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E-Mail :
editor.ijasem@gmail.com
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EFFICIENT ATTENDANCE MANAGEMENT USING FACE RECOGNITION AND DEEP LEARNING

[1]M.Mounika, [2]Bathini Shivaprasad

[1]Assistant Professor,[2]MCA Student

Depatment Of MCA

Sree Chaitanya College of Engineering, Karimnagar

ABSTRACT

In this project, we used Python to develop an automatic attendance system. Our concepts for a "Student Attendance System Based on Facial Recognition" that incorporates several applications have been proposed. Due to face authorisation, the application's face identification feature saves time and removes the possibility of proxy attendance. As a result, this technology may be used in an area where attendance is crucial. A person's face is a representation of who they are. As a result, we have suggested a facial recognition-based automatic student attendance system. Security control systems, in particular, benefit greatly from face recognition technology. Everything is mechanised and connected online in the world we live in. Machine learning, image processing, and the internet of things are all developing daily. As a result, several systems have undergone radical modifications in an effort to produce more accurate outcomes. A common illustration of this shift is the attendance system, which uses facial recognition instead of the more conventional signature on a piece of paper. This project suggests a technique for creating an all-inclusive embedded class attendance system that uses facial recognition to determine if a person's face belongs to a student in that particular class or not. The system is based on a machine learning algorithm that will be implemented in Python. Students' input images can be taken with a computer or laptop camera, or a standard external camera that must be connected to the system that is set up to handle face recognition by implementing the Local Binary Patterns algorithm (LBPs). When two photographs per person are trained, the average recognition accuracy is 100% for high-quality images, 94.12% for low-quality images, and 95.76% for the Yale face database.

I. INTRODUCTION

The main objective of this project is to develop face recognition based student attendance system. In order to achieve better performance, the test images and training images of this proposed approach are limited to frontal and upright facial images that consist of a single face only. The test images and training images have to be captured by using the same device to ensure no quality difference. In addition, the students have to register in the database to be recognized. The enrolment can be done on the spot through the user-friendly interface.

In today's networked world, the need to maintain the security of information or physical property is becoming both

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increasingly important and increasingly difficult. From time to time we hear about the crimes of credit card fraud, computer breakin's by hackers, or security breaches in a company or government building. In most of these crimes, the criminals were taking advantage of a fundamental flaw in the conventional access control systems: the systems do not grant access by "who we are", but by "what we have", such as ID cards, keys, passwords, PIN numbers, or mother's maiden name. None of these means are really define us. Recently, technology became available to allow verification of "true" individual identity. This technology is based in a field called "biometrics".

The idea of two technologies namely Student Attendance and Feedback system has been implemented with a machine learning approach. This system automatically detects the student performance and maintains the student's records like attendance and their feedback on the subjects like Science, English, etc. Automated Attendance System using Face Recognition proposes that the system is based on face detection and recognition algorithms, which is used to automatically detects the student face when he/she enters the class and the system is capable to marks the attendance by recognizing him.In this proposed system the student is requested to stand in front of the camera to detect and recognize the iris, for the system to mark attendance for the student.

Face recognition is crucial in daily life in order to identify family, friends or someone we are familiar with. We might not perceive that several steps have actually taken in order to identify human faces. Human intelligence allows us to receive information and interpret the information in the recognition process. We receive information through the image projected into our eyes, by specifically retina in the form of light. Light is a form of electromagnetic waves which are radiated from a source onto an object and projected to human vision. Robinson-Riegler, G., & Robinson-Riegler, B. (2008) mentioned that after visual processing done by the human visual system, we actually classify shape, size, contour and the texture of the object in order to analyse the information. The analysed information will be compared to other representations of objects or face that exist in our memory to recognize. In fact, it is a hard challenge to build an automated system to have the same capability as a human to recognize faces. However, we need large memory to recognize different faces, for example, in the Universities, there are a lot of students with different race and gender, it is impossible to remember every face of the individual without making mistakes. In order to overcome human limitations, computers with almost limitless memory, high processing speed and power are used in face recognition systems. The human face is a unique representation of individual identity. Thus, face recognition is defined as a biometric method in which identification of an individual is performed by comparing real-time capture image with stored images in the database of that person (Margaret Rouse, 2012).

