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FACE RECOGNITION BASED SMART ATTENDANCE SYSTEM USING MACHINE LEARNING ALGORITHM

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Abstract *:* Face recognition is a very productive application in context of image processing. Identifying the human face is an active issue for authentication purposes specifically for marking attendance of the students. Artificial-Intelligence can help us in automating the attendance system. Smart attendance system using face-recognition method is a procedure of recognizing students by extracting their facial features and further using their facial features for comparison based on the high-definition monitoring computer technology that checks every data very precisely. Face-recognition is a real-world solution for handling student attendance system. Number of algorithms and techniques has been used for the development and also for improving the face recognition technique but here we have used the concept of machine learning. Manual attendance system is very time consuming as the teacher has to call the respective names of each and every student. Marking attendance through face recognition can be applicable in thea educational institutions like schools, colleges etc not only for the students but for the teachers too via the camera installed. Smart attendance through face recognition can help to save more time for the teachers.
Terms: machine learning, face detection, smart attendance system, face recognition, artificial intelligence.

I. INTRODUCTION

The traditional method of marking attendance in a register is a time-consuming process. We very well know that it's a waste of time but still we do so because marking attendance of students is very important as it helps in tracing the active participation of the students in their respective institutions (schools, colleges, etc). Till now there are only two ways of marking attendance. The first way is manual method and the second way is automatic method. Automatic method of marking attendance of students has a very good impact over manual method. There are various ways to automate the attendance system but using Artificial-Intelligence (AI) is a smarter way of marking attendance of students. The brain of human beings has the ability to recognise and recall things automatically but machines like computers and other devices are not capable in recognising things on their own. So, we need to train our machines step-by-step and separately on each task in order to mark the attendance of the students successfully.

We are having some common types of biometric identifiers such as fingerprint-recognition, face-recognition, voice-recognition, iris-recognition, palm or finger vein patterns-recognition. Here we are going to use face detection and face recognition method. Face Recognition System can be defined as the technology that identifies and verifies a person by comparing the facial features described by Chaitanya Reddy [2]. Face recognition saves a lot of time and reduces human efforts. There are many different types of algorithms and set of rules that are implemented for face recognition system. Each algorithm has its own capabilities and strengths to perform the recognition. At present there are mainly two approaches for face recognition. The first and very familiar approach is native face recognition that depends on facial expressions to identify the face whether it is matching with someone or not. This approach can also identify the face from its side view. The second approach is frontal face recognition which uses the whole face to identify a person [1]. To develop a self-understanding and self-learning intelligent machine it is necessary for us to give sufficient data to the machine which is proposed by Pradeepa .M, H P Mohan Kumar [3].
To build a face recognition system we need to define some algorithms or instead we can use pre-defined algorithms. The main purpose of these algorithms is to extract the facial features from the image provided to it. Facial features can be defined as distinguishing the elements present in the face such as nose, eyes, eyebrows, lips etc. For example, we can map various facial features of face like height of the face, width of the face, height of the nose, average colour of the face. Operations related to face recognition are face detection, face analysis, image to data conversion and match finding. Face detection operation is the process of identifying the person. Face analysis is the operation in which pictures are captured and further analysed. In image to data conversion operation facial features are converted into numbers with the help of different machine learning algorithms. Match finding is the operation which compares the image code of real-time against the code of different images present in database.

IMPORTANCE OF FACE RECOGNITION:

Easy to Manage: Face recognition-based attendance system using machine learning is completely automated. It is very easy to manage as this kind of system are programmed to handle data in large scale. This automated system has very high efficiency. This automated system is very easy to use that's why now a days we are focusing more on the improvement of face-recognition system using machine learning and deep-learning.

Accuracy and Better Attendance: Face recognition attendance system marks attendance very accurately. There is no chance to do fraud with this system as there is no manual task to perform by the students. For example, in manual attendance system students give double attendance of their absent friends also. So, this kind of things have been removed completely in automated attendance system using machine learning algorithm.

Cost-Effective: The face recognition-based attendance system saves so much cost by managing the data and recording attendance automatically. This system has been built in order to reduce the cost amount for marking the active participation of workers and students in their respective workplace. It is also very much affordable for small businesses and small organizations. In automated attendance system data is received in real time. Hence, it is very cost effective.

Finding a Missing Person and Identifying Criminals: Now a days law enforcement agencies are also using facial recognition for identifying criminals and missing people by comparing their faces on live cameras. Face recognition system has been implemented to find the criminals as it can majorly help our police men to catch the criminals before they do any other evil practices which can harm the innocent citizens.

Better security: Face recognition also helps in improvement of safety and security. It is been a regular part of airport screening and have helped many times in identifying criminals that comes with the intention of destruction. We are using face-recognition technique to identify the person who is known and who is unknown for a particular organization in order to reduce the criminal activities that happens in our surrounding.

