FACE RECOGNITION PROJECT

Real-Time Face Detection & Recognition using OpenCV

Overview

This project implements a real-time face recognition system using Python and OpenCV. It uses Haar Cascade Classifier for face detection and LBPH (Local Binary Patterns Histograms) Face Recognizer for training and recognition. The system can detect faces from webcam input, collect datasets, train a model, and perform recognition in real-time.

Features

- Capture dataset of face images using webcam
- Train an LBPH model on the collected dataset
- Real-time face recognition via webcam
- Modular, simple, and beginner-friendly

Algorithms & Technologies Used

- **Haar Cascade Classifier** → For detecting faces in frames
- **LBPH (Local Binary Patterns Histograms)** → For recognizing and matching faces
- **Python Libraries**:
  - OpenCV
  - NumPy
  - Pillow

Workflow

1. **Create Dataset** – Capture 30 samples of the user's face via webcam
2. **Train Model** – Train LBPH recognizer using the collected dataset
3. **Recognize Faces** – Detect and recognize faces in real-time

Project Structure

FaceRecognitionProject/

- dataset/ # Folder to store captured face images (currently empty)
- .gitignore
- 0_create_dataset.py # Script to collect face dataset using webcam
- 1_train_model.py # Script to train the recognizer and save trainer.yml
- 2_face_recognition.py # Real-time face recognition script
- 3_haarcascade_frontalface_default.xml
- 4_trainer.yml # Trained model file (generated after training)
- 5_requirements.txt # Dependencies
- README.md

Note: The dataset/ folder is empty and is not uploaded to GitHub. Users need to **create their own dataset** using the provided script.

Installation

1. Clone this repository:

git clone https://github.com/YourUsername/FaceRecognitionProject.git

cd FaceRecognitionProject

2. Install required dependencies:

```
pip install -r requirements.txt
```

Usage

1. **Collect Dataset**

   python 0_create_dataset.py

- Enter a numeric user ID and name
- Look at the camera until **30 samples** are captured in the dataset/ folder

2. **Train Model**

   python 1_train_model.py

- Trains LBPH model and generates **trainer.yml**

3. **Run Real-Time Recognition**

   python 2_face_recognition.py

- Detects and recognizes known faces from webcam input
- Shows **User ID / Name** and **confidence score**

Sample Output

- Faces detected are highlighted with rectangles
- Recognized faces show User ID / Name and confidence score

Notes for GitHub Users

- The dataset/ folder is **empty** to begin with. Users must **collect their own face images**.
- The .gitignore file ensures temporary files, __pycache__, and other unnecessary files are not uploaded.

Future Improvements

- Add deep learning-based recognition (FaceNet, Dlib)
- Multi-face recognition and tracking
- GUI for easier use
- Database integration for storing face data

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