To maintain the attendance record with day-to-day activities is a challenging task. The

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conventional method of calling name of each student is time consuming and there is always a chance of proxy attendance. The following system is based on face recognition to maintain the attendance record of students. The daily attendance of students is recorded subject wise which is stored already by the administrator. As the time for corresponding subject arrives the system automatically starts taking snaps and then apply face detection and recognition technique to the given image and the recognize students are marked as present and their attendance update with corresponding time and subject id.

We have used deep learning techniques to develop this system, histogram of oriented gradient method is used to detect faces in images and deep learning method is used to compute and compare feature facial of students to recognize them. Our system is capable to identify multiple faces in real time. The main objective of this project is to develop face recognition based automated student attendance system. In order to achieve better performance, the test images and training images of this proposed approach are limited to frontal and upright facial images that consist of a single face only. The test images and training images have to be captured by using the same device to ensure no quality difference. In addition, the students have to register in the database to be recognized. The enrolment can be done on the spot through the user-friendly interface.

Nowadays, face recognition system is prevalent due to its simplicity and awesome performance. For instance, airport protection systems and FBI use face recognition for criminal investigations by tracking suspects, missing children and drug activities (Robert Silk, 2017). Apart from that, Facebook which is a popular social networking website implement face recognition to allow the users to tag their friends in the photo for entertainment purposes (Sidney Fussell, 2018). Furthermore, Intel Company allows the users to use face recognition to get access to their online account (Reichert, C., 2017). Apple allows the users to unlock their mobile phone, iPhone X by using face recognition (deAgonia, M., 2017). The work on face recognition began in 1960. Woody Bledsoe, Helen Chan Wolf and Charles Bisson had introduced a system which required the administrator to locate eyes, ears, nose and mouth from images. The distance and ratios between the located features and the common reference points are then calculated and compared. The studies are further enhanced by Goldstein, Harmon, and Lesk in 1970 by using other features such as hair colour and lip thickness to automate the recognition. In 1988, Kirby and Sirovich first suggested principle component analysis (PCA) to solve face recognition problem. Many studies on face recognition were then conducted continuously until today (Ashley DuVal, 2012).

II. LITERATURE SURVEY

1) Stress and anxiety detection using facial cues from videos

AUTHORS: G. Giannakakis, D. Manousos, F. Chiarugi

This study develops a framework for the detection and analysis of stress/anxiety

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Vol 18, Issue 4, 2024
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emotional states through video-recorded facial cues. A thorough experimental protocol was established to induce systematic variability in affective states (neutral, relaxed and stressed/anxious) through a variety of external and internal stressors. The analysis was focused mainly on non-voluntary and semi-voluntary facial cues in order to estimate the emotion representation more objectively. Features under investigation included eye-related events, mouth activity, head motion parameters and heart rate estimated through camera-based photoplethysmography. A feature selection procedure was employed to select the most robust features followed by classification schemes discriminating between stress/anxiety and neutral states with reference to a relaxed state in each experimental phase. In addition, a ranking transformation was proposed utilizing self reports in order to investigate the correlation of facial parameters with a participant perceived amount of stress/anxiety. The results indicated that, specific facial cues, derived from eye activity, mouth activity, head movements and camera based heart activity achieve good accuracy and are suitable as discriminative indicators of stress and anxiety.

2) Attendance System Based on Facial RecognitionAutomated Attendance System Based on Facial Recognition

AUTHORS: S R Dhanush

In this project we have implemented the automated attendance system using python . We have projected our ideas to implement "Automated Attendance System Based on Facial Recognition", in which it imbibes large applications. The application includes face identification, which saves time and eliminates chances of proxy attendance because of the face authorization. Hence, this system can be implemented in a field where attendance plays an important role. I am also adding the link to the code I used for the project since a lot of students have asked me the codes so far.

3) Reconstruction of Human Faces from Its Eigenfaces

AUTHORS : Subhajit Bhattacharyya

Eigenface or Principal Components Analysis (PCA) methods have demonstrated their success in face recognition, detection and tracking. In this paper we have used this concept to reconstruct or represent a face as a linear combination of a set of basis images. The basis images are nothing but the eigenfaces. The idea is similar to represent a signal in the form of a linear combination of complex sinusoids called the Fourier Series. The main advantage is that the number of eigenfaces required is less than the number of face images in the database. Selection of number of eigefaces is important here. Here we investigate what is the number of minimum eigenface that is required for faithful production of a face image.

