Attendance Recognition System using Face Appearance

Mannat Doultani[1], Yogesh Tekwani[2], Somesh Tiwari[3], Sagar Sidhwa[4]

Department of Computer Science, Vivekanand Education Society's Institute of Technology,

University of Mumbai.

Abstract- **Educational institutions are also concerned with student attendance on a daily basis. This is mostly because his or her attendance at the school influences the overall academic performance of students. There are primarily two traditional marking approaches that name the roll call or take the student sign on paper. Both have become longer and more difficult. There is thus a need for a student attendance program based on computers that helps the faculty automatically to maintain records. This algorithm compares the test image and the training picture and decides the present and absent students. The attendance record is held in an excel sheet that is automatically changed in the program.**

Keywords - **Automated, Time-Saving, Efficient, Fool-Proof, Face detection, Feature Extraction, Face Recognition.**

I. INTRODUCTION

Growing high, college and university is attended by each pupil. Empirical evidence shows that the attendance and academic performance of students was closely related. The argument claimed that students with weak attendance records are generally associated with poor retention. The faculty must also maintain an accurate attendance record. The manual attendance record system is unreliable and requires more time to document and measure each individual student's average attendance. Therefore, a program is needed to address the question of student accreditation by the measurement of average student attendance. The facial recognition offers an option for automatic student attendance.

II. RESEARCH OBJECTIVE

Face recognition can be used for various things such as image and video processing, human machines, criminal identification etc. This led researchers to develop calculative models to classify the fairly simple and user-friendly faces. The very important truth is that, even though these pictures are of high dimensionality, they only occupy very little dimensional space. In order to represent this face space, it is, therefore, easier to think instead of considering a complete face space with a high dimension, just a subspace with a lower dimension. The goal is to apply the framework (model) for each face and separate it from a large number of stored faces with other adjustments in real-time.

III. EXISTING SYSTEMS:

There are different types of recognition system available in the market some of them are :

1. Biometric System based on fingerprint

In this system, the fingerprint of each student of first fed and saved into the database and then whenever the student enters into the class it first needs to put it's finger in to the Fingerprint based Biometric System and then after getting recognized it's record will be saved in to the excel sheet , database and the attendance will be marked.

2. Identification by radio frequencies:

In this system, first database has to be created, the data of the student belongs to a particular student needs to be registered in to the system and then whenever the student enters in to the college it first needs to scan the ID card which belongs to a particular student only and get recognized it's record will be saved and the attendance will be marked based on the unique frequency.

3. Recognition System using Iris:

In this recognition system, a database has to be created for each student by standing the student in front of the system and saving it's Iris data into the system.

Secondly, whenever the student comes into the college or enters the college it first needs to scan it's Iris from the system and then needs to get entered into the college.

4. Face Identification and Recognition System:

The Face Identification and Recognition System is the best system that is used for detection and recognizes whether the person is there or not by finding the faces from the given camera or videos. **figure 1** illustrates the collection of face points required to store the face in the form of encodings.

Fig-1 Facepoints

In the Face Based Recognition System, faces of each student in different positions need to be feeded into the database and then by applying the face recognition algorithm. The encoding of all the students is to be stored and whenever the student is in the class the photo of the students is given to the system then the encodings of the known face and unknown face is to be matched and if matches the students who are recognized are marked as present.

V. DETERMINED SYSTEM:

1. The defined structure is to store the images of the pupils and the encoding of each pupil needs to be stored in the database.
2. Each student must be properly visible to the camera within the classroom, hence to ensure attendance.
3. The teacher takes the photo of students so that the encodings of each and every student is to be extracted properly and will be given to the system.
4. Then the encodings of the known images is to be matched and thus the marking of the attendance is to be done.
5. We can store the unknown images for further evaluation.

VI. WORKING OF SYSTEM :

The actual functioning of the recognition system is, the group image has to be taken of the students sitting in the classroom or the live video of pupils present at the lecture has to be taken and then converted to frames and the recognition is done.

The working of the system is to be divided into the different modules they are as shown in **figure 2**.

