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Face Recognition-Based Automated Attendance Management System

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ABSTRACT— Attendance is the most important aspect in education, industry, and any evaluation process, but the time taken to do attendance is high. The regular attendance method is slower and takes much time to complete the whole process. In which the teacher takes attendance by calling each individual name and marking the respective answers. So instead, a face recognition system is introduced to get attendance by capturing the facial data from each student collected from a camera placed, which is of high quality and resolution. By this method the real face of the individual is checked from the given data for the correct face identification and students' attendance is marked. Relying on the old slow-way approach can be changed for a faster better approach for detecting faces and marking attendance, the design we constructed using CNN in an ML-based algorithm solves this problem of a slow approach and gives much faster attendance, which is more practical and reliable in modern usage. In this process, we detect the face using a camera and send the data to the system to identify the face with the registered data. So the correct attendance is marked by the system. The logic used in the system is more accurate and identifies the person by facial and biometric systems. The face attendance method uses multiple combinations to analyze and detect the face according to the given data. Attendance is only given when the match is above 95%. Thus, this method is easier and user-friendly to use and marks attendance accordingly.

KEYWORDS— Face Recognition, Attendance Monitoring, Convolutional Neural Network, Encrypted face recognition algorithm, Automatic attendance, Attendance using ML.

I. INTRODUCTION

There are several existing systems that are closely analogous to the proposed idea of using official recognition techniques and algorithms to indicate attendance in a class. A literature survey of the proposed systems was conducted to analyze these systems. The system we proposed is based on the basic materials used the facial recognition which includes Networks, Algorithms, and processing features that differentiate the face from one another. The attendance is recorded manually by getting fingerprints and those prints are matched with the face and previous data. Where the process uses AI ML algorithms to correctly detect the faces and the respective attendance is given to the person. An OpenCV is created to use the programming language, so CNN is measured in the correct value to determine and execute the given input and to store the relevant data in order.

A relevant 3D face recognition system is given as featured data to analyze the input given and to process the data. We use the eigenface system to find the correct pair match from the stored data and the analyze is taken place by the algorithm using the ML system. Thus, the system finds irrelevant matching, or simply when the data is unidentified from the stored data, the system rejects the attendance giving showing invalid data, and the execution of attendance is stopped for presenting to the wrong match. In this way, the attendance system is effectively given to the class in a much easier and faster way possible. Algorithms used are to make the system execute in a much faster way.

II. LITERATURE SURVEY

Aparna Trivedi et al [1] This is a window application developed in Python technology, MySQL is a backend database. This application has two types of users one is the Admin user who will upload the files to the main storage with annotation details. Another is an end user who is a real beneficiary of this system and can able to search for the file by providing the query keyword. With this, the system end user can able to get the most matching files in a short time shown. This system uses a Workload that is like a cache area with the help of the Workload space and Annotation



technique this system helps the end user to get his required file in a short time. The System Architecture The usage period of any venture advancement is the most essential stage as it yields the last arrangement, which takes care of the current issue.

XUE AND REN [2] The AR dataset is composed of S-I and S-II subsets, which are collected in different periods, including over 4000 samples of 126 subjects, and there are 13 samples per subject in S-I and S-II. There are many facial expressions that must be thoroughly checked like sad, happy, angry, sunglasses, and so on. The Extended YaleB (E-YaleB) dataset contains 2414 images of 38 subjects under different illumination conditions, which is separated into five subsets according to the illumination angle, such as each subset containing samples per subject, respectively. For the E-YaleB dataset, the samples under various lighting conditions, subjects are selected as the generic set and the rest of the 20 subjects for evaluation. Subset 1 is used for person one and their photos are stored in the gallery, and the remaining subsets are used for others in the sets.

Falah Alsaqre et al. [3] In contrast to 2DPCA, which finds a projection matrix that maximizes the total scatter in the modeled feature space, CW2DPCA constructs class-wise projection matrices, each one containing the projection axes that maximize the scatter of projected sample images of a particular class and the principal components that maximize between-class separability. This ensures that for a given training dataset, CW2DPCA is more likely to model distinct feature subspaces, which in turn facilitates the subsequent classification task. Using measurements to evaluate and identify each test sample and to classify the subspace which exhibits the highest similarity measure.

Zi long Liu et al. [4] This paper is designed with (THM) Tent-Henon double chaotic system, characteristics of large key for using large key space of Henon map, which are suitable for two-dimensional images. The system uses encryption twice, which can have a deficiency in the Henon map. This has a simple structure and has very sensitive initial values that have large key space in the faster calculation of the process. The system also can generate a chaotic sequence, which is difficult to predict, and more flexible in application. Moreover, THM double chaotic system can change the dynamic behavior of the chaotic system, avoid the periodic degradation problem of a low chaotic system, and it can effectively resist the model reconstruction, exhaustive and other attacks.

