

AI Cheating Detection Using Face Mesh

Technical Report

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1. Introduction

This project implements an AI-assisted cheating detection system using MediaPipe Face Mesh and a Logistic Regression model. The system analyzes the student's head movement through eye–nose distance ratios to detect whether the student is looking away during an online exam. Such movement is considered potential cheating behavior.

2. Objective

The main objective of this project is to develop a lightweight real-time system capable of identifying abnormal head direction without requiring a large dataset or deep learning model. This is achieved by using classical machine learning and computer vision techniques.

3. Methodology

MediaPipe Face Mesh provides 468 facial landmarks. For this project, three of them are used: left eye (33), right eye (263), and nose (1). Distances between these points are calculated to determine a ratio that represents head orientation. A Logistic Regression classifier is trained to distinguish between normal and suspicious head movement.

4. Dataset and Training

A small dataset was created manually by collecting ratio values. Ratios close to 1.0 represent normal forward-facing behavior, while lower or higher ratios indicate looking left or right. Logistic Regression is used due to its suitability for binary classification. The model accuracy is calculated using the training data.

5. System Implementation

The system captures video frames through OpenCV and uses MediaPipe to detect face landmarks. Each frame is analyzed in real time, and the eye–nose ratio is computed. The trained classifier determines whether cheating is detected. Alerts are shown on the screen when suspicious behavior occurs.

6. Results and Output

The system successfully identifies when the student looks away from the screen. Model accuracy is displayed in the console. The application also draws the facial mesh and highlights key points in real time, allowing visual confirmation of detection accuracy.

7. Conclusion

This project demonstrates that a simple Logistic Regression model combined with facial landmark tracking can effectively detect head movement indicative of cheating. The system is fast, efficient, and suitable for online monitoring environments.

8. Future Improvements

- Expanding the dataset for higher model accuracy.
- Adding eye-blink or phone-detection features.
- Using more landmarks for better head-pose estimation.
- Upgrading to a deep-learning model for improved robustness.