AI-POWERED ATTENDANCE MANAGEMENT SYSTEM USING FACE DETECTION

BY

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CERTIFICATION

This is to certify that this project was carried out by AJAKAYE, Surajudeen Abiodun with Matric Number HND/23/COM/FT/0511, has been read and approved as meeting part of the requirements for the award of Higher National Diploma (HND) in Computer Science.

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DEDICATION

This project is dedicated to the creator of the earth and universe, the Almighty God. It is also dedicated to my parents for their moral and financial support.

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All praise is due to the Almighty God the Lord of the universe. I praise Him and thank Him for giving me the strength and knowledge to complete my HND programme and also for my continue existence on the earth.

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ABSTRACT
The increasing demand for efficient and accurate attendance management systems has led to the exploration of advanced technologies like artificial intelligence (AI). This project focuses on developing an AI-powered attendance management system using face detection technology. The AI Based Face Recognition Attendance System represents an innovative solution at the intersection of artificial intelligence and attendance management. Leveraging Python open-source libraries such as OpenCV and NumPy, alongside machine learning techniques, the system aims to streamline the attendance tracking process. By employing face detection algorithms and feature extraction methods, the system identifies individuals, records their attendance, and updates the database in real-time. The system architecture incorporates components like a front-end web application, real-time prediction module, registration form module, reporting module, SQL database and Insightface library. Through continuous improvement and innovation, the system enhances user experience, accuracy, and efficiency in attendance management.
CHAPTER ONE

GENERAL INTRODUCTION

BACKGROUND TO THE STUDY

Attendance management systems are pivotal in ensuring accountability and productivity in organizations. Traditional methods, such as manual registers and swipe cards, often result in inaccuracies and inefficiencies. The introduction of biometric systems, while an improvement, still faces limitations, such as susceptibility to spoofing and system failures. The emergence of AI and face detection technology presents an opportunity to address these shortcomings (Satpute et al., 2020).

According to Hasini et al., (2025) facial recognition system is a computer app that takes multiple photos of the person and it stores the data of face of that person and when the person again comes in front camera again, it is able to verify that person. Manual Attendance System is a process in which the teacher calls out for each and every student and individual marks their attendance. It can be considered a time-consuming process still there can be errors of judgment from the teacher. Sometimes students may answer for their friend or teacher who misses someone., there are a lot of problems with this traditional way taking attendance.

The advent of artificial intelligence has revolutionized numerous industries, including education and workplace management. Attendance tracking is a critical task in these sectors, often fraught with inefficiencies and inaccuracies when conducted manually. Traditional methods, such as pen-and-paper recording or basic biometric systems, are susceptible to manipulation and errors, leading to challenges in maintaining accurate records (Duwal, 2025).

In academic and organizational settings, the labor-intensive task of attendance management has historically relied on manual record-keeping, consuming valuable time. Face detection technology, a subset of AI, offers a promising solution to these challenges. By using computer vision algorithms, attendance can be recorded automatically by identifying and verifying individuals through their facial features. This eliminates the need for manual intervention, reduces administrative workload, and enhances security measures (Tamilkodi et al., 2024).

Oladele et al., (2024) asserted that face recognition has set an important biometric feature, which can be easily acquirable and is non-intrusive. Face recognition-based systems are relatively oblivious to various facial expression. Face recognition system consists of two categories: verification and face identification. Face verification is an 1:1 matching process, it compares face image against the template

face images and whereas is an 1:N problems that compares a query face images (Sharma et al., 2023).

The introduction of the AI based face recognition attendance system marks a pivotal shift in attendance tracking, presenting a sophisticated solution that combines the capabilities of facial recognition technology with advanced machine learning algorithms. This system represents a departure from conventional approaches by automating the identification and recording of individuals' attendance in real-time, thereby addressing the limitations of manual processes and enhancing operational efficiency.

Despite the potential of AI-powered systems, the adoption of such technologies faces challenges, including data privacy concerns and technical implementation hurdles. Addressing these issues requires a comprehensive understanding of both the technological and social aspects of AI applications (Eisert & Girod, 2020).