Arun Katara et al. (2017) mentioned disadvantages of RFID (Radio Frequency Identification) card system, fingerprint system and iris recognition system. RFID card system is implemented due to its simplicity. However, the user tends to help their friends to check in as long as they have their friend's ID card. The fingerprint system is indeed effective but not efficient because it takes time for the verification

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process so the user has to line up and perform the verification one by one. However for face recognition, the human face is always exposed and contain less information compared to iris. Iris recognition system which contains more detail might invade the privacy of the user. Voice recognition is available, but it is less accurate compared to other methods. Hence, face recognition system is suggested to be implemented in the student attendance system.

III. SYSTEM ANALYSIS AND DESIGN

EXISTING SYSTEM:

To develop an attendance system using face recognition. Concept In a classroom with large number of students, it is a very tedious and time-consuming task to take the attendance manually. Therefore, we can implement an effective system which will mark the attendance of students automatically by recognizing their faces. The process of this face recognition system is divided into various steps, but the important steps are detection of face and recognition of face. Firstly, to mark the attendance of students, the image of students' faces will be required. This image can be snapped from the camera device, which will be placed in the classroom at a suitable location from where the whole classroom can be covered. This image will act as input to the system. For the effective face detection, the image needs to be enhanced by using some image processing techniques like grayscale conversion of image and histogram equalization. To identify the students sitting on the last rows neatly, the histogram equalization of image needs to be done. Hence, there is a need to develop a real time operating student attendance system which means the identification process must be done within defined time constraints to prevent omission. The extracted features from facial images which represent the identity of the students have to be consistent towards a change in background, illumination, pose and expression.

PROPOSED SYSTEM:

The proposed System is to capture the face of each student and to store it in the database for their attendance. The face of the student needs to be captured in such a manner that all the feature of the students' face needs are recorded and analysed to the existing record. The main working principle of the project is that, the video captured data is converted into image to detect and recognize it. Further the recognized image of the student is provided with attendance, else the system marks the database as absent

The objective of this project is to develop face recognition based automated student attendance system. Expected achievements in order to fulfill the objectives are:

- To detect the face segment from the video frame.
- To extract the useful features from the face detected.
- To classify the features in order to recognize the face detected.
- To record the attendance of the identified student.

IV. SYSTEM DESIGN

SYSTEM ARCHITECTURE:

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Vol 18, Issue 4, 2024
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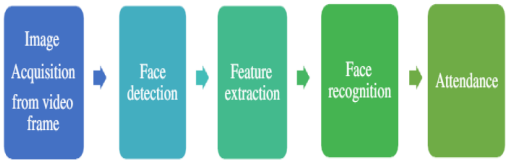
A throughout survey has revealed that various methods and combination of these methods can be applied in development of a new face recognition system. Among the many possible approaches, we have decided to use a combination of knowledge-based methods for face detection part and neural network approach for face recognition part. The main reason in this selection is their smooth applicability and reliability issues. Our face recognition system approach is given in Figure



System design

V. SYSTEM IMPEMENTATION

MODULES:

- **Admin**
- **Pre-processing**
- **Face Detection And Recognition**
- **OPENCV**
- **Integration with Attendance System**

MODULES DESCRIPTION:

Admin:

Admin can login with his credentials. Once he login he can activate the Students data. The activated students only allow the attends in our applications. The admin can set the training and testing data for the project dynamically to the code. The admin can view all users detected results in hid frame. By clicking an hyperlink in the screen he can detect the emotions of the images. . The dataset in the excel format. By authorized persons we can increase the dataset size according the imaginary values.

Data Preprocessing

Gather a dataset of facial images for each employee. Ensure that the dataset is diverse and representative of different lighting conditions, facial expressions, and poses. Crop and resize the facial images to a consistent size. Normalize the pixel values to improve model training.

FACE DETECTION AND RECOGNITION:

Dataset contains grid view of already stored dataset consisting numerous properties, by Property Extraction newly designed dataset appears which contains only numerical input variables as a result of Principal Component Analysis feature selection transforming A facial recognition system[1] is a technology capable of matching a human face from a digital image or a video frame against a database of faces. Such a system is typically employed to authenticate users through ID verification services, and works by pinpointing and measuring facial features from a given image.

Face Detection: Use a pre-trained face detection model (e.g., Haarcascades, MTCNN, or a deep learning-based face detector) to locate and extract faces from images.

Face Recognition Model: Choose a pre-existing face recognition model or train your own using a deep learning framework like TensorFlow or PyTorch. Popular pre-trained models include FaceNet, OpenFace, and ArcFace.

