International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 05 | May - 2023 SJIF 2023: 8.176 ISSN: 2582-3930

Attendance Through Face Recognition

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***ABSTRACT**--- Face recognition technology is essential in today's digital world and is used in practically every industry. One of the most common types of biometrics is face recognition. It has numerous advantages and can be used for security, identification, and authentication. Even though it performs less accurately than iris and fingerprint identification, it is nonetheless commonly utilized since the method is non-intrusive and contactless. Additionally, the facial recognition technology can be utilized in businesses, schools, colleges, and other places to track attendance.*

The goal of this system is to create a facial recognition-based class attendance system because the current manual attendance method is time-consuming and difficult to maintain. Additionally, there's a potential that a proxy will show up. Consequently, the demand for this system rises. Accuracy, effectiveness,

and simplicity are just a few benefits of this project. By doing away with manual attendance monitoring, it lessens the possibility of mistakes and manipulation. It offers real-time attendance monitoring, enabling prompt management and intervention. The method is adaptable and simple to implement into a variety of environments, including companies, events, and schools.

Keywords – Face Recognition, Histogram of Oriented Gradients, Attendance System, Real time Database

I. INTRODUCTION

Face recognition attendance systems have grown in popularity as an advanced and effective technique of tracking and maintaining attendance records in educational institutions, businesses, and other organizations. These systems use computer vision and machine learning to identify people in real time based on their facial traits. Face recognition attendance systems provide various benefits by automating the attendance process, including accuracy, speed, ease, and the removal of manual record- keeping.

Paper-based registers or swipe cards, for example, are prone to errors, buddy punching, and time-consuming administrative procedures. Facial recognition attendance systems offer a seamless and frictionless solution, allowing people to be identified just by looking at a camera. The device captures their face features, compares them to a pre-registered database, and instantaneously records their attendance. Face detection, feature extraction, and face matching are the essential components of a real-time face recognition attendance system. To locate and extract faces from live video feeds or camera streams, face identification algorithms such as Viola-Jones, HOG, or deep learning-based techniques such as SSD or Faster R- CNN are utilized. Feature extraction approaches, which are frequently based on deep learning models such as CNNs or Siamese Networks, compress the facial image and capture distinctive facial traits. To identify and record attendance, face matching algorithms compare the retrieved attributes with the enrolled database

II. LITERATURE REVIEW

The method used in this research [9] entails photographing the employee using a camera in order to record their faces and visions. The taken photograph is compared individually with the face mask when the result is located on the face website, displaying the employee's face where presence is recognized. The main advantage of this approach is that the presence is logged on a very secure server that is inaccessible to anybody else. Furthermore, to increase the accuracy of the detection process, the suggested system's face detection algorithm is constructed using a skin-splitting method. The system is now unaffected despite ongoing work to increase the face detection algorithm's accuracy.

This application requires a stationary computer with a non-portable steady power source. Since employees only need to report attendance once per day, as opposed to students who need to confirm their attendance for each class on a given day, this type of system is equipped to track staff attendance. It will be challenging if there is any marking.

The system has gotten out of hand. To solve this problem, the entire outdated system management system is turned into a portable module and utilized to run a Python system. A model for an automatic attendance system was put up by the authors in [3]. The model focuses on how face recognition and Radio Frequency Identification (RFID) work together to identify and count authorized students as they enter and exit the classroom. Every student who has registered with the system has an authentic record kept.

Additionally, the system maintains information about each student registered for a certain course in the attendance log

and delivers necessary data as needed.

The authors of this study [4] have developed and put into operation an iris biometric attendance system. The participants were initially required to register their personal information and distinctive iris template. The technology took attendance for the class automatically by taking a picture of each student's eye, identifying their iris, and looking for a match in the built-in database. The prototype ran on the web.

Authors in [5] proposed a facial recognition-based attendance system. The support vector machine (SVM) classifier and techniques like Viola-Jones and Histogram of Oriented Gradients (HOG) features were utilized to create the system.

The authors evaluated various real-time conditions such as scale, illumination, occlusions, and position. The quantitative study was carried out using Peak Signal to Noise Ratio (PSNR) data and was carried out in the MATLAB GUI.

The authors of [7] compare the Receiver Operating Characteristics (ROC) curve to find the best facial recognition algorithm (Eigenface and Fisherface) offered by the Open CV 2.4.8 and then integrate it in the attendance system. The ROC curve demonstrated that Eigenface outperforms Fisherface in the studies presented in this research. The Eigenface algorithm-based system attained an accuracy rate of 70% to 90%.