This project aims to explore the design and implementation of an AI-powered attendance management system, focusing on its effectiveness, challenges, and benefits. By doing so, it contributes to the ongoing conversation about the role of AI in modern organizational processes.

STATEMENT OF THE PROBLEM

Traditional attendance systems are often plagued by inefficiencies, inaccuracies, and vulnerabilities. Manual methods are time-consuming and prone to human error, while biometric systems can be manipulated or fail in adverse conditions. Thus, there is a pressing need to introduce an automated, reliable and robust attendance system that utilizes face recognition technology to streamline the process, improve accuracy, reduces administrative burden, and enhances overall efficiency.

AIM AND OBJECTIVES

The aim of this project is to develop an AI-powered attendance management system utilizing face detection technology for improved accuracy and efficiency. The objectives are to:

design and implement a face detection-based attendance system;

implement a facial recognition biometric system that verifies and identifies an individual on the enrollment in the database;

evaluate the performance and reliability of the proposed system; and

assess the challenges and propose solutions for effective implementation.

1.4 SIGNIFICANCE OF THE STUDY

This project provides a significant contribution to the field of organizational

management by introducing an advanced, AI-driven solution for attendance tracking. It highlights the potential of AI to improve operational efficiency and offers insights into overcoming challenges related to implementation. The findings can benefit educational institutions, corporate environments, and research communities.

SCOPE OF THE STUDY

This project focuses on developing and evaluating an AI-powered attendance management system using face detection. It encompasses the design, implementation, and testing of the system in controlled environments. It also covers the integration of machine learning algorithms, real-time data processing, and autonomous decision-making capabilities. The system is limited to the technological aspects, leaving out broader ethical and legal implications, which are mentioned briefly for context.

1.6 ORGANIZATION OF THE REPORT

The project write-up is organized into five distinct chapters. Chapter one covers general introduction, which contains introduction to the project topic, statement of the problem, aim and objectives of the study, significance of the study, scope of the study and organization of the report. Chapter two covers the literature review, which contains review of related past works, overview of artificial intelligence, description attendance system and other related concepts. Chapter three explains the project methodology which includes analysis of existing system, problems of the existing system, the description of the proposed system and advantages of proposed system. Chapter four explains the design, implementation and documentation of the system which contain system designed output design, input design, database design, procedure design, implementation of the system hardware and software support and documentation of the new system installation procedure, operating the system and system maintenance. Lastly, chapter five explains the summary of the research, recommendations, and conclusion.

CHAPTER TWO

LITERATURE REVIEW

2.1REVIEW OF RELATED LITERATURE

Hasini et al., (2025) developed an AI-based smart attendance management system. The study presented the development of a facial recognition system using Local Binary Patterns Histogram (LBPH) for efficient face detection and recognition. The system integrated OpenCV, NumPy, and PIL for image processing and training, leveraging Haar Cascade classifiers for accurate face detection. The was trained on

labeled datasets and utilizes real-time video streaming for face capture and recognition. The approach ensured fast and efficient identification of individuals while maintaining computational efficiency. The project demonstrates a robust and lightweight solution suitable for real-world applications such as attendance systems, access control, and surveillance. The implementation highlights the effectiveness of LBPH in handling variations in lighting, pose, and facial expressions, ensuring accurate recognition. The system is designed to function independently, making it ideal for standalone environments without requiring cloud-based processing. The method ensures low computational overhead, making it accessible for devices with limited hardware capabilities. Additionally, it offers privacy and security advantages by storing and processing data locally. The real-time face recognition system enhances usability and efficiency, providing seamless identification without manual intervention. The results indicated that the system provided high reliability and accuracy even under varying environmental conditions.

Sharma et al., (2023) worked on AI-based attendance monitoring system. The article proposes a more efficient and reliable technique using facial recognition technology. A camera captures images of students entering the classroom, and the facial biometric framework compares these images to a pre-existing database of student images taken during enrollment. If there is a match, the system marks the student present and continuously monitors their performance. Moreover, artificial intelligence concepts can further enhance attendance monitoring by capturing motion pictures of students in class to analyze attendance data, such as how much time they spend in class.

