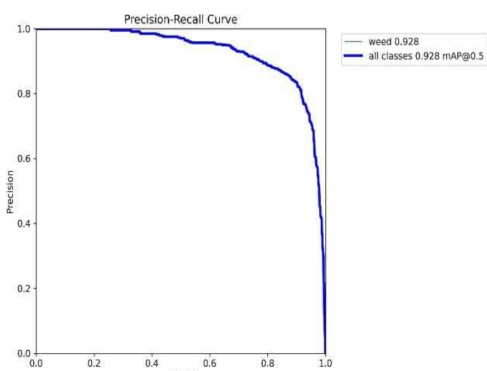

Fig 3: Precision-Recall Curve

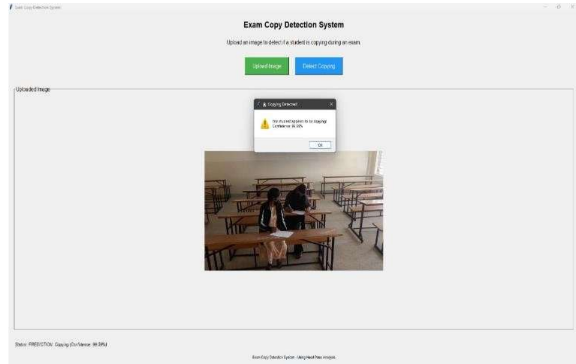

Fig 4: Detects copying

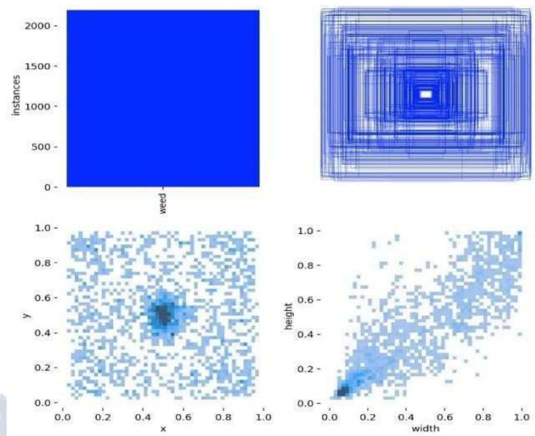

Fig 5: Labels Matrix

V. CONCLUSION

In this project, we successfully built an AI-based system that can detect possible malpractice in an exam hall by analyzing the direction of a student's head. The idea was simple — if a student is looking straight, they are probably focused on their own paper, but if they're turning their head left, right, or backward, it might indicate suspicious behavior. We used a custom image dataset and trained a lightweight MobileNetV2 CNN model to classify these head positions. The final system included a user-friendly GUI built with Tkinter, which allows teachers or exam supervisors to upload a student image and instantly check for signs of copying. The model showed good accuracy and stability, and the visual results using evaluation curves like F1Confidence and Precision-Recall helped confirm that the system performs reliably.

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VI. FUTURE WORK

Honestly, there are still a few things we'd like to improve in the future. Right now, the system only works with images, so it can't handle live video feeds — which would be more useful in actual exam halls. Also, it only detects one student at a time, which is fine for testing, but in real exams, there are many students in one frame. Making it work for multiple people at once would be a big step forward Our dataset was also kind of limited — we mostly used similar lighting and angles, so collecting more diverse images could help the model generalize better. Another idea we had was connecting the system directly to CCTV cameras in schools, so it could monitor automatically without manual image uploads. And maybe even a mobile version in the future — something lightweight where teachers can just click a photo on their phone and get the result instantly.

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