

FACE RECOGNITION BASED ATTENDANCE SYSTEM

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Abstract—Automatic face recognition (AFR) is the technology by which we can easily recognize human faces, images in various applications [1]. Automation or automatic control is the use of different control systems for operating equipment like machinery, processes in factories with minimal or reduced human intervention. Automatic face recognition (AFR) technologies have made many improvements in different aspects of security [1]. Face Recognition Based Attendance System is one aspect where it uses AFR technology and with the help of Machine Learning algorithms we can provide attendance for people in an organization [2]. Here the face is the major part where the machine detects the face and converts it into grey scale images and recognizes the face using the images stored in the database. Hence if the face of the registered person is identified it marks it as present.

Keywords: Machine Learning, AFR (Automatic Face Recognition), Face Recognition, Face Detection

1. Introduction

In this Modern era, we experience Automation everywhere and there are lot of automation in attendance field.

Some of the Automation are Biometrics using a portable fingerprint device.

Here we come with an idea of Face Recognition Based Attendance System. This Overcomes the Burden of Manually providing attendance in an organization [1].

Method of Implementation

Python

The python libraries used in this project are CV2 from OPENCV, PANDAS and NUMPY. We further discuss about the modules in detail.

CV2 from OPENCV

•OpenCV (Open Source Computer Vision) is a library of programming functions mainly aimed at real-time computer vision. In a programming language it is library used for Image Processing and is mainly used to do all the operation related to Images.

- Installation: pip install OpenCV
- Importing the library: import cv2

PANDAS:

Pandas is an open-source, BSD-licensed Python library providing high-performance, easy-to-use data structures and data analysis tools for the Python programming language. Python with Pandas is used in a wide range of fields including academic and commercial domains including finance, economics, Statistics, analytics, etc.

- Installation: pip install pandas
- Importing the library: import pandas as pd

NUMPY:

NumPy is a package in Python which is majorly used for manipulation in arrays, datatypes and used to perform different operations. The ND array (NumPy Array) is a multidimensional array used to store values of same datatype. These arrays are indexed just like Sequences, starts with zero.

- Installation: pip install NumPy
- Import the library: import NumPy as np

Problem Definition

In this Modern era, we experience Automation everywhere and there are lot of automation in attendance field Some of the Automation are Biometrics using a portable fingerprint device and Radio Frequency Identification (RFID) which makes use of card reader [10].

Here in Face Recognition Based Attendance System it automatically detects and recognizes the faces. This Overcomes the Burden of Manually providing attendance in an organization.

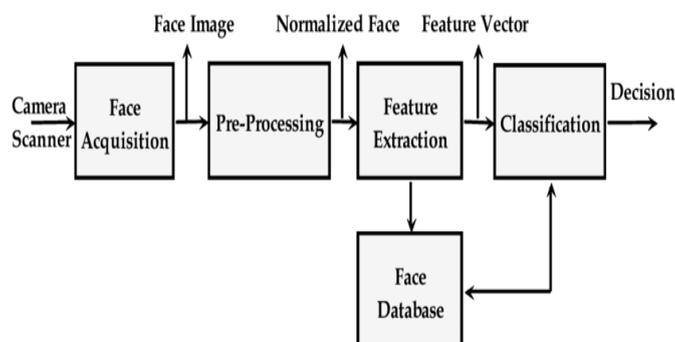
Proposed system

Here we come with an idea of Face Recognition Based Attendance System which automatically detects and recognizes the faces with the help of Machine Learning Algorithms and provides attendance if it is properly recognized [1]. This Overcomes the Burden of Manually providing attendance in an organization Where there is no need for a person to manually take attendance because the system is trained in such a way that it takes multiple images and through further processing steps the face is being recognized and the attendance database is updated.

Advantages:

- 1) Removes the risk of Manual Errors.
- 2) Saves Time
- 3) Fool-proof Facial Biometric Technology

3. Module Description



Face Acquisition: In the initial phase, the image is captured by means of any source such as camera or working with standard databases of images. The captured image is converted to grey scale image and resized to eliminate pose problem. The pre-processing is done to remove noises from images.