Oladele et al., (2024) proposed an AI-based face recognition attendance system. The AI Based face recognition attendance system represents an innovative solution at the intersection of artificial intelligence and attendance management. Leveraging Python open-source libraries such as OpenCV and NumPy, alongside machine learning techniques, the system aims to streamline the attendance tracking process. By employing face detection algorithms and feature extraction methods, the system identifies individuals, records their attendance, and updates the database in real-time. The system architecture incorporates components like a front-end web application, real-time prediction module, registration form module, reporting module, Redis database, Streamlit framework, Insightface library, and AWS deployment. Through continuous improvement and innovation, the system enhances user experience, accuracy, and efficiency in attendance management.

Tamilkodi et al., (2024) carried out an efficient attendance tracking using AI-based face recognition and absence alerts for educational institutes. This research aims to bridge this gap by implementing a face attendance system that enhances communication between institutions and parents through automated absence notifications. Leveraging the MTCNN algorithm for face detection and alignment, paired with CCTV cameras for efficient attendance capture, the system records student data and organizes it in Excel sheets, simplifying attendance management. The results showcase the system's efficiency and reliability, automating attendance management while providing real-time absence notifications, promising improved parent-school interaction and communication. The Face Attendance System offers a progressive approach to attendance management, addressing the research gap, and streamlining processes with AI technology.

Katsaggelos (2020) developed a face recognition-based attendance system using Raspberry Pi. The study presented the development of a face recognition-based attendance system using Raspberry Pi, a low-cost, credit-card-sized computer. The system utilized OpenCV for face detection and recognition and was designed for use in small-scale educational institutions. The study demonstrated the feasibility of deploying cost-effective face recognition solutions for attendance management, with a focus on simplicity and affordability.

Mohamed and Raghu (2019) proposed a face recognition-based attendance system using deep learning approach. The paper proposed a face recognition-based attendance system employing deep learning techniques. The system leverages convolutional neural networks (CNNs) for feature extraction and classification, achieving high accuracy in identifying and recording attendance. The study highlighted the advantages of deep learning algorithms in handling complex facial variations and robust performance across diverse environmental conditions.

Mrunal (2021) worked on evaluation of face recognition systems for attendance management in educational institutions. The study provided a comparative evaluation of different face recognition systems for attendance management in educational institutions. The researchers conducted experiments using various face recognition algorithms and assessed their performance in terms of accuracy, speed, and scalability. The findings offer valuable insights into the strengths and limitations of different approaches, aiding decision-making in system selection and deployment.

Senthamil et al (2022) proposed a privacy and ethical considerations in face recognition-based attendance systems. The paper examined the privacy and ethical

implications associated with the deployment of face recognition-based attendance systems in educational settings. The authors discussed concerns related to data privacy, consent, surveillance, and potential biases in algorithmic decision-making. The study emphasizes the importance of incorporating ethical principles and legal frameworks into the design and implementation of such systems to ensure fairness, transparency, and respect for individual rights.

2.2 REVIEW OF RELATED CONCEPTS

2.2.1 Overview of Artificial Intelligence (AI)

Artificial Intelligence (AI) refers to the development of computer systems capable of performing tasks that typically require human intelligence. These tasks include learning, reasoning, problem-solving, perception, and language understanding. AI systems can analyze vast amounts of data quickly and make decisions or predictions based on that data. They achieve this through machine learning, where algorithms improve their performance with experience, and deep learning, which mimics the neural networks of the human brain. AI has become integral to numerous fields, such as healthcare, finance, transportation, and entertainment (Kumar et al., 2024).

AI operates across various levels, including narrow AI, general AI, and superintelligent AI. Narrow AI specializes in specific tasks, like virtual assistants or recommendation systems, while general AI aims to replicate human cognitive abilities across multiple areas. Superintelligent AI, though theoretical, represents machines surpassing human intelligence. AI's advancement has sparked debates about its potential to revolutionize industries and improve lives versus ethical concerns, such as bias, privacy, and potential job displacement.

The rapid growth of AI technologies is driven by advancements in computational power, availability of large datasets, and sophisticated algorithms. From self-driving cars to predictive analytics, AI is reshaping the world by automating complex processes and enabling new capabilities. However, the field faces challenges, including ensuring fairness, transparency, and ethical development, to maximize its positive impact (Ghazo & Hayajneh, 2023).

