



International journal of basic and applied research

www.pragatipublication.com

ISSN 2249-3352 (P) 2278-0505 (E)

Cosmos Impact Factor-5.86

SMART ATTENDANCE SYSTEM USING FACE RECOGNITION

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ABSTRACT

Technology has changed almost every aspect of society. In this competitive world, education also needs to be updated to keep up with changes. Attendance management systems have changed significantly in a short time, from manual recording to high-tech smart attendance tracking systems. In general, the participation process is in the form of attendance or signature on paper. However, both methods are time consuming and the information is difficult to retain. Therefore, the system we developed measures participation through facial recognition. Collect and record the student's face, use this training data to train them to recognize the person, and then sign to participate by recognizing the face. The system shows the student's attendance status, absence details and attendance status until that date. This project also prepares attendance data in excel file

Contents: smart attendance, LBPH, facial recognition, mass attendance, Excel spreadsheet.

INTRODUCTION

Attendance tracking is the foundation of any organization. Research shows that absenteeism has an impact on student retention and academic success. Participation can be many things. Traditional methods include attendance or having students sign their papers. This process brings with it problems such as representative participation, difficulty in organizing information, a

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March 2024, Volume 14, ISSUE 1

UGC Approved Journal



and most importantly, time consumption. Therefore, in order to participate, the smart participation system must be used. The article is based on smart optimization design using openCv, python and Local Binary Patterns Histogram. Although there are other methods such as iris scanning and fingerprint, facial recognition is more accurate and faster than similar technologies because it does not require external intervention. Facial recognition is a real-time, contactless tracking software that is especially important in the current situation. The system records students, takes and stores their photos. This algorithm is used to train the system. Data is stored in histogram format. When students participate, the input image is converted into a histogram and compared to the image with the most participation.

SYSTEM REQUIREMENTS

1. Hardware Requirements

The minimum hardware required to run the system is as follows:

Processor - Intel I3

RAM - 4 GB

Storage - 1GB

¼ Network Needle photo

2 . Required software

-Operating system - Windows 10

-Programming language - Python -3.10 64-bit

-Front-end - Python Tkinter

3. Job Requirements

Admissions

Record and track student attendance through facial recognition at specific times.



- ✓ Mark Attendance and update the same in excel sheets
- ✓ Calculate the absentees and cumulative attendance of month

2. NON- FUNCTIONAL REQUIREMENTS

- ✓ Reliability requirements
- ✓ Scalability requirements
- ✓ Security requirements
- ✓ Maintainability requirements
- ✓ Usability requirements
- ✓ Interoperability requirements
- ✓ Availability requirements
- ✓ Data Integrity requirements

METHODOLOGY

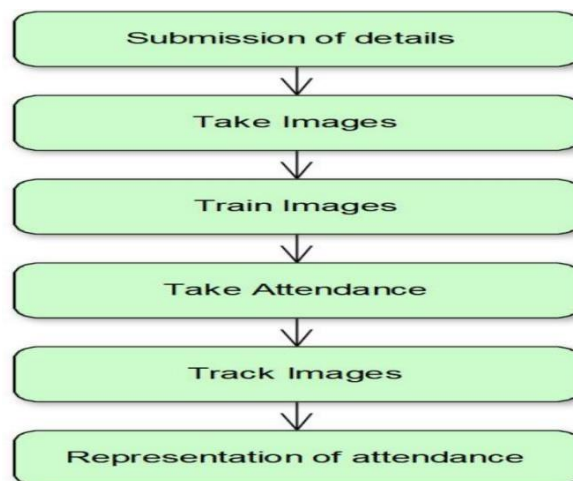
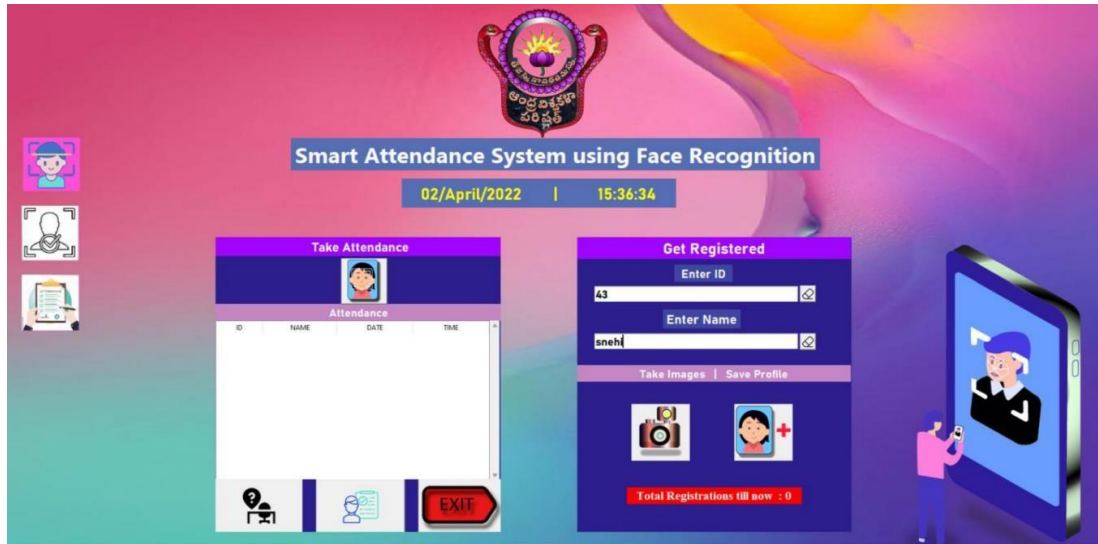


