



FACE RECOGNITION PROJECT

OUR TEAM



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ABOUT PROJECT

- This project presents a real-time **Face Analysis System** that detects and analyzes human faces through a webcam feed. The system performs multiple tasks simultaneously, including:
- **Face Recognition** using FaceNet embeddings and a KNN classifier
- **Emotion Detection** using a pre-trained deep learning model
- **Gender Classification** using a Caffe-based DNN
- **Real-Time Visualization** with bounding boxes and dynamic overlays
- It provides live feedback about the total number of detected faces, recognized individuals, gender distribution (male/female), and emotional states. The system is designed to be lightweight, efficient, and adaptable for use in security applications, smart classrooms, attendance tracking, or sentiment analysis in public spaces

Problem Statement

In crowded spaces like universities, offices, and public venues, there is a growing need to detect and analyze people's identities, emotions, and gender for both security and feedback purposes

Project Objective

The main objective of this project is to develop a real-time face analysis system capable of:

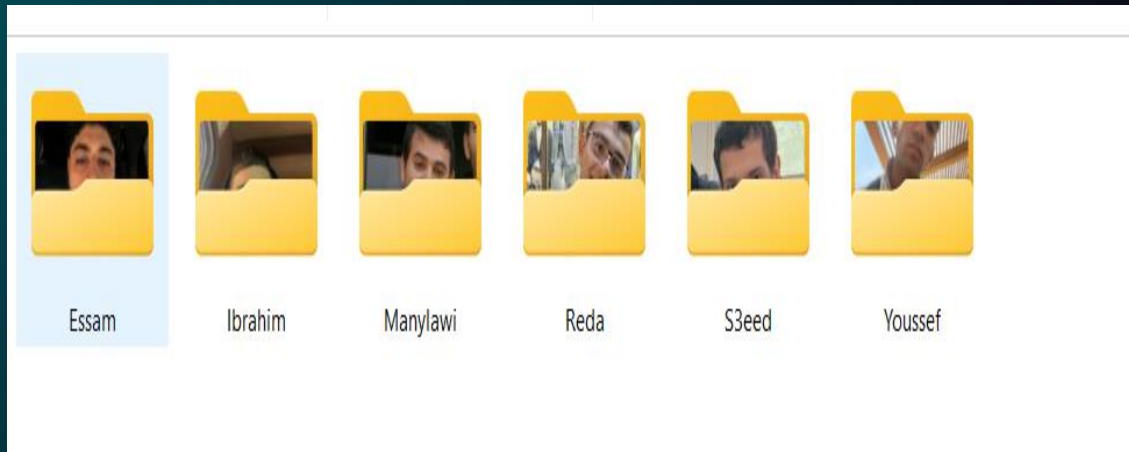
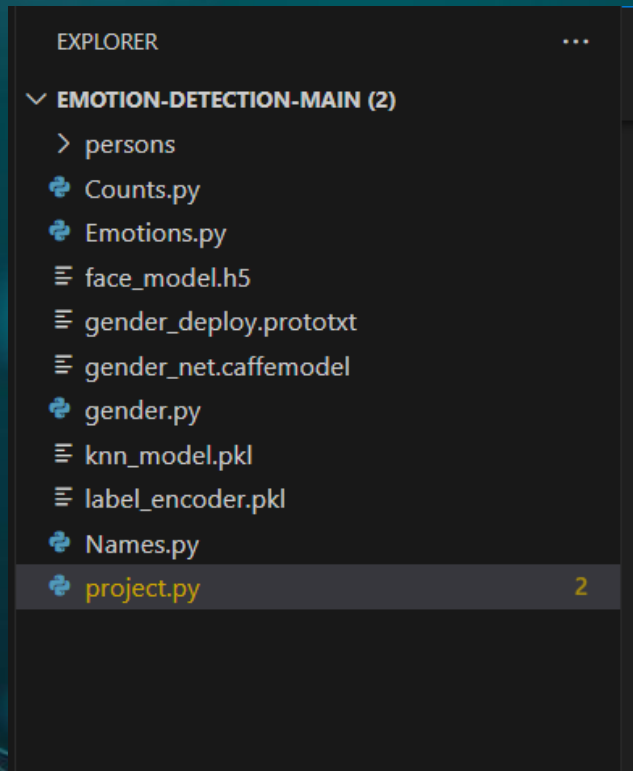
- Detecting human faces through a webcam stream
- Identifying individuals using facial recognition
- Classifying gender as male or female
- Recognizing emotional expressions such as happy, sad, angry, etc.
- Displaying live statistics and visual feedback on the screen

This system aims to provide an intelligent, interactive solution that can be applied in various real-world scenarios such as security monitoring, smart attendance systems, customer behavior analysis, and user experience feedback.