Overview of Biometric System

A biometric system is a technology-based solution designed to identify and authenticate individuals based on their unique biological or behavioral characteristics. These systems offer a highly secure and reliable method of authentication, as they rely on traits that are inherently specific to each individual,

making them difficult to forge or replicate. Biometric systems can capture various types of biometric data, including fingerprints, iris patterns, facial features, voiceprints, hand geometry, and behavioral traits such as typing patterns or gait. The process of biometric authentication involves capturing biometric data from an individual, converting it into a digital format, and comparing it against stored templates or reference data to verify the person's identity.

One of the key advantages of biometric systems is their accuracy and reliability. Biometric traits are unique to each individual and remain relatively stable over time, making them highly reliable for authentication purposes. Unlike traditional methods such as passwords or PINs, which can be forgotten, stolen, or shared, biometric data is inherently tied to the individual and cannot be easily replicated or stolen. This makes biometric authentication a robust and secure solution for controlling access to sensitive information, physical spaces, or digital systems (Adam & Andrzej, 2020).

Top of Form

Classifications of Biometric System

Biometric systems can be classified into several types based on the biological or behavioral characteristics used for identification or verification. Here are some of the most common types of biometric systems:

Fingerprint Recognition Systems: Fingerprint recognition is one of the oldest and most widely used biometric technologies. These systems capture and analyze the unique patterns of ridges and valleys present on an individual's fingertip. Fingerprint recognition systems are used for various applications, including access control, time and attendance tracking, border control, and criminal identification.

Iris Recognition Systems: Iris recognition systems identify individuals based on the unique patterns present in the iris of the eye. The iris is the colored part of the eye surrounding the pupil, and its patterns are highly distinctive and stable over time. Iris recognition systems use specialized cameras to capture high-resolution images of the iris, which are then analyzed to create a unique iris template for each individual.

Face Recognition Systems: Face recognition systems identify individuals based on the unique features of their face, such as the arrangement of eyes, nose, mouth, and other facial characteristics. These systems use algorithms to analyze facial images captured by cameras or sensors and compare them against stored templates to verify identity. Face recognition systems are widely used for

applications such as surveillance, access control, and digital authentication.

Voice Recognition Systems: Voice recognition systems authenticate individuals based on the unique characteristics of their voice, including pitch, tone, cadence, and pronunciation. These systems analyze speech patterns and vocal features to create a voiceprint, which is then compared against stored templates to verify identity. Voice recognition systems are used in applications such as telephone banking, voice-controlled devices, and forensic analysis.

Hand Geometry Recognition Systems: Hand geometry recognition systems authenticate individuals based on the physical dimensions and proportions of their hand. These systems capture images of the hand using specialized sensors and analyze characteristics such as finger length, width, and knuckle shape to create a unique hand template for each individual. Hand geometry recognition systems are commonly used for access control in environments such as workplaces and educational institutions.

Behavioral Biometrics: Behavioral biometrics authenticate individuals based on their unique behavioral patterns, such as typing rhythm, gait, signature dynamics, or mouse movements. These systems capture and analyze behavioral data using specialized sensors or software algorithms and compare them against stored templates to verify identity. Behavioral biometrics are used in applications such as fraud detection, continuous authentication, and user profiling (Mohamed & Raghu, 2019).

Face Recognition System Overview

Face recognition systems are a subset of biometric systems that authenticate individuals based on the unique features of their face. This technology has gained widespread popularity due to its non-intrusive nature and the ubiquity of cameras in modern devices and environments. Face recognition systems typically capture facial images or videos using cameras or sensors and analyze key facial characteristics, such as the distance between eyes, nose shape, and jawline, to create a unique face template for each individual. These templates are then compared against stored templates in a database to determine the person's identity. Face recognition systems can operate in either verification mode, where the identity of a person is confirmed against a known database, or identification mode, where the system searches for a match across a larger database of individuals.