1 . Creating Database :

The appearance of faces in the dataset with name of the image is the full name of the student so that in case there might be 2 students having the same name so to avoid such confusion the name of the image which needs to be stored into the database is having the different name also the database size must be enough and good also the images which will be saved in the database must be having the dimensions of less than 700 X 700 and the size of the image is less than 600kb. It is to be done in two steps.

1.1 Image Generation:

The photo of all students is taken to effectively capture the dimensions of faces of all the students. This image is used to test our algorithm further. We have used the 1366x768 laptop camera itself because this resolution is

adequate to support the prototype. We must use more sensitive cameras with higher resolution to process a larger classroom.
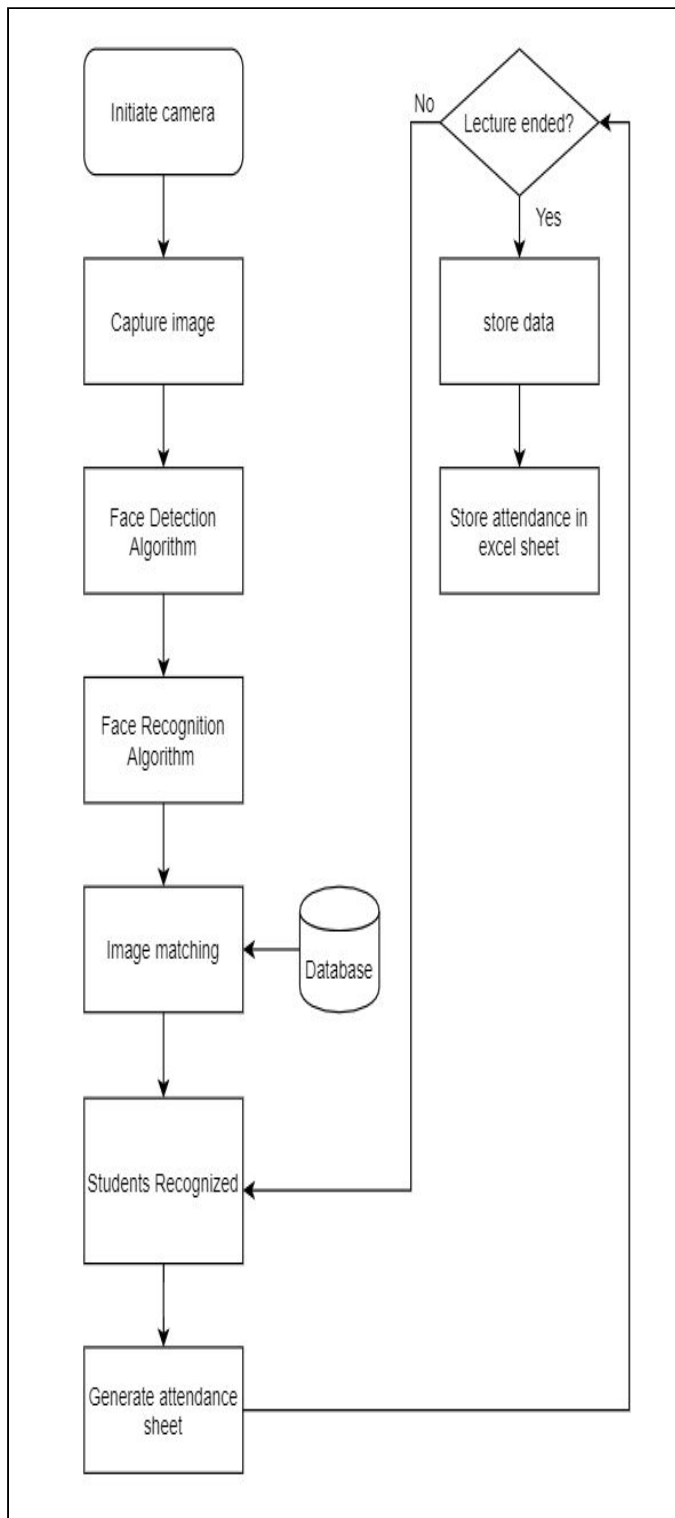

Fig-2 Conceptual Design

1.2 Finding Faces and their Extraction:

After taking images containing faces, we can crop the extra unnecessary pixels so that the size and dimensions of the image become more precise for our process.