Pre-Processing Module

In this module we process the image thereby removing the noise that is present in the image. In the first step, we convert the image into a gray-scaled image. Then, we perform the scaling operation which makes the image uniform. In the next step, we take the outline of the image which makes it easier to recognize the face.

Feature Extraction

In this module, with the help of Camera which is present in the system, we take nearly 100 sample images of the person who has to be registered and the attendance database is updated.

Face Recognition

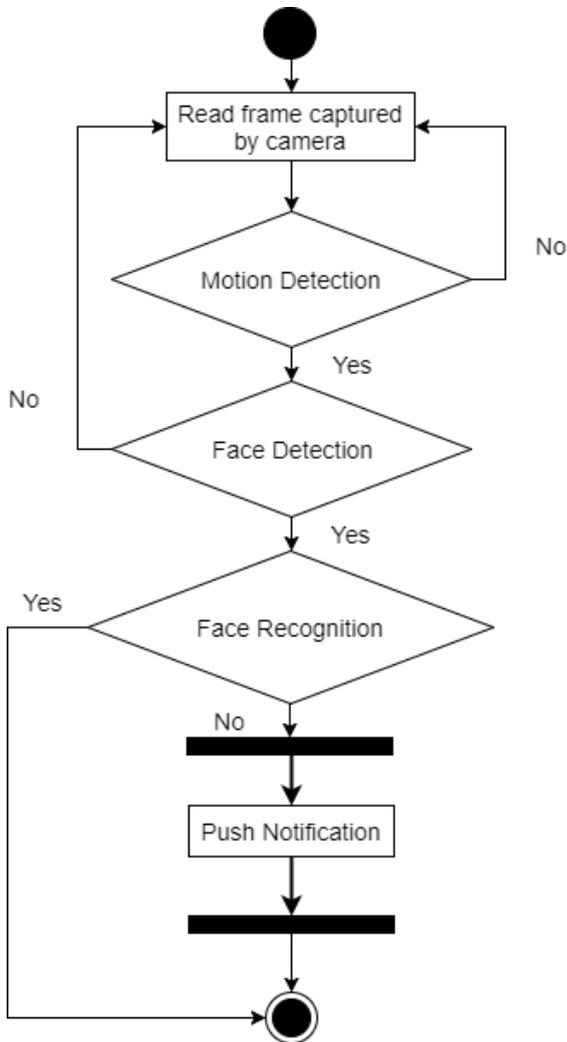
In this module, we train the module to recognize the facial features which is stored in the database. If the confidence level is up to the mark, and if the face is recognized, the presence of the person is marked.

Classification and Decision

In this module, the trained model tries to find out the features of the person in the database. If it matches, then it marks as present in the database, else marks absent if not matched.

Screen1: Running the Python code in command Line.

I. Activity Diagram for Face Recognition Based Attendance System



```

6 data_path = 'C:/Users/MY_LENOVO/Downloads/OpenCV-master/faces/'
7 onlyfiles = [f for f in listdir(data_path) if isfile(join(data_path,f))]
8
9 Training_Data, Labels = [], []
10
11 for i, files in enumerate(onlyfiles):
12     image_path = data_path + onlyfiles[i]
13     images = cv2.imread(image_path, cv2.IMREAD_GRAYSCALE)
14     Training_Data.append(np.asarray(images, dtype=np.uint8))
15     Labels.append(i)
16
17 Labels = np.asarray(Labels, dtype=np.int32)
18
19 model = cv2.face.LBPHFaceRecognizer_create()
20
21 model.train(np.asarray(Training_Data), np.asarray(Labels))
22
23 print("Model Training Complete!!!!")
24
  