Utku AKTAS et al. [5] Main objective of feature extraction is reducing the number of dimensions and obtaining the main characteristics of the data. Scale Invariant Feature Transform (SIFT) is an algorithm that aims to find the key point of the given image. It is prone to image scale and image transformations such as rotation and translation. Speeded Up Robust Features (SURF) is a feature detector that can be used in object recognition. It is useful for locating key points of the objects in the scene. VGG is a well-known CNN-based deep learning architecture where it has been used for image classification tasks. It is also commonly used to extract 5 features from the images. The method is called VGG16 feature extraction. To do this, input is forwarded to a pre-trained VGG model, and results before the last layer is fetched.

Chamandeep Vimal et al. [6] Image that is given is taken for color space, which is taken from Russian that is a grayscale image of skin possibility. Skin pixels have a selection of stable values for each, g and b element. This includes three normalized augmentation processes; these elements have images using two different materials, which are given in the format, normalized-red, normalized-green, and normalized-blue. This gives a segmentation process and takes normalized elements obtained and two images are created. A normalized input is given for getting elements that are obtained from two images obtained. This also has a threshold, which is a set of images created. This modeling image has three key steps that involve, PCA that detects skin region and project. In the second step, projected skin regions are reconstructed, with the Principal Components (PC).

Ayesha Akhtar Supti et al. [7] In the proposed system, the convolutional neural network CNN is used to analyze visual representation in deep learning. As a classifier support vector machine (SVM) is used along with that for face recognition, Face Net is used which is dependent on CNN. After combining all these deep learning methods, the proposed system will be created. This system will save both time and energy as it won't take more than 12-15 minutes for the attendance of approximately 50 students. Now with this system, this time can be used in more productive work. Where each student will only have to stand before the camera for a few seconds and it will automatically mark them present in their respective excel sheet which will mark them present.



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Amit Verma et.al[8]PHT technique is used to detect faces that give different rotations. PHT is robust to noise, and minimum redundancy, and much faster accuracy to detect face detection techniques at different angles. And basically, after the selection of different and image testing is taken initial images are processed in morphological order in the angle. Thus, the PHT technique is performed from cascading. This feature gives extracted small blocks of single images in more detail. That leads to accurate results from RIFDS uses binary images to display some selected facial features. When a test image is uploaded, converting grayscale image because the increase in color increases the complexity of multiple color channels.

Manik Sharma et.al[9]DBN network is mostly used in a graphical model, deep learning technology for its architecture, and Deep belief learning for inputs in probability reconstructs. The composition of the simple and unsupervised networks has been determined in the autoencoders to get the unsupervised networks from Boltzman machines and autoencoders. Each sub-network has been implemented in this output layer network. Thus by combining all RBM in the system, a powerful model has been created to solve the problems in the DBN network. And just like MLP, DBN is also considered more powerful to use in the system in the trained network.

Rehmat Ullah et.al[10]PCA is the widely used network system that has been operated in the orthogonal vectors as proposed in the drums and Jalal two-level classifications. In this principal component analysis, we combine support vector machines to react with the necessary techniques as in the system. By using so they have extracted the essential, 16 facial impressions from the proposed system. By gathering all the information in the system can operate the required algorithm in the system to approach various face recognition systems. Thus, the improved version of the system can be easily obtained using this method. All gathered information is then stored in the PCA and an effective approach has been declared to get the results from those obtained face recognition systems.

III. ATTENDANCE USING ALGORITHM

Face Recognition-Based Automated Attendance Management System [1] In the Classical way this means, using Radio frequency identification (RFID) near field communication (NFC) for direct biometric identification. This system uses CSV Comma Separated Values that contain a list of data from which required files are obtained for reference. This helps to transfer data from one file to another application using a CSV file. And a window application developed in Python technology, MySQL backend database has two types of users one is an Admin user who will upload the files to the main storage with annotation details. Another is an end user who is a real beneficiary of this system and can be able to search for the file by providing the query keyword.

Single sample per person face recognition algorithm based on the robust prototype dictionary and robust variation dictionary construction [2] To sketch map of the RPRV construction, and images are combined for dictionary learning to construct the robust prototype dictionary (RP) and robust variation dictionary (RV). The prototype used the system to represent the linearity from a robust prototype and robust variation in the given label and sample. This resides in the error between the reconstructed samples and the probe sample recognition result. This method, the enhanced robust prototype dictionary, and the robust variation dictionary help to improve the SSPP face recognition performance.

