

Vision-Driven Framework For Student Identity Verification Using Face As Hall Ticket In Modern Examination Systems

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Abstract- Student authentication during examinations has emerged as a critical challenge in modern academic environments due to the rising incidence of impersonation, identity fraud, and unethical examination practices. Conventional verification methods such as hall tickets, identity cards, and manual invigilation are highly vulnerable on document-based verification and basic biometric techniques suffer from poor scalability, limited real-time effectiveness, and an inability to accurately confirm the physical presence of candidates, particularly under uncontrolled examination conditions. To address the limitations of traditional examination authentication methods, this project proposes a deep learning-based automated student authentication system in which the student's face acts as a digital hall ticket. The framework employs Multi-Task Cascaded Convolutional Neural Networks (MTCNN) for accurate facial detection and alignment, enabling reliable face localization under varying pose and lighting conditions commonly found in examination halls. To ensure that the candidate is physically present and to prevent spoofing attacks using photographs or recorded videos, a CNN-based liveness verification module is integrated. After successful liveness validation, FaceNet is used for live facial inputs with enrolled student data. Upon authentication, the system automatically displays the student's hall name, seat number, examination details, and assigned invigilator. During the examination, the invigilator captures the student's face, and the system verifies the hall ticket in real time. If impersonation is detected, an instant SMS alert is sent to the Controller of Examinations and the respective Head of Department. Overall, the system strengthens examination security, prevents impersonation, and automates hall ticket verification.

Keywords: Networks, AI, CNN, SMS, FaceNet, MTCNN

I. INTRODUCTION

OVERVIEW

Education as a planned undertaking, at a personal level on a small scale or institutional level on a large scale, aims at making student capable of becoming active, responsible, productive, and caring members of society. They are made be acquainted with the various practices of the society by imparting the relevant skills and ideas. Education encourages the students to analyses and evaluate their experiences, to doubt, to question, to investigate – in other words, to be inquisitive and to think independently and acquire proficiency.

EXAMINATION SYSTEM

Exams and tests are a great way to assess what the students have learned with regards to particular subjects. Exams will show what part of the lesson each student seems to have taken the most interest in and has remembered. With every pupil being so individual, exams are also a great way for teachers to find out more about the students themselves. The test environment comes with added stress, which allows teachers to work out how their students argue and how they think individually by their works, which is a great attribute for them to keep in mind for future class activities.

LEVEL OF SERIOUSNESS OF THE EXAMS IN ONE'S LIFE

Examinations can be categorized on the basis of various dimensions. Some of these dimensions are:

High Stake Examinations: These types of examinations have very high impact on one's lives or are high stake. Examples of such examinations in our country are the 10th board exams, 12th board exams, and university level examination, that could be a semester examination or annual examinations.

Medium Stake Examinations: These types of examinations are of medium impact on our lives or are medium stake. Example of such examinations are Science Olympiad or the

National Talent Search Examinations or Scholarship Examinations etc.

Low Stake Examinations: These types of examinations are of low impact on our lives or are of low stakes. Example of such examinations are practices tests, mock tests and class tests etc.

PROBLEMS IDENTIFIED

Examination management in educational institutions faces significant security and administrative challenges, particularly in verifying student identity and preventing malpractice. Traditional examination entry systems rely heavily on printed hall tickets, manual identity verification, and human supervision. These methods are time-consuming, prone to human error, and vulnerable to impersonation or proxy writing. Manual verification at entry points often leads to overcrowding, delays, and confusion, especially in large-scale examinations involving hundreds or thousands of students. Additionally, paper-based attendance tracking lacks real-time validation and can be manipulated or inaccurately recorded. Another critical issue is the increasing sophistication of impersonation techniques. Conventional ID card checks or static photo comparisons are insufficient to prevent fraudulent attempts, as they cannot detect spoofing attacks such as printed photographs or mobile video displays.