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Model Training: Split your dataset into training and testing sets. Train the face recognition model using the training set. Fine-tune the model if needed to improve accuracy.

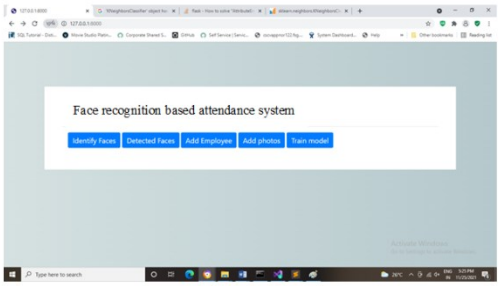
Validation and Evaluation: Validate the model using the testing set. Evaluate the model's performance using metrics such as accuracy, precision, recall, and F1 score.

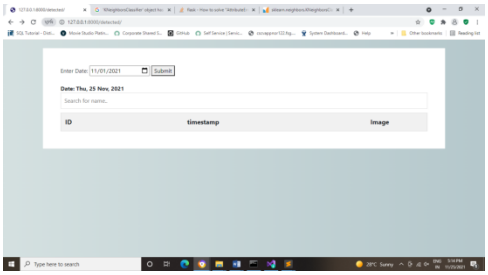
OPENCV:

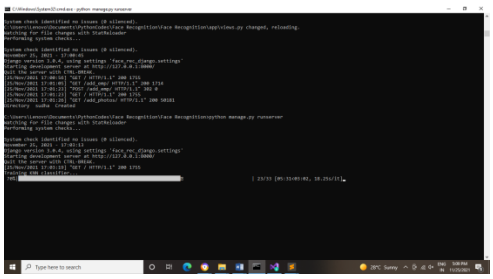
OpenCV is the huge open-source library for the computer vision, machine learning, and image processing and now it plays a major role in real-time operation which is very important in today's systems. By using it, one can process images and videos to identify objects, faces, or even handwriting of a human. When it integrated with various libraries, such as NumPy, python is capable of processing the OpenCV array structure for analysis. To Identify image pattern and its various features we use vector space and perform mathematical operations on these features, from the original image, lots of pieces of information that are present in the original image can be obtained. Like in the above image there are two faces available and the person(I) in the images wearing a bracelet, watch, etc so by the help of OpenCV we can get all these types of information from the original image.

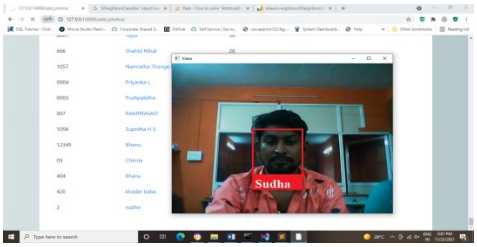
It's the basic introduction to OpenCV we can continue the Applications and all the things in our upcoming articles.

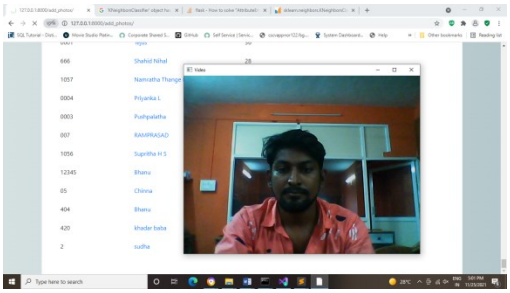
VI. SCREEN SHOTS











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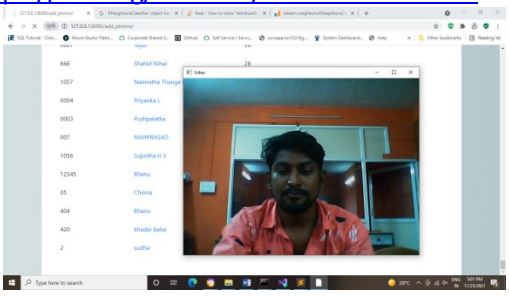