Human Face Recognition Using Class-wise Two-dimensional Principal Component Analysis [3] An eigenface method used for 2D face images processing were the bilateral projection-based 2DPCA (B2DPCA) matrix reflection in underlying structural information is arranged in (2D)² PCA format and segregates in columns to compression in images. Eigenfaces of the original training dataset. The applied PCA gives the transformation from the face training in the eigenface subspace that holds the features from the sample. The fundamental assumption in PCA-based methods is that all the facial samples under consideration must be unfolded into column vectors, which, however, induce extensive computational costs and usage of space.

Encrypted face recognition algorithm based on Ridgelet-DCT transform and THM chaos.[4] A THM (tent-Henon map) chaotic encrypted face algorithm based on Ridgelet-DCT transform is proposed in this paper. By applying the homomorphic encryption method that extracts the visual robust features of the application. Ridgelet transform has higher approximation accuracy and better sparse representation performance for image processing. And it has a



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stronger noise suppression ability. THM tent Henon double chaotic system is the design that has the key features to design the required characteristics from the complexity of the Henon map, in the two-dimensional images system representation for the THM encryption twice in the deficiency of tent map and Henon map.

Vulnerabilities of Facial Recognition and Countermeasures [5] Scale Invariant Feature Transform (SIFT) is an algorithm that aims to find the key point of the given image. Speeded Up Robust Features (SURF) is a feature detector that can be used in object recognition. VGG is a well-known CNN-based deep learning architecture where it has been used for image classification tasks. Labeled Faces in the Wild is one of the most used datasets in the field of face detection and recognition. It includes more than 13,000 face images. Images in the dataset retrieved from the web.

Face Detection's Various Techniques and Approaches: A Review [6] Automatic face detection, PCA-based modeling of the geometric structure in detecting a face in an image and video Skin Colour Modelling (SCM) is one of the best techniques applied for effective layout in RGB and HSV. Enhancement of the technology in the cascade detector features from the Haar feature and in the detection of the new decision approach from the given algorithm, designs the factor that decides the provided algorithm to run in the most efficient way from the simple format to the design structure of other advanced features.

Automatic Attendance System Using Facial Recognition. [7] The proposed algorithm that can detect multiple faces, and performance has a target training dataset, CNN is trained to extract facial features and use these features to train the LSVM. A CNN network is utilized to extract features in this study. This necessitates resampling the facial image to attain the same width and height as the photos used to train the identification algorithm. A bi-cubic interpolation approach was chosen for resampling the face photos. Then, using the target training dataset, CNN is trained to extract facial features and use these features to train the LSVM.

Secure Rotation Invariant Face Detection System for Authentication [8] RIFDS (Rotation Invariant Face Detection System) is implemented for a robust method of face detection taken at various angles. In RIFDS Polar Harmonic Transforms (PHT) technique is used to connect the MBLBP that has been served in the two most identical systems that have been combined. The RIFDS system combines two methods PHT and MBLBP. The extract is made to determine the different rotations in the PHT robust, fast, and accuracy ranges in the different applied techniques. This can also be applied in the field of angles for structural application, in the development factor.

Facial detection using deep learning [9] DBN is an implementation of a deep neural net. RBM is used to reconstruct the given input from the others. By combining all RBM we are introducing a collaborating method getting a powerful full new model which solves our problem which is DBN. Like MLP, DBN is the propagation provided from the network in the back-trained identical MLP. But when we come to training, those are entirely different. To develop a powerful trained network this feature is being used in the process. A DBN is called a stack of RBNs. In these hidden layers, one RBN is the visible layer for the above one. The first RBM constructed as input is possible after the hidden layer of the first RBN has visible layers for the second RBN.

A Real-Time Framework for Human Face Detection and Recognition in CCTV Images [10] A two feature extraction algorithms, principal component analysis (PCA) and convolutional neural network (CNN). We use and compare the performance of the algorithms K-nearest neighbor (KNN), decision tree, random forest, and CNN. By applying the acquired technique to obtain facial recognition for efficient lighting and the key feature to develop the scale from the fewer tolerant images in simultaneously in the section of the image recognition field from the other dedicated storage sections.

IV. CONCLUSION

Attendance marking in a class during a lecture is not only an onerous task but also a time-consuming neat that. Due to an unusually high number of students present during the lecture, there will always be a probability of proxy attendance. In our attendance system, the computer will be able to recognize the student whose data has been stored and it marks the attendance of that student. Various algorithms and techniques have been used for improving the performance of face recognition. The concept we are using here is Open CV. his way the attendance will be automated.



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Student attendance is used to be usually achieved in the classical way which means recording papers or more novel approaches by hardware tools such as radio frequency identification (RFID), near field communication (NFC), biometric identification, or a combination of just presented. But our proposed system does not require carrying any hardware device or to perform some kind of direct biometric identification. The proposed system is an easy way for marking attendance where a student is identified by the camera, and the faces are matched to the ones stored in the database after comparing the trained images.

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