Reduces Human Touch-Points: This system of face recognition does not require any physical contact or direct human interaction to mark the attendance of the students instead, it uses artificial-intelligence and machine-learning algorithms to make it automatic and seamless process. Reducing human touch-points can also be one of the best ways to reduce the spread of harmful diseases which will lead to mankind and a healthy surrounding.

LIMITATIONS OF FACE RECOGNITION:

Large Memory Storage: This system requires large data sets to be trained and stored in order to perform the task successfully**.** In face recognition-based attendance system the images are converted in the form of data and they are stored in the database that requires a large memory. This type of system is managed at very large scale. The required memory for database is very expensive and this can also be one of the biggest demerits of this kind of system in future also.

Opportunities for Fraud and Crimes: The professional criminals and terrorist can use this automated attendance system in success of major frauds and crimes. The data can be copied from the database with the all images and information and use it to make the fake identity proofs through which the innocent citizens get punished.

Lack of Regulation: Governments all around the world has not yet passed the legislations for face recognition. So, in result there are not any frameworks for the use of face-recognition. Many businesses are adopting the face recognition system, which is very challenging as it is very difficult to predict future scope of face-recognition.

II. RELATED WORKS

Fingerprint Based Attendance System:

The attendance can be recorded with the thumb impression of students also. with the no involvement of faculties or teachers the students need to give the thumbprint and the data will be transferred to the system. It helps to keep the record of attendance accurate. In marking attendance with the fingerprint students would be disturbed i.e., the concentration will be break. This was discussed by Akshara Jadhav [4].

Speech to Text Recognition Based Attendance System: Overall we have seen that with at most everything the issues of marking attendance manually can be solved, one of the ways is speech to- text recognition-based attendance system in which the students have to speak their respective roll-no in the mic and it will be converted into text form and stored in the database. It is a very easy & time-saving mode to mark attendance without any kind of interference of the faculty. But it may not work properly if there is any distortion sound disturbing the speech of the student. It can not be done in a group you must have to speak individually by going near the mic. Present students can illegally mark the attendance for absent students.

Iris Recognition Based Attendance System: This is a biometric system which uses iris (part of an eye) for recognising and identifying the person. This is a system in which the iris is scanned and extracted the features and matched with the database. The main problem with this system is placing the transmission lines of the scanner in a good condition of light to scan the entire irises passing through the system. This is discussed by Akshara Jadhav [4].

III. METHODOLOGY

Aim:

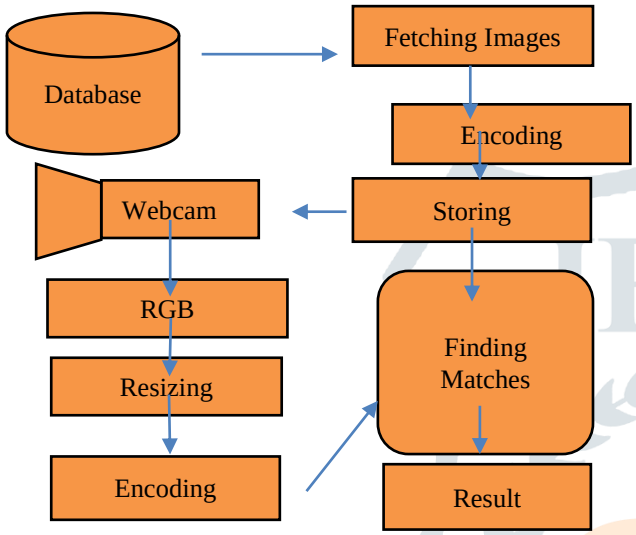
We are using face recognition method to mark the attendance of the students because it is a branch of artificial intelligence and by using artificial intelligence, we can easily automate our attendance system. The main intention of this project is to automate the attendance system and to also overcome the problems made by the manual method (traditional method of marking attendance) of marking attendance of the students.

Algorithm:

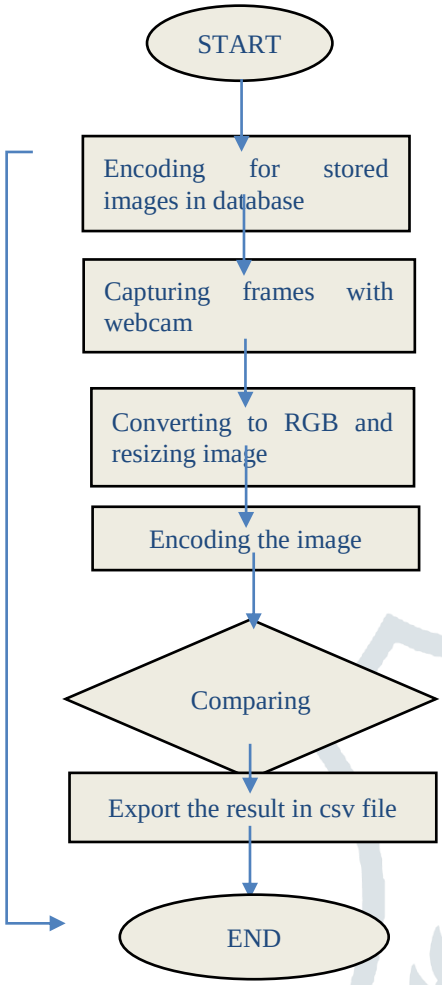
Step 1: Creating a database where all our data will be kept. We will store image of every student in RGB colour combination and we will also store their details like roll no, enrolment no, etc.