One of the primary advantages of face recognition systems is their convenience and ease of use. Unlike other biometric modalities that require physical contact or

specific positioning, face recognition can be performed at a distance and in a non-intrusive manner. This makes face recognition systems suitable for a wide range of applications, including access control, surveillance, law enforcement, and authentication on electronic devices. Additionally, face recognition technology has improved significantly in recent years, thanks to advancements in artificial intelligence and deep learning algorithms, leading to higher accuracy and robust performance across diverse environmental conditions.

Despite their many advantages, face recognition systems also pose certain challenges and considerations. One of the key challenges is variability in facial appearance due to factors such as changes in lighting conditions, facial expressions, and aging. These variations can affect the accuracy and reliability of face recognition algorithms, leading to false positives or false negatives. Additionally, there are concerns about privacy and data security related to the collection, storage, and use of facial images for identification purposes. Issues such as algorithmic bias, accuracy disparities across demographic groups, and regulatory compliance also need to be addressed to ensure the responsible and ethical use of face recognition technology.

To mitigate these challenges, ongoing research and development efforts are focused on improving the robustness, accuracy, and fairness of face recognition systems. This includes developing more advanced algorithms capable of handling variations in facial appearance, implementing privacy-enhancing techniques such as data anonymization and encryption, and establishing clear guidelines and regulations for the ethical use of facial recognition technology. Despite the challenges, face recognition systems hold immense potential for enhancing security, efficiency, and convenience in various applications, and continued innovation in this field is expected to drive further advancements in the future (Eisert & Girod, 2020).

Overview of Attendance System

An attendance system is a mechanism used to track and record the presence or absence of individuals in various settings, such as educational institutions, workplaces, events, or any other organized gathering. Traditionally, attendance systems relied on manual methods, including paper-based sign-in sheets, roll-call, or time clocks, which were labor-intensive, prone to errors, and lacked real-time monitoring capabilities. However, modern attendance systems leverage technology to automate the process of attendance tracking, offering greater accuracy, efficiency, and convenience. These systems utilize various technologies such as

barcode scanners, RFID (Radio Frequency Identification) tags, biometric sensors, GPS (Global Positioning System) tracking, or facial recognition to record attendance electronically.

One of the primary benefits of attendance systems is their ability to streamline administrative processes and improve organizational efficiency. By automating attendance tracking, these systems reduce the time and effort required for manual data entry, freeing up resources for other tasks. Moreover, attendance systems provide real-time monitoring capabilities, allowing administrators to track attendance trends, identify patterns, and generate comprehensive reports for analysis. This enables organizations to make informed decisions, optimize resource allocation, and enhance overall operational efficiency.

Attendance systems play a crucial role in various sectors, including education, where they are used to monitor student attendance, track academic progress, and ensure compliance with attendance policies and regulations. In workplaces, attendance systems are used for employee time and attendance tracking, payroll processing, and workforce management. They help organizations maintain accurate records of employee hours worked, monitor productivity, and enforce attendance policies effectively. Additionally, attendance systems are used in events and conferences to manage attendee registration, track participation, and ensure smooth event logistics.

However, the deployment of attendance systems also raises certain challenges and considerations, including privacy concerns, data security risks, and ethical considerations. Depending on the technology used, there may be concerns about the collection, storage, and use of personal data such as biometric information or location data. It is essential for organizations to implement robust security measures, adhere to data protection regulations, and prioritize user privacy when deploying attendance systems. Furthermore, organizations must ensure transparency, fairness, and accountability in the use of attendance data to maintain trust and confidence among stakeholders. Overall, attendance systems offer significant benefits in terms of efficiency and accountability, but careful consideration of ethical, legal, and technical factors is essential to ensure responsible deployment and use (Liu & Ma, 2020).

2.2.6 Artificial Intelligence and Face Recognition in Attendance Systems

Artificial Intelligence (AI) has revolutionized attendance systems by incorporating

face recognition technology to enhance accuracy and efficiency. Traditional attendance methods, such as manual roll calls or card-based systems, often suffer from inefficiencies and vulnerabilities, including proxy attendance and human error. AI-powered systems leverage advanced algorithms to identify individuals using facial biometrics, ensuring a seamless and accurate way of tracking attendance. These systems use machine learning models trained on diverse datasets to recognize and authenticate faces in real-time, making attendance recording quicker and more reliable.

