Face Recognition Project - Complete Beginner Guide

This guide helps you build a **Face Recognition System** using Python and OpenCV from scratch. It explains every step in simple terms so that even a beginner can understand and replicate the project easily.

1. Project Workflow

The project includes three stages: 1. Face Capture – capture face images and store in dataset/. 2. Training – train model with LBPH algorithm. 3. Recognition – recognize faces in real-time.

2. Required Libraries

Install dependencies: pip install opencv-contrib-python pillow numpy

3. Step 1 – Face Capture

The script captures 30 images of each user from webcam and stores them as 'User...jpg'. It uses Haar Cascade classifier to detect faces and OpenCV's VideoCapture to take input from the camera.

4. Step 2 – Training the Recognizer

The script reads all images from dataset/, converts them to grayscale, and trains a LBPH recognizer. The model is saved as trainer/trainer.yml for later use.

5. Step 3 – Real-Time Face Recognition

The trained model is loaded and used to recognize faces in live webcam feed. It displays recognized names and confidence scores on screen.

6. Understanding haarcascade_frontalface_default.xml

This XML file is a pre-trained model provided by OpenCV containing facial feature data. It detects eyes, nose, mouth, and edges of the face.

7. Folder Structure

Face_Recognition_Project/ ■■■ dataset/ ■■■ trainer/ ■■■ haarcascade_frontalface_default.xml ■■■ 01_face_capture.py ■■■ 02_face_training.py ■■■ 03_face_recognition.py

8. How to Run the Project

1. Capture Faces: python 01_face_capture.py 2. Train Recognizer: python 02_face_training.py 3. Run Recognition: python 03_face_recognition.py

9. Common Issues & Fixes

- Error: No module named cv2.face → install opencv-contrib-python - Camera not opening → ensure webcam not used by another app - trainer.yml missing → run training step first

10. Conclusion

You now know how to create a complete Face Recognition System using Python. This knowledge can be extended for attendance systems, security access, and AI automation.