Furthermore, most existing systems lack continuous monitoring mechanisms, allowing unauthorized substitution after initial entry. The absence of automated alert systems also delays administrative response when suspicious activities occur, weakening examination integrity. Centralized and manual monitoring approaches further create operational inefficiencies. Invigilators and examination authorities must manage identity verification, seating allocation, attendance marking, and malpractice reporting separately, resulting in fragmented data handling and limited transparency. Without integrated digital records, tracking seating history, authentication logs, and incident reports becomes difficult. Moreover, institutions often lack scalable and intelligent systems capable of handling real-time verification and monitoring across multiple examination halls simultaneously. Therefore, the core problem, transparency, and operational efficiency in modern examination environments.

II. LITERATURE SURVEY

1.Shadow Eye: A Security System Featuring Few-Shot Face Recognition with Siamese Networks and Triplet Loss (2025)

Objective: The main objective of this research is to overcome the limitations of traditional facial recognition systems that require large datasets and frequent retraining. The proposed Shadow Eye system aims to provide accurate and scalable few-shot face recognition that works effectively even with limited images and varying real-world conditions such as lighting, pose, and facial expressions.

Methodology: The study introduces a Few-Shot Face Recognition framework that combines Siamese Networks with triplet loss to learn similarity between facial embeddings. A pre-trained ResNet50 backbone is used for feature extraction, allowing the system to generate high-quality embeddings from a small number of images. The approach focuses on embedding comparison rather than full retraining, which improves scalability and reduces computational cost.

Algorithms Used: The system mainly uses Siamese Neural Networks, Triplet Loss optimization, and a ResNet50 deep convolutional neural network for feature extraction. Few-shot learning techniques enable the model to generalize from limited training samples while maintaining recognition accuracy.

Dataset: The evaluation is conducted using the VGGFace2 dataset, which contains diverse facial images with variations in age, pose, illumination, and expression. The dataset helps validate the robustness of the proposed system in real-world scenarios.

Findings: Experimental results show that the Shadow Eye system achieves an accuracy of 94.2% on VGGFace2, outperforming FaceNet by approximately 4.7%. The model demonstrates strong performance even with only 50–100 images per user and maintains stability under challenging environmental conditions.

Merits: The major advantages include high accuracy with limited training data, reduced need for retraining when new users are added, and improved robustness against variations in lighting and facial angles. The system is scalable and suitable for real-time security applications.

Demerits: Despite its advantages, the approach may still require powerful computational resources due to deep learning architecture. Performance can also depend on the quality of initial embeddings, and extreme occlusions or poor image resolution may reduce recognition accuracy.

2.Design and Implementation of Entrance Guard System Based on Face Recognition (2024):

Objective: The objective of this research is to improve the reliability of face recognition-based access control systems by solving problems related to image overexposure and underexposure during acquisition. The study aims to develop an intelligent entrance guard system with adaptive illumination control for accurate recognition.

Methodology: The proposed system uses a closed-loop feedback mechanism where illumination intensity is automatically adjusted using relays and stepping motors controlling curtains and lighting.

A camera connected to a PC performs face recognition while ultrasonic sensors and infrared detectors assist in detecting human presence and coordinating access control operations.

Algorithms Used: The system combines image preprocessing techniques, adaptive illumination adjustment, and face recognition algorithms implemented on a PC platform. Embedded system control using a single-chip microcontroller and serial USB communication supports coordinated operation between hardware and software components.

Dataset: The study relies on real-time captured facial images instead of a predefined dataset.

Images are collected through a camera under varying lighting conditions to test the adaptive illumination mechanism.

Findings: Results indicate that adaptive control of lighting conditions improves recognition stability and reduces errors caused by poor exposure. The integrated access control system demonstrates reliable performance in real-world entrance monitoring scenarios.

Merits: The design is simple, reliable, and easy to install, with improved recognition accuracy under changing lighting environments. Integration of sensors and closed-loop feedback enhances system automation.

Demerits: The system may require additional hardware components, increasing installation cost. Performance can still be affected by extreme environmental changes or hardware maintenance issues.

EXISTING SYSTEM

Manual Verification by Invigilators

In traditional examination environments, invigilators verify students by visually comparing their appearance with

the photograph printed on hall tickets or identity cards. This process depends heavily on human judgment and becomes difficult when there are large numbers of students. Fatigue, time pressure, and human error can lead to incorrect verification, allowing impersonation or proxy attendance to occur. The manual approach also increases entry delays and requires significant staff effort.