2. Generation of Encodings :

The next step of working is to generate the encodings from the pictures present in dataset and saving the encodings in to the pickle file this is because we are extracting the images encodings in the form of dictionary having the key as the name of the image for which the encodings are to be generated and the values as the list which contains the encodings of the each images. as seen in **figure 3** below.
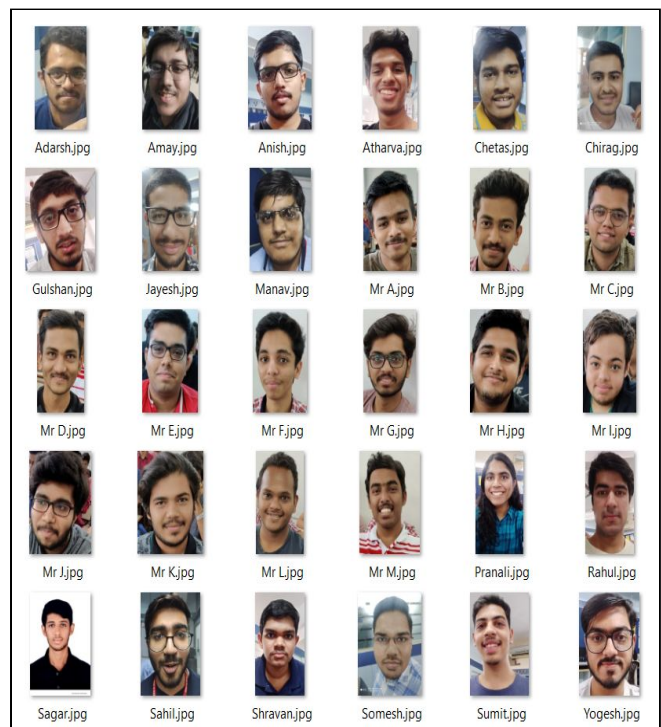

Fig-3 Sample Dataset Images

3. Detection and Recognition of Faces:

After generation of encodings as shown in **figure 4**, the next step is to take the image or the video of the students then give the images or the video into the system as the input to our system and convert the input into frames.

Every frame acts as an input to the system. The first step is extracting face points from the given image, that means to detect the faces in the frame, and then recognize it in different steps of our algorithm.

```
Administrator: Anaconda Prompt (Anaconda3) - python cp.py
     -2.20830828e-01, -2.45911047e-01, -6.55882061e-02, -1.63123682e-01,
      5.71719650e-03, -1.29115775e-01,  6.36128038e-02,  5.20317778e-02,
     -1.97570279e-01, -1.03431344e-02, -2.93918438e-02,  5.29831722e-02,
      1.88221969e-02, -2.21735425e-02,  1.76394686e-01, -2.57154666e-02,
     -1.79204449e-01,  1.67631712e-02,  6.47740364e-02,  2.32588232e-01,
      6.75292239e-02,  5.99649996e-02,  6.94376230e-03, -8.68495852e-02,
      7.09230155e-02, -1.81647554e-01,  1.41611770e-01,  1.31429702e-01,
      1.50554344e-01,  2.76860446e-02,  3.77337039e-02, -1.92929417e-01,
      2.02434454e-02,  1.07062265e-01, -1.62665039e-01,  1.05098858e-01,
      9.22845080e-02,  5.33852428e-02, -2.73535028e-04, -4.74916808e-02,
      1.91096008e-01,  1.58293083e-01, -1.04887404e-01, -8.20894614e-02,
      9.99104828e-02, -8.56228545e-02, -6.63355887e-02,  1.06198184e-01,
     -1.09552942e-01, -2.38506392e-01, -2.59513468e-01,  1.15481324e-01,
      4.41091210e-01,  1.46312967e-01, -1.63331121e-01, -5.03885280e-03,
     -2.06064414e-02, -4.86618541e-02, -1.15116574e-02,  8.01829174e-02,
     -1.96383506e-01,  7.61328824e-03, -5.68708479e-02,  5.50880469e-02,
      1.90809086e-01,  5.96467145e-02, -4.42152992e-02,  1.74381331e-01,
     -1.47016607e-02, -1.59114487e-02, -2.11065821e-02,  4.68888767e-02,
     -9.33256745e-02,  1.32763069e-02, -1.14720307e-01, -2.75338739e-02,
      9.94333159e-03, -3.27044576e-02, -6.35872334e-02,  1.19204842e-01,
     -2.45019794e-01,  9.10191685e-02,  4.90488717e-03, -1.20391995e-01,
     -5.35320193e-02,  1.24736078e-01, -9.09190923e-02, -2.53772847e-02,
      1.78003147e-01, -2.43242234e-01,  1.57283664e-01,  1.30373672e-01,
      9.21133682e-02,  1.51054338e-01,  1.18100345e-01,  7.23097026e-02,
      5.33105843e-02,  1.85354017e-02, -1.26947850e-01, -6.01121970e-02,
      1.00343689e-01, -8.94089192e-02,  8.92341956e-02,  3.26400101e-02])}
There are 8 persons in the image.
```