Modules / Components

Component / Module	Used For
OpenCV	Capturing webcam feed, image processing, drawing on frames
MediaPipe (Face Detection)	Detecting faces in real-time with high accuracy
Keras-FaceNet	Extracting 128-dimensional face embeddings for recognition
KNN Classifier	Matching face embeddings to identify known individuals
joblib	Loading the trained KNN model and label encoder
TensorFlow / Keras	Loading and using the pre-trained emotion classification model
Caffe (GenderNet)	Predicting gender using a deep neural network with Caffe model
NumPy	Numerical operations and data handling
cv2.CascadeClassifier	Backup face detection method (not the main one)
draw_text Function	Drawing readable, shadowed text on the video frames
load_model()	Loads the .h5 Keras emotion model

DATA AND FILES



1. Face Detection

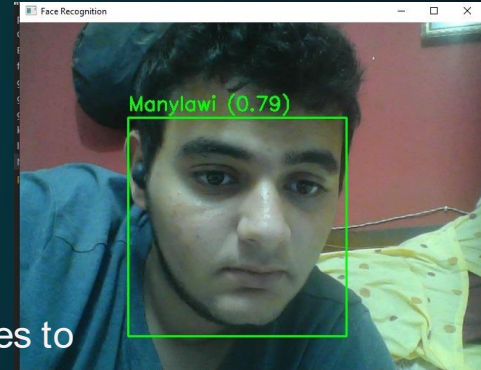
Model: MediaPipe

Use: Detects where the face is in the camera frame quickly and accurately.

2.Face Recognition

Model: FaceNet + KNN

Use: Turns the face into numbers and compares them to saved faces to identify the person



3.Emotion Detection

Model: CNN (Keras Model)

Use: Checks facial expressions and tells if the person is happy, sad, angry and ...

4-Gender Detection

Model: Caffe (GenderNet)

Use: Predicts if the person is male or female



5.Counters

Male Counter

Use: Increases by 1 when a detected face is classified as **Male**.

Female Counter

Use: Increases by 1 when a detected face is classified as **Female**

Known Counter

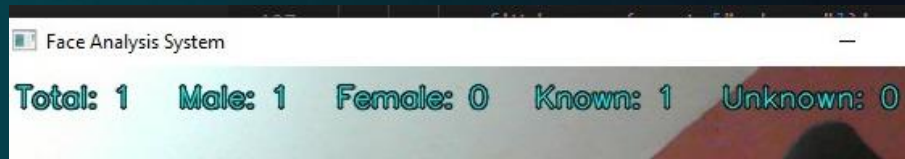
Use: Increases when the face is **recognized** using the FaceNet + KNN model (distance < 0.9).