Barcode / QR-Based Hall Tickets

Some modern examination systems include barcodes or QR codes on hall tickets to speed up entry verification. While scanning reduces manual workload, it only confirms that the document is valid, not the person carrying it. If a student shares their hall ticket or QR code with someone else, impersonation can still occur. These systems lack biometric validation and cannot ensure real-time identity confirmation.

PROPOSED SYSTEM

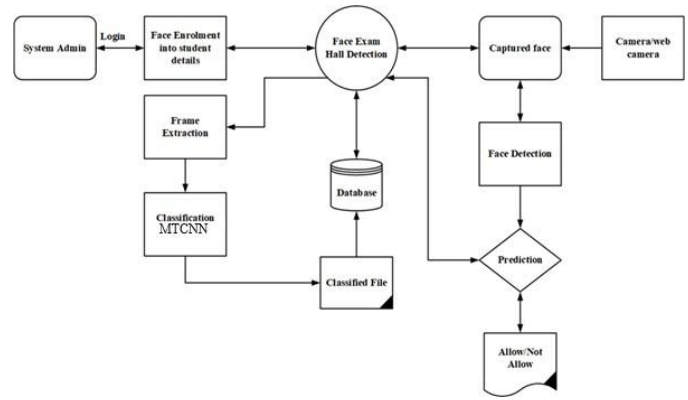
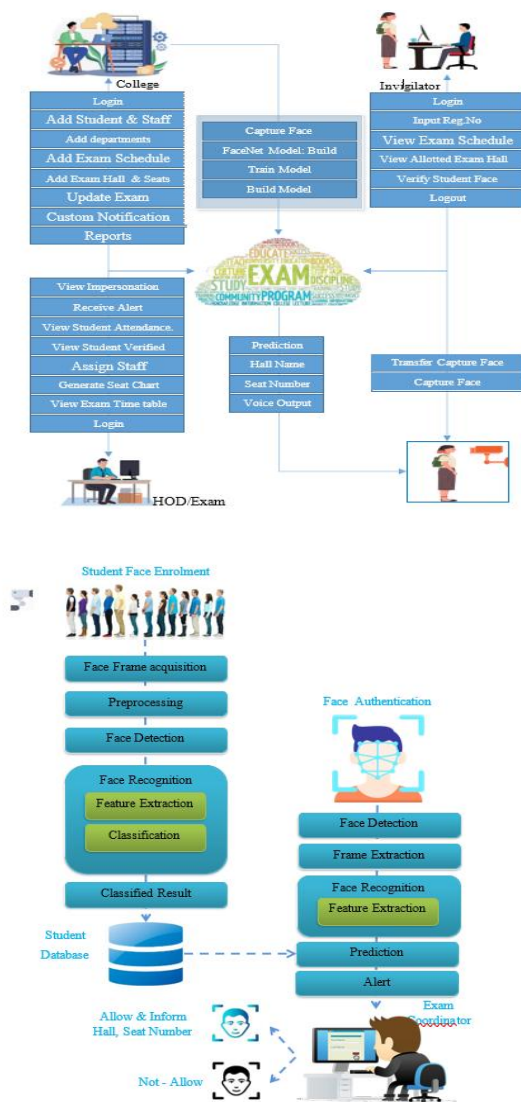
The proposed system introduces a deep learning-based examination authentication framework in which the student's face functions as a secure digital hall ticket. By integrating MTCNN for face detection, CNN-based liveness detection, and FaceNet for identity recognition, the system performs accurate real-time verification, reduces impersonation risks, and automates examination monitoring.