Face recognition-based attendance systems offer significant advantages in various sectors, including education, corporate, and healthcare. In schools and colleges, this technology minimizes classroom disruptions by automating attendance, allowing educators to focus on teaching. Similarly, organizations benefit from enhanced employee productivity as these systems streamline time management and eliminate the need for manual clock-ins. The integration of AI ensures that these systems adapt to changes in facial features over time, such as aging or hairstyle modifications, providing consistent and robust performance.

However, the adoption of AI-driven face recognition systems raises important ethical and privacy concerns. Critics argue that widespread use could lead to unauthorized data collection and potential misuse of sensitive biometric information. To address these concerns, stringent data protection measures, such as encryption and compliance with global privacy laws like GDPR, are imperative. Transparency in data usage and obtaining user consent can also build trust and mitigate apprehensions about privacy risks.

Despite these challenges, AI and face recognition technologies continue to gain traction due to their transformative potential. Innovations like deep learning and edge computing are further enhancing the capabilities of these systems, making them faster and more secure. As these technologies evolve, they are poised to play an increasingly integral role in attendance systems, fostering efficiency while addressing privacy concerns through responsible implementation. By striking the right balance between innovation and ethical considerations, organizations can harness the full potential of AI-powered attendance systems (Maddu & Kumar, 2019).

CHAPTER THREE

METHODOLOGY AND ANALYSIS OF THE SYSTEM

3.1RESEARCH METHODOLOGY

The development of the face recognition-based attendance system was carried out using the iterative software development methodology. This approach involves building the system incrementally through repeated cycles (iterations), allowing continuous improvement and refinement based on feedback and testing. Each iteration included planning, designing, implementing, and testing specific components of the system. Initially, the core functionality such as GUI creation using Tkinter, face image capture with OpenCV, and basic data handling with NumPy was developed.

Subsequent iterations focused on integrating face recognition using OpenCV's Local Binary Patterns Histogram (LBPH) algorithm, managing datasets, improving user interface, and ensuring smooth data retrieval and storage. The iterative software development methodology is as shown below:

Figure 3.1: Diagram of Iterative Software Development Methodology, Source: (Gawda et al., 2020)

The system working process is described below:

Video of the person's face is stored in a folder along with the name or ID of that person.

Faces are extracted continuously from each video file and each image is labeled with that person's name or ID.

Once all the faces are extracted, the face images are trained using a pretrained model.

Now, whenever the attendance needs to be marked, the admin or a super user will initiate a session which will open the camera and will try to recognize the faces.

Once the session is completed, the name or ID of those people who are present are retrieved.

The attendance of those present people is marked.

Now, if the person wants to view his/her, he or she can login to the platform and their attendance will be displayed to them.

The admin can perform the same process to take attendance in each session.

The block diagram of the proposed system is as shown below:

Figure 3.2: Block Diagram Showing Working of the Proposed System

The system will be developed using phyton programming for the front end and MySQL a relational database management system for the backend.

3.2ANALYSIS OF THE EXISTING SYSTEM

Existing attendance systems, including manual registers and biometric devices, often fail to meet modern organizational needs. Manual systems are inefficient, while biometric devices, such as fingerprint scanners, may struggle with issues like hygiene and hardware malfunctions. These limitations highlight the necessity for an advanced solution. Here's an analysis of the existing system:

Manual Process: The current system is predominantly manual, requiring instructors to manually take attendance during each class session. This process is time-consuming and prone to errors.

Limited Accuracy: Manual attendance systems are susceptible to inaccuracies due to human error, such as instructors forgetting to mark attendance or students signing in on behalf of absent classmates (proxy attendance).

Lack of Real-time Monitoring: With manual systems, there's no real-time monitoring of attendance. Instructors may not know if students are present until after the class session, making it difficult to address attendance issues promptly.

Administrative Burden: Collating and managing attendance records manually can be administratively burdensome for instructors and administrative staff. It consumes valuable time and resources that could be better utilized for other tasks.