Fig-4 Recognized Face points

Fig-5 Attendance Sheet

The second step is to generate the encodings of the images which are extracted or detected the third part is to compare the encodings of the extracted images and the images which are presented in the database and if the encodings match with the images in the database and the input frame then the student is recognized.

4. Attendance Marking :

After the students' faces are successfully detected then the recognition process starts. For the Face Recognition process face encodings are generated. Now the encodings are successfully compared with the encodings of known faces' encodings. After this, the excel sheet is generated which will be stored in the database. Referring to **figure 5**, the excel sheet is generated where the name of the excel sheet is the date and the timestamp of the image when the system has computed the processing of the input so that the actual proof which verifies that the date and time of the attendance. Also, the excel sheet contains the name,date,time,and present columns which have the rows of the student that are present in the classroom.

The attendance sheet which is generated can be checked by his/her parents , the student can also see it's record present in the database with only the view option so that it cannot alter the details and the teachers ,admin is having the right to update the previous details of the students.

VI. RESULTS & DISCUSSIONS:

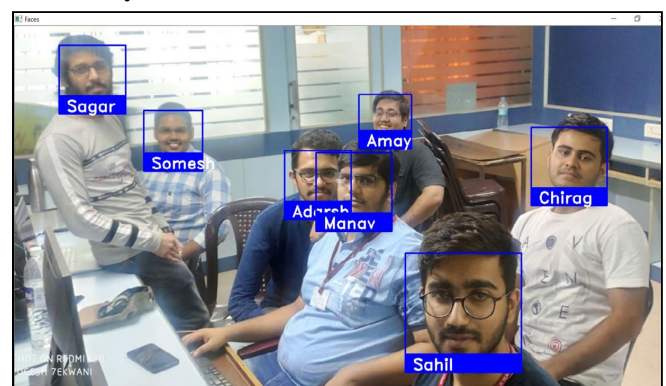**1. Attendance of 7 Students in the lab marked accurately :**

Fig-6 Sample Output Of Recognized Faces(1)

2. Attendance of 9 Students in a row of 2X2 marked accurately :

Fig-7 Sample Output Of Recognized Faces(2)

VII. CHALLENGES

1. Posture alteration :
Facial expressions can be varied by the human interventions due to the hiding of the faces from the different angles or the posture of the faces present over the differing angle in them and also the lights falling on the faces can also reduce the system performance.

2. Aging of Faces:
Face points tend to change after a particular time, hence extractions of the face should be updated accordingly.

3. Changes in Lightning:
The different changes of the light falling while clicking the pictures of the pupils present in the lecture can also affect different weathering conditions like during the evening the light is directly falling may be very high causing the shadow falling into the picture and thus may alter the processing and may be invalid to the system.

4. Optimization of Pixels and Resolution:
It is time-consuming to detect faces in multimedia files with high resolutions and high pixel quality, since it indirectly makes the size of the file bigger. Hence, it should be optimized previously to prevent time consumption.