The authors of [6] suggested a method for tracking student attendance in a classroom using a facial recognition algorithm that combined Discrete Wavelet Transforms (DWT) and Discrete Cosine Transforms (DCT). These techniques were utilized to extract the features of the student's face, which were then classified using the Radial Basis Function (RBF). This system had an 82% accuracy rate.

The recommended approach, according to the research journal [8,] is nearly identical to the first research journal in which RFID technology was employed to improve the adult attendance program. During this process, the tag and the student are also utilized to track student presence. The distinction between the original journals and the online site is where the information for the participants will be available. It is quite simple to retrieve information. This technology is also not perfect in the sense that it is not portable, because the RFID reader can only function while attached to a PC. Second, the RFID tag does not include authentic information that may uniquely identify the reader, resulting in inaccuracies in the data collected by participants.

III. EXISTING SYSTEM

Several methods for face recognition attendance have already been developed and implemented in various organisations.

Fingerprint Based Recognition System: For a fingerprint-based departure system, the portable fingerprint device should be pre-configured ahead of time with individual fingerprints. To ensure their everyday presence, the coed should record fingerprints on the suspended gadget later in the instructional hours or prior. The point is that it should be distracting to people's eyes during thestudy.

RFID (Radio Frequency identity) Based Recognition System: In an existing RFID-based system, Co-ed should always carry proper identity and place an ID in front of a cardboard reader to record their daily presence. The system may connect to RS232 and record attendees on a previously saved website. There is the potential of unauthorised access. Some students may use another student's ID to prove their presence in the absence of the true student, or they may try to misuse it on occasion.

Iris-based recognition system: The student should spin in front of the camera during an iris- based student travel programme so that the camera can read the Iris code. The specific data saved on the website is compared to the scanned iris, and any discrepancies should be corrected. As a result, fewer college members of the organisation use paper and pens. Additionally, it helps preserve safe code records and lowers the likelihood of representation in the classroom. It is a wireless biometric technique that addresses the issue of fake existence and, as a result, the challenge of establishing a functional network.

Face-based recognition system: A high-definition camera will be utilised to take pictures of attendance and use biometric detection technology to identify each person's face. The machine will then compare these faces to student images on the website. Attendees are identified with the current webpage for subsequent calculation when the face of the code matches a saved image. The taken image is saved as a new image on the website if it does not match the student face that is already there. There is a possibility that the camera won't capture the right image or won't record the precise number of people in the image during this process. **TimeTec TA:** TimeTec TA is a cloud-based attendance system that manages attendance using face recognition technology. It uses a specialised equipment or mobile application to collect the face features of employees and instantly compares them to the registered database. The system creates reports, provides accurate attendance records, and includes extra capabilities like geolocation trackingand payroll system integration.

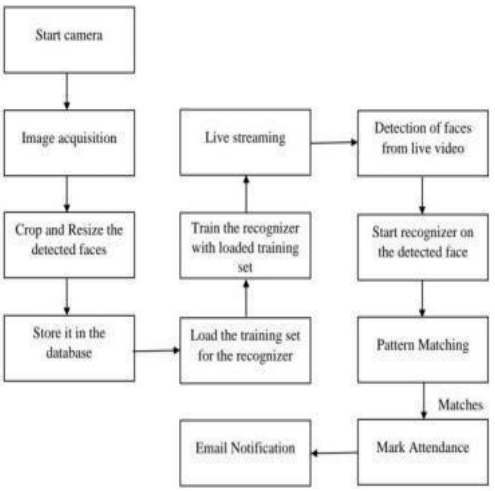
ZKTeco FaceKiosk: A complete attendance system that combines face recognition with additional biometric modalities like fingerprint and RFID is called ZKTeco FaceKiosk. In order to authenticate people and track their attendance, it uses cutting-edge facial recognition algorithms. A user-friendly interface, real-time monitoring,

IV. PROPOSED METHODOLOGY

The suggested method is using the Histogram of Oriented Gradients (HOG) algorithm for this facial recognition attendance system. Collection, training, capture, detection, image matching, and attendance marking are some of the sequential elements that make up the proposed project.