```

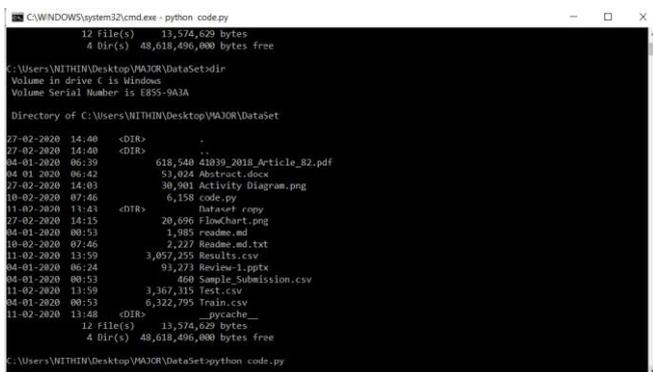
Screen2: The above Fig shows the model checking the Confidence-Interval

```

1 import cv2
2 import numpy as np
3 from os import listdir
4 from os.path import isfile, join
5
6 data_path = 'C:/Users/MY_LENOVO/Downloads/OpenCV-master/faces/'
7 onlyfiles = [f for f in listdir(data_path) if isfile(join(data_path,f))]
8
9 Training_Data, Labels = [], []
10
11 for i, files in enumerate(onlyfiles):
12     image_path = data_path + onlyfiles[i]
13     images = cv2.imread(image_path, cv2.IMREAD_GRAYSCALE)
14     Training_Data.append(np.asarray(images, dtype=np.uint8))
15     Labels.append(i)
16
17 Labels = np.asarray(Labels, dtype=np.int32)
18
  
```

II. Discussion of Results

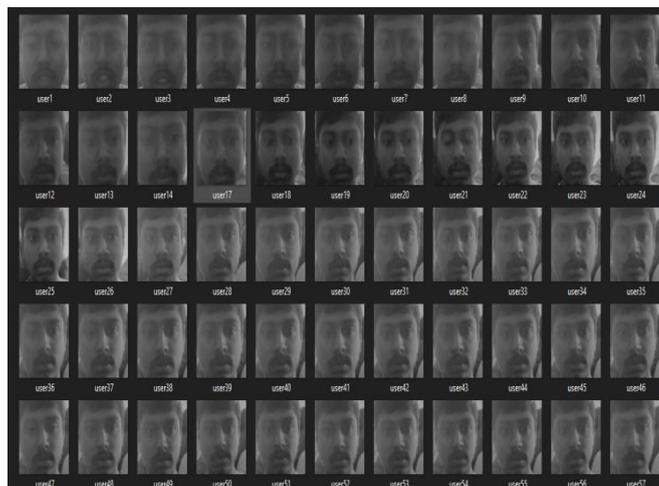
Screen3: The model is being trained and depending on the confidence level, face is recognized.



```

50 result = model.predict(face)
51
52 if result[1] > 500:
53     confidence = int(100*(1-(result[1])/300))
54     display_string = str(confidence)+'% Confidence it is user'
55     cv2.putText(image,display_string,(100,120), cv2.FONT_HERSHEY_COMPLEX,1,(255,0,0))
56
57
58 if confidence > 75:
59     cv2.putText(image, "Unlocked", (250, 450), cv2.FONT_HERSHEY_COMPLEX, 1, (0,255,0))
60     cv2.imshow('Face Cropper', image)
61
62 else:
63     cv2.putText(image, "Locked", (250, 450), cv2.FONT_HERSHEY_COMPLEX, 1, (0,0,255))
64     cv2.imshow('Face Cropper', image)
65
66
  
```

Screen4: The final recognition of face is done and provided with attendance if properly recognized.



Screen5: The result is shown in the above screen

4. Conclusion and Future Work

We have presented an Automation method for recognizing and detecting faces of person and depending on the Confidence Level if the face is recognized then updates in the database as present.

The idea is to recognize and detect faces that are

(1) first captured in the digital camera and the face is being recognized in different angles and

(2) stores in the database and by further processing if the face is recognized properly then updates in the database as present if not updates as absent.

This Attendance System helps in increasing the accuracy and speed in Automation Face Recognition and providing Attendance to meet the need for automatic classroom evaluation [9].

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