3.3PROBLEMS OF THE EXISTING PROBLEM

The existing system has the following shortcomings:

Inaccuracies in Attendance Records: Manual attendance processes are prone to errors, leading to inaccuracies in attendance records.

Proxy Attendance: There's a risk of proxy attendance, where students mark attendance on behalf of absent classmates, leading to inaccurate attendance data.

Time-Consuming Process: Manual attendance-taking is time-consuming for both instructors and students, reducing valuable instructional time.

Limited Monitoring: Lack of real-time monitoring makes it challenging for instructors to track attendance patterns and address issues promptly.

Administrative Challenges: Managing and organizing paper-based attendance records or dealing with electronic systems can pose administrative challenges and increase workload.

3.4DESCRIPTION OF THE PROPOSED SYSTEM

The proposed AI-powered attendance management system uses face detection

technology to automatically record attendance. Users are registered through a one-time facial data capture, which is securely stored. During attendance, the system scans and matches faces with the stored data in real-time. The system operates on a client-server architecture, ensuring scalability and real-time updates. It incorporates deep learning models for enhanced accuracy, even in varying lighting conditions. Security features include encrypted data storage and multi-factor authentication.

The proposed solution is user-friendly, requiring minimal training for operation. Its automated nature reduces administrative workload, making it an efficient alternative to traditional systems.

3.5ADVANTAGES OF THE PROPOSED SYSTEM

The proposed system has the following advantages:

Enhanced accuracy and reliability.

Real-time operation and scalability.

Reduced administrative workload and operational costs.

Improved security and data integrity.

User-friendly interface and ease of deployment.

CHAPTER FOUR

IMPLEMENTATION OF THE SYSTEM

4.1DESIGN OF THE SYSTEM

This is the computation of the particulars of a new system and the determination of what the new system would be and the function it is to perform. This may involve changing from one system to another or modifying the existing system operation. The most challenging phase of the system life cycle is the change from manual operation to a faster and more accurate one. The system design stage covers the technical specifications that will be employed in the implementation of the new system in order to modify the previous system. Some factors are taken into consideration. These factors include input design, output design, definitions file and procedure designs, and other documentation.

4.1.1OUTPUT DESIGN

This incorporates the objectives of solving the existing system problems and challenges. This involves the structuring of the desired information and also to enhance efficient and effective attendance system. Things taken into consideration

in determining the output are represented below:

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Figure 4.1: Splash Screen

This page provides a brief introduction to the project topic as well as the researcher.

4.1.2INPUT DESIGN

The input to run this software is obtained from lecture attendance system using facial based recognition system. The administrator is expected to safeguard the files and document using facial authentication. The input design describes the input interface for data entry into the program. Data entry interfaces need to be considered in developing a new system to ensure users' friendliness. Data entry is done through the use of keyboard, camera, and in some cases selection from the dropdown combos and list boxes are done using mouse selection. The interface descriptions are as shown below:

Figure 4.2: Home page

This is the main menu that contains submenus where the user can navigate from one page to another within the environment.

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Figure 4.3: Registration form

This page is used by student to supply or enter their information and capture their face for recognition and identification purposes.

Figure 4.4: Capture Student

This page is used to capture the student's face.

4.1.3DATABASE DESIGN

The structure and organization of records in the tables is a database file is essential to be considered in designing a database driven application. The database files main record where house for keeping data and information relevant for this application.

Table 1: Student Table

This table entails all the student details.
Table 2: Attendance Table

This table entails all the attendance of each student taken.

4.13PROCEDURE DESIGN

These are the steps involved in unifying the whole process to produce the desired output. It involves computer procedures that start from the original input lessons to the output result file. This allows the processing of the information and the result to be possible. A menu is provided to aid the user in processing the output file.

4.2IMPLEMENTATION OF THE SYSTEM

This entails the choice of the programming language employed to implement the software which should-be suitable for lecture attendance using facial recognition authentication. The software is designed for the use of lecture attendance system which should serve as an assistant for the management in monitoring the attendance system for students.

4.2.1CHOICE OF PROGRAMMING LANGUAGE

The Application was developed in a .net (dot net) integrated development environment (.net IDE). The Application IDE is chosen following the fact that extracted information needs to be presented in an enhanced pictorial/graphical format and easy communication with the database for program flexibility in windows platform.