Step 2: Fetching the images from database for processing it for further steps.
Step 3: Extracting the facial features of the images that has been fetched from the database.
Step 4: Storing the encodings of all the images in a array further we will use this encodings for matching faces in real-time.
Step 5: In this step we are going to use webcam for capturing the images at real-time which will further help us in marking the attendance of the students.
Step 6: Resizing the images that are captured through the webcam in step 5. Resizing the image will help our program to run more faster and more efficiently as the size of images will be decreased at its minimal value that is possible, without damaging the image.
Step 7: Converting the resized images efficiently to RED BLUE GREEN (RGB) colour combination for better results.
Step 8: Creating encodes for the images which has been captured through the webcam and has been resized and converted to rgb colour code.
Step 9: Comparing the encoding created in step 3 and step 8 to get the final results.
Step 10: All the matched results will be stored and exported in a csv file.

System Architecture:



Flowchart:



IV. SOLUTION

Resizing:
In this project we are not resizing the images that are present in database. Here we are resizing the images which has been captured at real time to reduce the storage capacity of the software. Reducing the storage capacity of the software will automatically lead to the faster execution of the software that will help the software to find the results more efficiently.

Coding:
We all know that coding in python is always minimal and faster than early languages. So, keeping this in mind we have implemented our software in python and we have used python as the base language of our software.

Output:

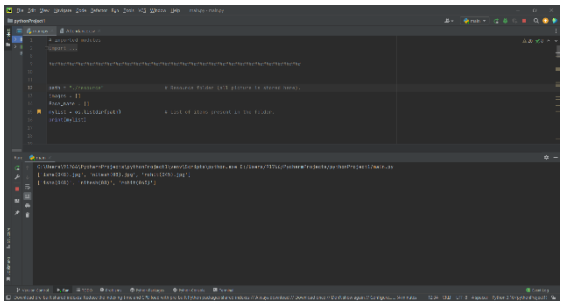


Figure 1

This image is showing the pictures found in database along with their roll numbers.

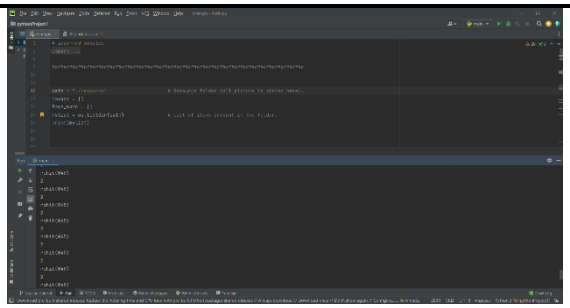


Figure 2

This image is showing the result of the face detected through webcam.

Figure 2.1

This is that detected face in the above image with the help of the webcam.

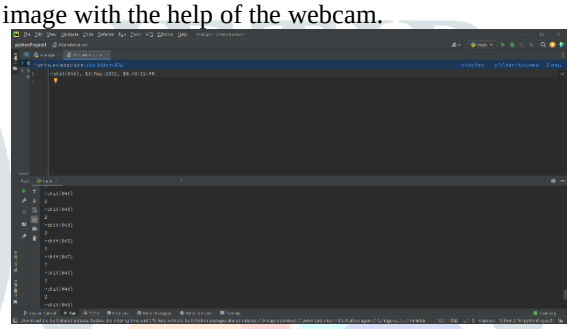


Figure 3

In This image you can clearly see that the attendance of rohit have been marked successfully and has been exported to the csv file.

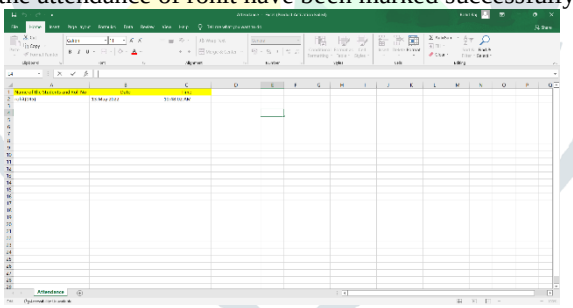


Figure 4

Now, the final result has been converted into the excel sheet. This will help in saving more time of our lecturers.

V. CONCLUSION

Face recognition is an emerging technology that can benefits us in many ways. Here, we conclude at the end of this project that the main purpose of creating this automated attendance system was to make the manual attendance system automatic, consumption of less time for teachers and students. With the help of artificial intelligence this automated face-recognition based attendance system came into existence student will pay attention to the class as it will be monitored by the cameras, there will be increment in the strength of teachers as well as students from now onwards. Artificial Intelligence made the attendance system more accurate, easy, secure, and manageable.

In future we are going to work on the human movement gestures.

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