Figure 1: Steps in the project The various steps in the system are as shown above in the flowchart .

1. SUBMISSION OF DETAILS



The students of the class have to first register themselves in the system. For this the system asks for the name and Id of the student. And the system also has a secret password which



must be used by the students for successful registration. The information is added to student details excel sheet

Figure 2: Registration portal

2. TAKE IMAGES

The take images function is used to capture and store the images of students. When the students clicks the take image button the video-capture is switched on. It takes nearly 101 images. The system crops the images as per



1.3*5 inches rectangle ,changes the color image into grayscale and stores it in the format



Figure 3: video-capture



Figure 4: Training Dataset

of name. serial number in excel-sheet.studentId.count of image.jpg . These images are stored in training dataset as shown .

3. Image training

Here we use the local binary histogram algorithm to train the algorithm using the training data.

This algorithm works by treating each image like a matrix, taking that pixel as the starting point and comparing it with all other pixels in the matrix, and if the pixel value is less than the starting point, 0 is given, otherwise 1 is given. These are combined to form a large binary number and then converted to decimal number. The resulting number is a new beginning. This threshold helps in improving the image [1]

The current algorithm takes the enhanced image and divides it into regions. Creates a histogram for each region that represents the usage of that region. Similarly create histograms for each region. The final histogram represents the images in the training data. Histograms of all images are created and stored in the trainer.yml file. [2]



```
Trainer - Notepad
File Edit View
%YAML:1.0
---
opencv_lbphfaces:
  threshold: 1.7976931348623157e+308
  radius: 1
  neighbors: 8
  grid_x: 8
  grid_y: 8
  histograms:
    - !!opencv-matrix
      rows: 1
      cols: 16384
      dt: f
      data: [ 3.57142836e-02, 5.10204071e-03, 0., 0., 1.02040814e-02,
0., 0., 0., 5.10204071e-03, 0., 0., 0., 1.53061226e-02, 0.,
1.53061226e-02, 5.10204071e-03, 1.53061226e-02, 0., 0.,
5.10204071e-03, 5.10204071e-03, 0., 0., 0., 3.57142836e-02,
0., 0., 0., 7.14285672e-02, 1.02040814e-02, 2.55102031e-02,
2.55102031e-02, 5.10204071e-03, 0., 0., 0., 5.10204071e-03,
0., 0., 0., 0., 0., 0., 0., 0., 0., 0., 0., 0., 0., 0., 0.,
0., 0., 0., 0., 0., 0., 1.53061226e-02, 1.02040814e-02,
0., 5.10204071e-03, 1.02040812e-01, 0., 5.61224483e-02,
6.12244904e-02, 5.10204071e-03, 5.10204071e-03, 0., 0.,
5.10204071e-03, 0., 5.10204071e-03, 0., 0., 0., 0., 0.,
5.10204071e-03, 0., 0., 0., 0., 0., 0., 0., 0., 0.,
0., 0., 0., 0., 5.10204071e-03, 0., 0., 0., 0., 0.,
5.10204071e-03, 0., 0., 0., 0., 0., 0., 0., 5.10204071e-03,
0., 0., 5.10204071e-03, 2.04081628e-02, 0., 0., 0., 0.,
0., 0., 2.04081628e-02, 0., 0., 0., 8.16326514e-02, 0.,
```