- Data collection: Gather a database of facial images from those who will be using the attendance system. Make sure the dataset has a broad collection of pictures, covering a range of angles, lighting, and facial expressions.
- Face detection: Locate and extract faces from the photos in the dataset using a face detection technique, such as Haar cascades or a deep learning-based face detector (like MTCNN or OpenCV's DNN module). The facial regions can now be more easily isolated for processing.
- Preprocessing: Use preprocessing methods to enhance the quality and eliminate noise from the photos of people's faces. The photos are typically resized to a uniform size, made grayscale, and then histogram equalization for contrast enhancement is applied.
- HOG feature extraction: Use the HOG algorithm to extract face features. The distribution of gradient orientations within a certain area of the face is computed and represented by HOG. This process aids in identifying distinctive facial patterns that can be utilised for identification.
- Feature representation: Represent the HOG features in a way that will allow categorization. In order to do this, the feature vectors may need to be flattened or the feature space may need to be reduced using dimensionality reduction techniques like Principal Component Analysis (PCA).
- Attendance Database Creation: Making a database that links the derived features to the relevant dataset participants. Store the feature vectors and the associated labels or identifiers for each person.
- Recognition and attendance marking: Complete the following actions while markingattendance:
  - Locate and remove the face area from the source image.
  - Preprocess the image of the extracted face using the same preprocessing methods as during training.
  - Remove the HOG characteristics from the face image after preprocessing.
  - Use the feature representation and an appropriate classifier (such as a Support Vector Machine, K-nearest neighbours, or deep learning-based models) to compare the extracted features to the features in the attendance database.
  - Mark the appropriate person's attendance if a match is discovered above a predetermined threshold.

V. DESIGN SPECIFICATIONS



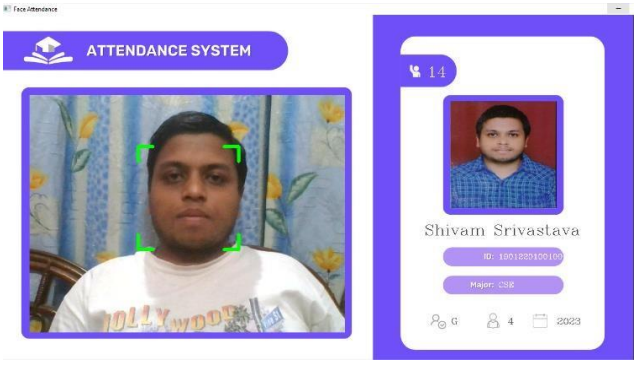
Functional Prerequisites:

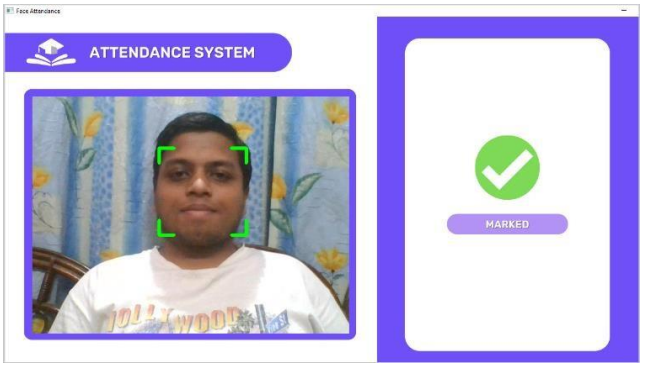
1. Hardware requirements: Check to see if you have the required hardware in place, such as a computer or server to run the system on, a camera or webcam to record live images, and enough computing power to conduct real-time activities.
2. Software requirements: Install the necessary libraries and face detection, face recognition, and picture processing software dependencies. Libraries like OpenCV, dlib, TensorFlow, or PyTorch are frequently utilised.
3. Database Management System: To store and manage the attendance data is step three of database management. The attendance records can be safely stored using well-liked choices like MySQL, Firebase, or MongoDB.
4. Face Detection: Identify and extract faces from the input photos or video frames using a face detection method. Utilizing pre-trained models like Haar cascades or deep learning- based detectors like MTCNN or RetinaFace, or algorithms like HOG (Histogram of Oriented Gradients), this can be accomplished.
5. Face recognition model: Create or use a face recognition model that has already been trained to recognize people from the identified face regions. HOG, deep convolutional neural networks (CNN), or pre-trained models like

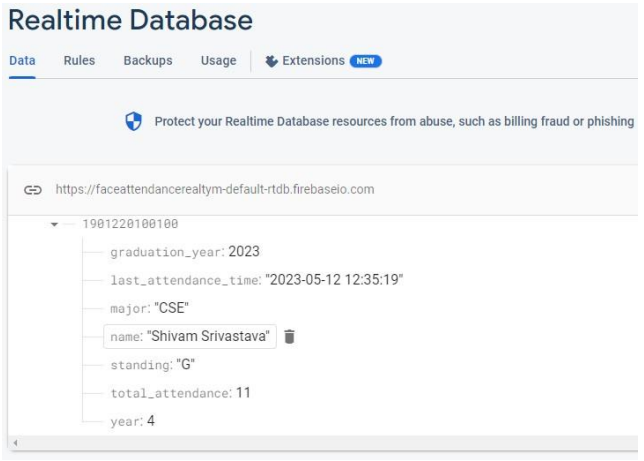
VGGFace, FaceNet, or OpenFace are some examples of the methods you can employ.

