FACIAL RECOGNITION

A PROJECT REPORT

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BONAFIDE CERTIFICATE

Certified that this project report titled **"FACIAL RECOGNITION"** is the bonafide work of "**Aashish Yadav-21BAI10116, Ujjwal Sagar-21BAI10047, Divya Agarwal-21BAI10159, Shubham Singh-21BAI10247**" who carried out the project work under my supervision. Certified further that to the best of my knowledge the work reported at this time does not form part of any other project/research work based on which a degree or award was conferred on an earlier occasion on this or any other candidate.

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I would like to thank all the technical and teaching staff of the School of Aeronautical Science, who extended directly or indirectly all support.

Last, but not least, I am deeply indebted to my parents who have been the greatest support while I worked day and night for the project to make it a success.

ABSTRACT

The main aim of this project is to demonstrate the implementation of Facial Recognition whose main objective is to

identify individuals, whether individually or collectively. It is based on concepts of Python, NumPy and Cv.

A face recognition system is one of the biometric information processes, its applicability is easier and working range is larger than others, i.e.; fingerprint, iris scanning, signature, etc. A face recognition system is designed, implemented, and tested at Atılım University, Mechatronics Engineering Department. The system uses a combination of techniques in two topics: face detection and recognition. The face detection is performed on live acquired images without any application field in mind. Processes utilized in the system are white balance correction, skin like region segmentation, facial feature extraction and face image extraction on a face candidate. Then a face classification method that uses Feedforward Neural Network is integrated in the system. The system is tested with a database generated in the laboratory with 26 people. The tested system has acceptable performance to recognize faces within intended limits. System is also capable of detecting and recognizing multiple faces in live acquired images.

Tasks performed by Facial Recognition are:

Inputs images and save images to the databases, Detects Faces, Match detected faces to database, recognize faces, Provides information about them.

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INTRODUCTION

1.1

- Nowadays instead of pencil and paper or face to face recognition, everyday action are increasingly being handled electronically.

- This growth in electronic transactions results in great demand for fast and accurate user identification and authentication.

- Access codes for building, banks accounts and computer system often use PINs for identification and security clearances, but the user of the PIN is not verified. When credit and ATM cards are lost or stolen, an unauthorized user can often come up with the correct PIN.

- Face recognition technology may solve this problem since a face is undeniably connected to its owner expect

1.2

- The variety of fields required Face detection and recognition mechanism in the modern life. Face recognition algorithms are also used in

many different applications apart from biometrics, such as video compressions, indexing etc. In this system help in forensic sciences, identification for law enforcement, surveillance, authentication for banking and security system, and giving preferential access to authorised users.

LITERATURE SURVEY

2.1

Face recognition is a popular type of biometric system. Such systems are essentially pattern recognition systems that operate by fetching an individual's biometric data,
extracting a feature set from the acquired data (in this case the face), and comparing this feature against the template set in the database.

Face detection has gained significant importance in recent times. Law Enforcement Agencies, security organizations, personal identification systems and mass surveillance applications all use this technology.

2.2

The approach for face recognition involves sensitivity to size variation that can be use a purely curvature-based representation and handle size change between faces, but run into problems with change of facial expression between the enrollments image and the image to be recognized. In facial recognition system should be able to handle variation in expression.

SYSTEM ANALYSIS

3.1
When the user starts the program, it will start by taking input image and saving the image into database. Then it will detect face and compare the faces present in the database. Then the program will recognize faces and provide the information about them.
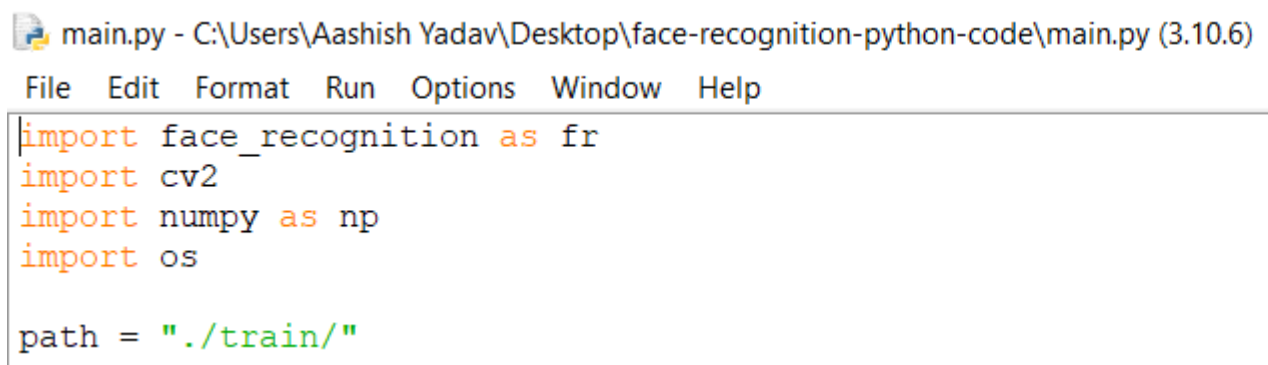
3.2
Proposed System:
Modules needed:
1) Face recognition- Recognize and manipulate faces from Python