VIII. FUTURE SCOPE

The future scopes of attendance using face recognition system are as follows:
1. The system can be used in some official board meetings where the number of members are less(<40) and they could use their valuable time very efficiently.
2. We can develop this system so that we can detect and recognize the person even if half face is visible by Deep Learning and using the symmetry of face points.
3. Another critical topic to be discussed is the digital attendance portal and the automated updating of attendance, taking into account the growing importance of the Internet of Things.
4. The existing system's accuracy can be improved by using this system to quite a large extent. For example, the existing system is giving accuracy of 82% it can be improved to 88%-93%.
5. If the classroom size is too large we can merge the images from the two or more cameras to mark the attendance of all the audience without any failure with very good accuracy.

IX. APPLICATIONS

1. Enhanced Security
Face recognition can be used for high risk areas such as air base, RBI Bank Buildings, and ISRO to protect their environment from illegal activities and also protect the employees or members of that organization.

2. Seamless integration:
No need to especially allot a stall to get the biometrics, it is far easy to get face-biometrics using the face recognition system via just a simple selfie / photograph.

3. Non-invasive automation for identification:
No special assistance needed to mark anyone's presence, just a look at the CCTV camera will be enough to get a person's identity known.

4. Elimination of Fraudulent time-audit entries:

As soon as a person is identified, it can maintain a real-time record of a person's presence along with timestamp and location, hence eliminating fraudulent time-audit entries.

5. Criminal Identification:

No need to personally search criminals who are already under a CCTV, facial recognition systems are capable enough to get them caught.

6. Payments using Facial Recognition:

Due to challenges in security, different types of the security organizations like banking sectors can use face recognition as an extra authentication in their processes system. Facial Recognition is a preferred choice in the financial sector.

7. **Authentication by Face**: Users of any website or the applications can use the additional authentication to the application as facial authentication.

8.**Protection from Scam:** The face recognition algorithm allows it to analyze and collect information from image databases and help recognize fraudsters just steps away from the bank. This technology can also help **safeguard** vaults and deposit boxes against loot. Streamline **KYC** processes and increase compliance.

X. CONCLUSIONS

Thus, our solution for Intelligent Attendance successfully minimizes Human-Interference, Enhances transparency and completely eliminates the Gaps of the current system.

The automation helps in eliminating the Fraudulent entries and finally we can receive the real-time attendance and reliable evaluations and scrutiny checks can be performed to ensure that the entries are fail-safe.

Also, the faces of the unidentified people can also be stored for further inspections and evaluations.

The Automated Classroom Attendance System thus contributes to increasing the precision and speed of the attendance marking process and assures a high level of accuracy in real time to meet the needs of automation required for present and future assessment.

XI. REFERENCES

[1]. "Student Attendance System in Classroom Using Face Recognition Technique",Samuel Lukas, Aditya Rama Mitra, Ririn Ikana Desanti, Dion Krisnadi. DOI: 10.1109/ICTC.2016.7763360, Oct 2016.

[2]. International Research Journal of Engineering and Technology (IRJET),"Face Recognition Based on HOG and Fast PCA Algorithm", Muralidhar Reddy Reddem2, Dheeraj Ravi3, Venkata Kalyan Polamarasetty1, Mahith Sai Madala4
e-ISSN: 2395-0056, Apr-2018 www.irjet.net p-ISSN: 2395-0072 © 2018, IRJET.

[3] Mr. Sudesh2, Arun Katara1 ,Attendance System Using Face Recognition and Class Monitoring System,5_Issues/February_17_Volume_5_Issue_2 , 15-03-2017.pdf.

[4] "Automated Attendance System Using Face Recognition", by Akshara Jadhav, Akshay Jadhav, Tushar Ladhe, Krishna Yeolekar in International Research Journal of Engine.

[5] "A smart technique for the attendance system to recognize faces through parallelism",
V Madhu Viswanatham and M Rajashekhara Babu,V Tanuja, B Prabhavathi in IOP Conf. Science and Engineering 263, 2017.

[6] "Student Attendance System Using Iris Detection"
by Simran Parkhe,Prajakta Lad, Sonali More, Priyanka Nikam, Dipalee Chaudhari,2017.

[7] D. H. Hareva, M. H. Muchri, S. Lukas, topic-"Discrete cosine transform , radial basis neural network in faces of image recognition,"
International Conference on Soft Computing Intelligent Systems, and Information Technology, 2015.