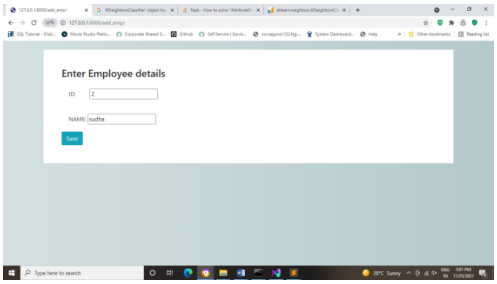

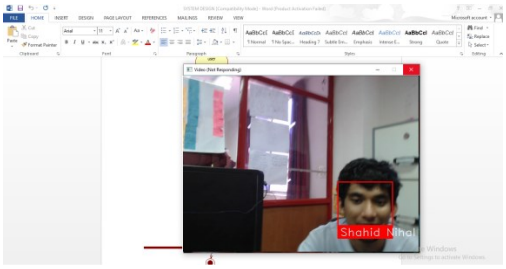

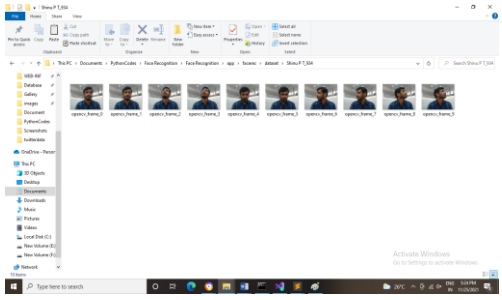

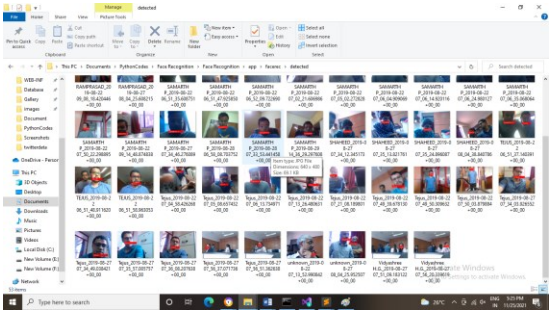

VII. CONCLUSION

A detailed description of an automated student attendance system based on facial recognition is provided. By comparing the input image, which is acquired via capturing video frames, with the train image, the suggested method offers a way to identify the individuals. This suggested method can identify and locate a face from an input facial picture that is taken from a video frame that is being recorded. In addition, developing a facial recognition system for student attendance was the project's main objective. This thesis discusses facial recognition concepts in great detail. In a similar vein, Django web development is covered, followed by explanations and implementation examples. The project's outcome was a functional facial recognition system prototype that allows the administrator to add students and their data to the database and create a teaching account. After then, teachers can access the system and record students' attendance. A camera detects the student's face, and the database records the student's attendance. The pupils' attendance data was visible to the administrators and teachers. All things considered, the project was successful in demonstrating that Django can be used to develop a web application. Once put into practice, it may be utilised to record students' attendance and take attendance. By including more features for instructors and students, this project might potentially be developed further in the future. Additional elements like grades, assignments, and outcomes might be included.

Further Enhancement

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The goal of the automated attendance system is to lessen the shortcomings of the manual, traditional approach. This attendance system serves as an example of how image processing methods are used in the classroom. This technique may enhance an institution's reputation in addition to helping with the attendance system.

REFERENCES

[1] Michael Dobson, Douglas Ahlers, Bernie DiDario, <Attendance Tracking System", United States Patent Application Publication, Pub. No.: US 2006/0035205 A1, Feb.16, 2006.

[2] Naveed Khan Balcoh, M. HaroonYousaf, Waqar Ahmad and M. IramBaig, <Algorithm for Efficient Attendance Management: Face Recognition based approach=, IJCSI International Journal of Computer Science Issues, Vol. 9, Issue 4, No 1, pp.146-150, July 2012.

[3] O. Shoewu and O.A. Idowu, <Development of Attendance Management System using Biometrics ", The Pacific Journal of Science and Technology, Vol. 13, Number1, pp.300-307, May 2012 (Spring).

[4] Damir Demirovic, Emir Skejic , Amira Serfovic, <Performance of some images processing algorithms in TensorFlow=, computer vision and pattern recognition, pp, 799- 778, 2018.

[5] http://www.openCV.org

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

[7] S. Bahrampour, N. Ramakrishnan, L. Schott. And M. Shah, M. Comparative Study of Caffe, Neon, Theano, and Torch for Deep Learning<. CoRR, abs/1511.06435. 2015.

[8] I. K. Park, N. Singhal, M. H. Lee, S. Cho and C. Kim, "Design and Performance Evaluation of Image Processing Algorithms on GPUs," in IEEE Transactions on Parallel and Distributed Systems, vol. 22, no. 1, pp. 91-104, Jan. 2011.