4.2.2HARDWARE REQUIREMENTS

Minimum of Microcomputer Pentium IV- Intel 1.5 GHZ processor, 1.0 GB RAM, 40GB Hard disk, 14” VGA Monitor Windows XP or higher, Enhanced keyboard, mouse and pad.

4.2.3SOFTWARE REQUIREMENT

i.Windows 7

ii.Microsoft Visual C#.

iii.Webcam

IV.Microsoft Access Database

4.2.4 CHANGE OVER TECHNIQUE

These deals with the processes and steps taking to put the system into use, before the system can be fully employed into the system, some training might have been done by the user of the application if he or she is a computer illiterate, because the

user might be a computer illiterate, so also the system might have also been use.
Since the work of an expert cannot be eliminated from the system, the computerized system will have to work hand in hand with the expert in the field.

4.3DOCUMENTATION OF THE SYSTEM

After the program has been well tested with input that the output has already been known, the next is to install the software in to the computer system for use.
The process of installing is been stated below
Insert the CD into the system through the CD-ROM after the computer is switch on
Locate the CD drive directory in my computer and click it to open
After open, locate setup.exe, and then click to install the program by following the necessary step in installing the program.
Ensure full installing of the software for effective operation of the system.
After the program has been fully install. The next thing is to locate the package install to put it into operation, to locate the package for expiration purpose the following step are to be taking .
Click on start menu from task bar. Then select all program
From the display sub option, select by locating the software installed named Information to load the software.

4.3.1PROGRAM DOCUMENTATION

The program is packaged for use in any system irrespective of either it runs Visual Basic Application or not. After developing a program in Visual Basic, there is a facility provided in Microsoft Visual Studio suite called “Package and Deployment Wizard” that is used in Visual studio application packaging and deployment.
The automated face recognition based lecture attendance system is packaged into an installable setup that can be run from any system.

4.3.2MAINTAINING THE SYSTEM

The system maintenance refers to making modification to an already existing application/program without necessarily re-writing everything from start. Program maintenance of a program includes modification of the program to meet-up with certain requirements of the users. In this course, additional features can be added, errors corrected, ambiguous interfaces redesigned to eliminate confusions and unnecessary features removed.
Maintaining this program can be done in PHP environment. Any future modification can be by re-running the program source code in a VB environment making necessary changes and updates and recompile the application into an upgrade

version of the existing version of the mini word processing application. Further versions of this program can be named following their year of release or it can be given a different version number.

CHAPTER FIVE
SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1SUMMARY

The implementation of an AI-based facial recognition attendance system offers a modern solution to streamline attendance tracking processes. Leveraging advanced facial recognition technology, this system automates the identification of staff or students, reducing administrative overhead and improving accuracy. Through the enrollment phase, where facial data is securely stored, and the real-time scanning process during attendance taking, the system ensures efficient and reliable tracking of individuals entering designated areas. The project explores the potential of AI-powered attendance systems, emphasizing their advantages over traditional methods. It discusses the challenges and limitations of existing systems, presenting face detection technology as a viable alternative. The proposed system’s design, implementation, and evaluation highlight its effectiveness and reliability. The system was developed using Python open-source libraries OpenCV and NumPy and MySQL for the database management system.

5.2 CONCLUSION

Face recognition technology has been used to develop an automatic attendance management system for institutions. It aids in minimizing staff time and effort, particularly when there are many pupils present and attendance needs to be recorded.

Python is the programming language used to implement the entire system. Various facial recognition technologies are employed in order to track individuals' attendance. Moreover, the student's record is correctly maintained. It can also be applied to any exam-related problems. AI-powered attendance management systems represent a significant step forward in organizational management. By using face detection technology, these systems address the inefficiencies and vulnerabilities of traditional methods.

5.3 RECOMMENDATIONS

Based on the findings of this research, the following were recommended:
Organizations should invest in AI-powered attendance systems to improve efficiency and accuracy.
Policies and guidelines should be developed to address data privacy and security concerns.
Further research should explore the integration of AI attendance systems with broader organizational processes for enhanced functionality.

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