6. Real-time video processing: Use this feature to record live video streams coming from a webcam or camera. For continuous face detection and recognition, approaches like frame acquisition, frame preprocessing, and effective handling of the video stream are used.
7. Real-time attendance logging: Create a system for keeping track of attendance information. In order to store attendance data along with the pertinent timestamps and identities, this can include building a database table or file.
8. User interface: Create an application or user interface that enables users to interact with the attendance system, examine current attendance status, produce reports, and control system settings.
9. Network connectivity: Check that the system has dependable network connectivity so that it may update itself, and if necessary, communicate with other components. This is crucial if you want to offer remote access or distribute the system across numerous locations.
10. System security: Implement suitable security measures to safeguard user privacy and safeguard attendance data. This can include access restrictions to prevent unauthorised access, user authentication processes, and encryption of sensitive data.
11. Testing and Validation: Thorough testing and validation should be done on the system to guarantee its accuracy, dependability, and performance in a variety of real-world settings. To determine the robustness of the system, run testing under various lighting situations, viewing angles, and aesthetic modifications.

VI. TEST RESULT







The face of student is recognized and the Attendance is marked on the Database. The name of student with its roll no. is displayed and the last attendance time is updated on the Database.

VII. CONCLUSION

Finally, face emotion recognition is a promising technology with the potential to improve industries such as healthcare, marketing, and security. Machine learning and computer vision algorithms have advanced, making it easier to detect and recognise human emotions from facial expressions. However, designing an accurate and reliable face emotion recognition system remains a difficulty. Lighting circumstances, head pose, facial occlusions, and ethnic variances can all have an impact on the system's accuracy. Overall, facial emotion detection technology has considerable promise for societal benefit and can be further enhanced. As with any technology, it is critical to evaluate how it will affect individuals and society as a whole.

VIII. FUTURE PLANS

It is significant to remember that achieving desired validation accuracy requires a lot of trial and error and lack of a specified architecture. Because of this, neural networks are frequently referred to as "black box algorithms." The system achieved an accuracy of 87% on the test dataset. Accuracy of Face Recognition: Measure the number of correct identifications compared to total attempts to determine reliability.

But we need to improve in specific areas like-

- Number and configuration of convolutionallayers
- Number and configuration of dense layers
- Dropout percentage in dense layers.

However, because we lacked a highly configured system, we were unable to explore dense neural networks in more depth because the system became extremely slow. We will endeavour to address these issues in the future. Find a method to create a neural network that is guaranteed to function properly. Different issues would call for various networks. Additionally, we would like to train more databases into the system to increase the model's accuracy, but resources are once again an obstacle. We also need to make improvements in a number of other areas in the future to fix the faults and increase accuracy. Determine areas for development by routinely assessing the system's performance, conducting user studies, and gathering feedback. This feedback loop makes sure that the system develops and adjusts to suit the shifting requirements and difficulties in attendance management.

IX. REFERENCES

[1] Salim, Omar Abdul Rhman, Rashidah Funke Olanrewaju, and Wasiu Adebayo Balogun. "Class attendance management system using face recognition." 2018 7th International Conference on Computer and Communication Engineering (ICCCE). IEEE, 2018.

[2] Hapani, Smit, et al. "Automated Attendance System Using Image Processing." 2018 Fourth International Conference on Computing Communication Control and Automation (ICCUBEA).IEEE, 2018.

[3] Akbar, Md Sajid, et al. "Face Recognition and RFID Verified Attendance System." 2018 International Conference on Computing, Electronics & Communications Engineering (iCCECE). IEEE, 2018.

[4] Okokpujie, Kennedy O., et al. "Design and implementation of a student attendance system using iris biometric recognition." 2017 International Conference on Computational Science and Computational Intelligence (CSCI). IEEE, 2017.

[5] Rathod, Hemantkumar, et al. "Automated attendance system using machine learning approach." 2017 International Conference on Nascent Technologies in Engineering (ICNTE). IEEE, 2017.

[6] Lukas, Samuel, et al. "Student attendance system in classroom using face recognition technique." 2016 International Conference on Information and Communication Technology Convergence (ICTC). IEEE, 2016.

[7] Siswanto, Adrian Rhesa Septian, Anto Satriyo Nugroho, and Maulahikmah Galinium. "Implementation of face recognition algorithm for biometrics based time attendance system." 2014 International Conference on ICT For Smart Society(ICISS). IEEE, 2014.

[8] Hussain, Dugar, Deka, Hannan, et al. “RFID based Student Attendance System” 2014.

[9] SenthamilSelvi, Chitrakala, Antony Jenitha,, et al. “Face Recognition System Based on Face Recognition" 2014, to overcome prior system challenges.