2) cv2- is a open source library for computer vision, machine learning and image processing.
3) NumPy-it is used for working with arrays. It helps in making the process faster.
4) OS-it is module in python it provides functions for interacting with the operating system.

SYSTEM DESIGN AND IMPLEMENTATION
4.1 "This is how we have designed our code for Face Recognition system."

4.2 Module 1: Libraries


```
main.py - C:\Users\Aashish Yadav\Desktop\face-recognition-python-code\main.py (3.10.6)
File   Edit   Format   Run   Options   Window   Help
import face_recognition as fr
import cv2
import numpy as np
import os

path = "./train/"
```

4.3 Module 2: Train Path Coding

```python
path = "./train/"

known_names = []
known_name_encodings = []

images = os.listdir(path)
for _ in images:
    image = fr.load_image_file(path + _)
    image_path = path + _
    encoding = fr.face_encodings(image)[0]

    known_name_encodings.append(encoding)
    known_names.append(os.path.splitext(os.path.basename(image_path))

print(known_names)
```

4.4 Module 3: Program Structure

```python
import face_recognition as fr
import cv2
import numpy as np
import os

path = "./train/"

known_names = []
known_name_encodings = []

images = os.listdir(path)
for _ in images:
    image = fr.load_image_file(path + _)
    image_path = path + _
    encoding = fr.face_encodings(image)[0]

    known_name_encodings.append(encoding)
    known_names.append(os.path.splitext(os.path.basename(image_path))[0].capitalize())

print(known_names)

test_image = "./test/test.jpg"
image = cv2.imread(test_image)
# image = cv2.cvtColor(image, cv2.COLOR_BGR2RGB)

face_locations = fr.face_locations(image)
face_encodings = fr.face_encodings(image, face_locations)

for (top, right, bottom, left), face_encoding in zip(face_locations, face_encodings):
    matches = fr.compare_faces(known_name_encodings, face_encoding)
    name = ""

    face_distances = fr.face_distance(known_name_encodings, face_encoding)
    best_match = np.argmin(face_distances)

    if matches[best_match]:
        name = known_names[best_match]

    cv2.rectangle(image, (left, top), (right, bottom), (0, 0, 255), 2)
    cv2.rectangle(image, (left, bottom - 15), (right, bottom), (0, 0, 255), cv2.FILLED)
    font = cv2.FONT_HERSHEY_DUPLEX
    cv2.putText(image, name, (left + 6, bottom - 6), font, 1.0, (255, 255, 255), 1)


cv2.imshow("Result", image)
cv2.imwrite("./output.jpg", image)
cv2.waitKey(0)
cv2.destroyAllWindows()
```

FUTURE ENCHANCEMENT

Facial recognition is one of the many smart devices making their ways into our lives. In the current phase of our project, it is based on image processing and saving the data in the database, then matching the image with the image in database and then giving out the final output. Also, not all types of image size is supportable in this phase of the Project, so we would like to update it in future so that we can use live camera, so it can read the face and give out the information live of that person.

CONCLUSION

Facial Recognition is an upcoming technology that can provide many benefits. It can save time, and even generate new income stream for companies.

Face detection and face direction estimation are important for face recognition. In personal identification with surveillance cameras, for example, it is necessary to detect the face whose size, position, and pose are unknown. After the face detection, the face direction estimation is useful for the correct face recognition because we can select the face image of the most desirable direction from the face images taken by the multiple cameras.

REFRENCE

CODE: https://data-flair.training/blogs/python-face-recognition/

RESEARCH:

https://ieeexplore.ieee.org/abstract/document/8321959/

https://ieeexplore.ieee.org/abstract/document/9388375/

http://journals.resaim.com/ijresm/article/view/1184

https://www.academia.edu/download/59877876/IRJET-V6I481420190626-30560-cxi4q6.pdf