Face Enrollment and Recognition Model

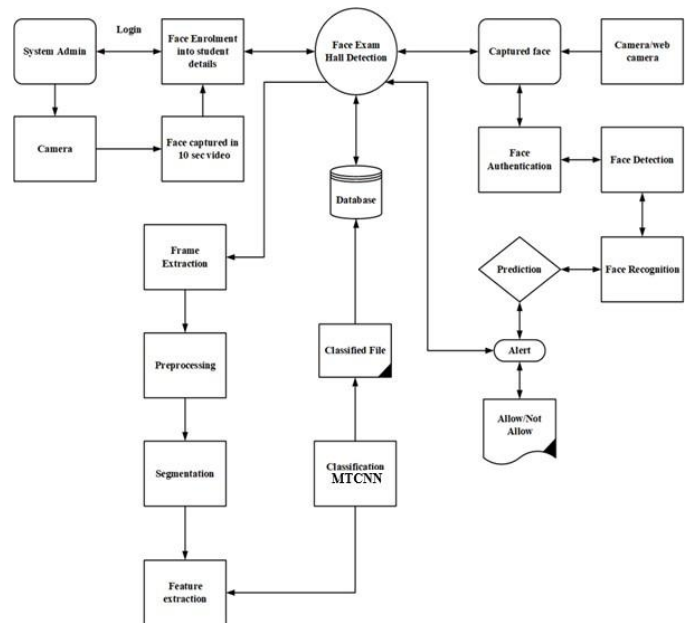
During enrollment, student faces are captured through live video and converted into frames. The MTCNN algorithm representing each student's identity. These embeddings are labeled and stored in the database to train the recognition model, enabling accurate identification during examinations.

III. SYSTEM ARCHITECTURE

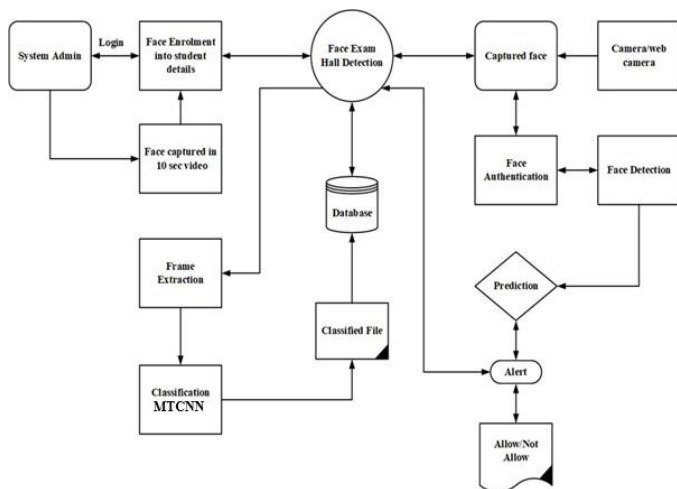
DATA FLOW DIAGRAM



LEVEL 2



LEVEL 0



LEVEL 1

RESULT



IV. CONCLUSION

In conclusion, this project successfully develops a project, offering a secure and technology-driven solution for modern examination management. By integrating MTCNN for precise face detection and alignment, CNN-based liveness verification to prevent spoofing, and FaceNet for accurate

identity recognition, the system ensures reliable real-time student authentication where the face itself acts as a digital hall ticket. The automated exam details display, impersonation detection, instant alert notifications, and face-based attendance management collectively enhance transparency, reduce manual workload, and strengthen examination integrity. The centralized dashboards for Admin, HoD, Invigilators, and CoE improve monitoring, decision-making, and institutional control. While the current system effectively minimizes malpractice and operational inefficiencies, future enhancements may include cloud-based deployment, advanced AI analytics for behavior monitoring, and improved scalability for large-scale university environments. Overall, this project significantly improves security, efficiency, and reliability in examination processes, contributing toward a smarter and fully digital academic ecosystem.

V. FUTURE ENHANCEMENT

The project has significantly improved the security and reliability of student verification during examinations. However, there are several opportunities for future enhancement to further strengthen system performance, scalability, and usability.

- [1] **Mobile and Tablet Support** – Develop a dedicated mobile or tablet application for invigilators to perform instant re-authentication, receive real-time alerts, and monitor attendance records directly from portable devices for improved flexibility during exams.
- [2] **Multi-Modal Biometric Integration** – Enhance the system by integrating additional biometric methods such as voice recognition or iris/palm verification alongside facial recognition to provide stronger multi-layer authentication and minimize impersonation risks.
- [3] **Cloud-Based Deployment** – Deploy the system on a secure cloud infrastructure to enable centralized monitoring across multiple campuses, real-time remote supervision and seamless scalability for large-scale examination sessions.

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