Figure 5: Storing histograms in trainer.yml

4. Watch the footage

When students join by clicking the join button, the video capture will open, capture the footage , crop it and convert it to grayscale. Now the algorithm creates a histogram for the input image . The histogram obtained from the input image is compared with the reference histogram. In case of similarity between histograms, the corresponding name and ID will be returned to mark the student participating in

5. Participation report

Tag attendance is displayed on the screen every day and saved in the Excel form. Compare the student's Excel file to that day's attendance sheet and calculate the number of absences. The absentee's name and ID are displayed on the screen and stored in an Excel file. All days since the beginning of the month until today



TESTING

Software testing is a survey designed to provide stakeholders with information about the quality of the product or service being tested. Software testing also provides an objective and independent look at software, allowing companies to recognize and understand the risks of using software.

Table 1: Sample Test Cases

Step	Step Details	Expected Results	Actual Results	Pass/Fail/Not Executed/Suspended
1	Saving Profile	It asks for ID , Name, Password	The student must submit his name ,Id and secret Password to register .The password is for security	Pass
2	User enters wrong password while saving profile	A pop up box notifying that it is wrong password	Pop up box showing that wrong password has been entered	Pass
3	Enrolling by taking images without filling the student name and Id details	Displays that students details should be entered first	Notified that correct student name should be given	Pass
4	The lecturer clicks the Show Absentee button	The message box shows the absentee	For error-less recording of absentees the message box shows the absentee name and ID	Pass



5	The student clicks the take attendance button	Video capture is switched on	The front camera takes the picture of the student and compares the input image with the trained dataset images and if matches ,marks attendance	Pass
6	The student clicks the Show cumulative attendance button	The message box pops up with % of attendance	It allows the students to check their cumulative attendance till date since the starting of the month	Pass

RESULTS AND DISCUSSION

The outputs of the system we have created is as follows:

Take Attendance				
Attendance				
ID	NAME	DATE	TIME	
42	moushmi	02-04-2022	21:48:04	
43	snehi	02-04-2022	15:49:15	

Figure 6: Displaying the marked attendance



Absentees List(Pin No.):	
ID	NAME
41	pravallika
44	suma

Figure 7: Absentee list

ID	PERCENT (%)
43	44.44
42	33.33
41	33.33
44	33.33

Figure 8: Cumulative Attendance

SERIAL NO.	ID	NAME
1	43	snehi
2	42	moushmi
3	41	pravallika
4	44	suma

Figure 9: Student Details excel-sheet

Id	Name	Date	Time
43	snehi	02-04-2022	15:49:15
42	moushmi	02-04-2022	21:48:04

Figure 10: Attendance excel-sheet



	A	B	C	D	E
1	ID		NAME		
2					
3	41		pravallika		
4					
5	44		suma		
6					

Figure 11: Absentees excel-sheet

	A	B	C	D	E
1	ID		PERCENTAGE(%)		
2					
3	43		44.44		
4					
5	42		33.33		
6					
7	41		33.33		
8					
9	44		33.33		
10					

Figure 12: Cumulative Attendance excel-sheet

CONCLUSION

In this system, we implemented the participation using the LBPH algorithm, which is an efficient and effective face recognition algorithm. This method can be used in teaching in the classroom, laboratory, laboratory and other places. The purpose of automatic enrollment systems is to reduce the shortcomings of traditional (manual) system



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ISSN 2249-3352 (P) 2278-0505 (E)

Cosmos Impact Factor-5.86

s. It saves time and effort, especially if you have many students. The system can also be used for employee management and payroll can be added as an add-on.

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