Unknown Counter

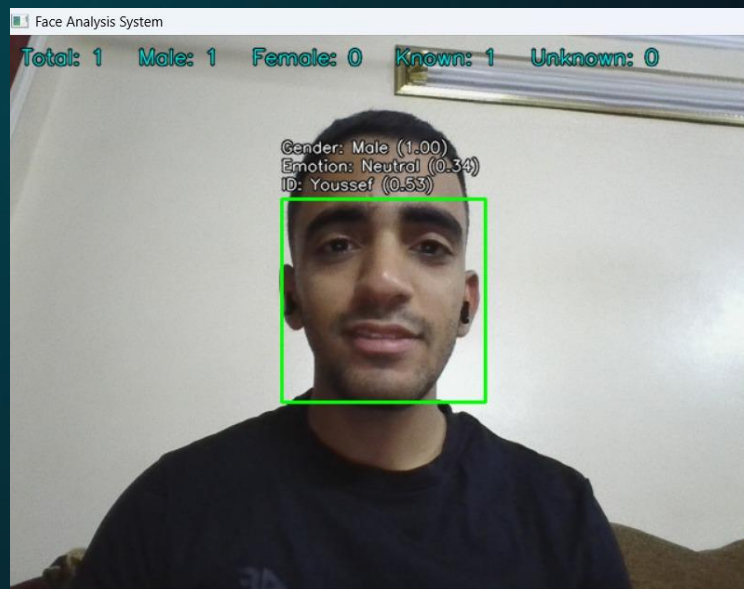
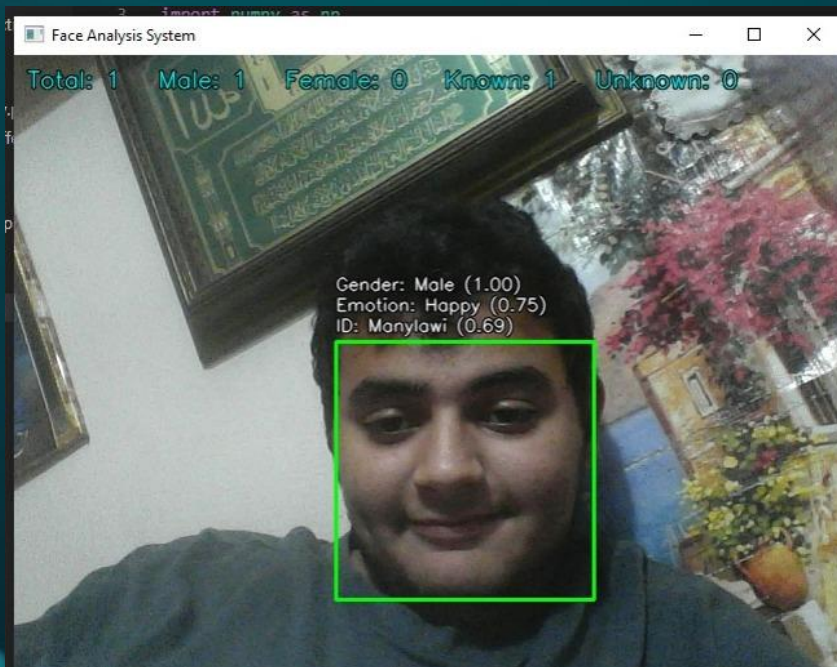
Use: Increases when the face is **not recognized** or not found in the known database.

Total Faces Counter

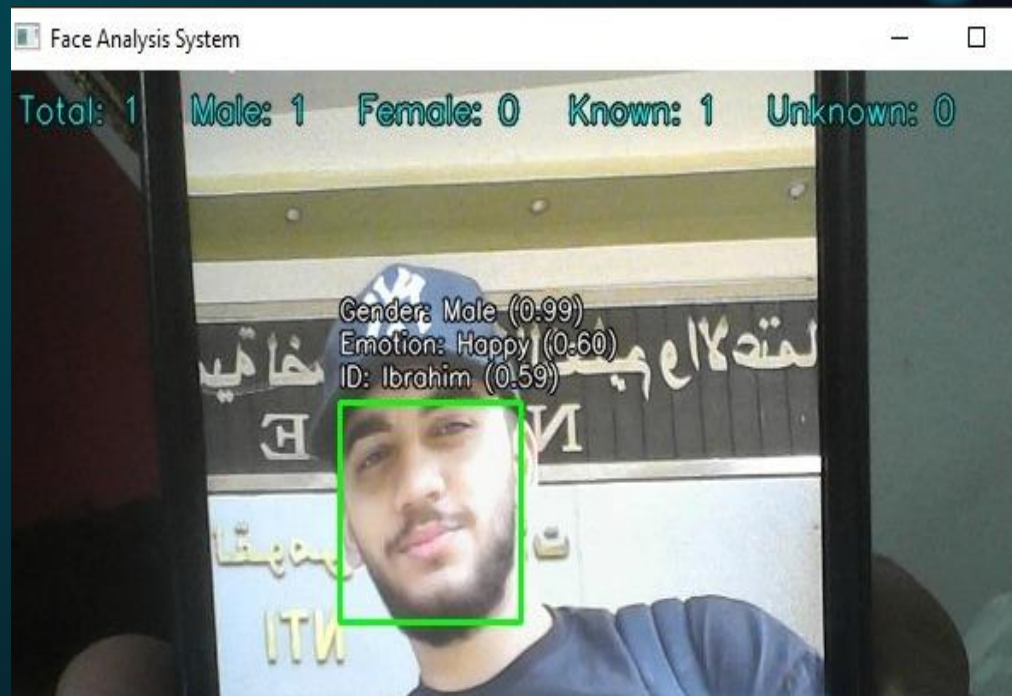
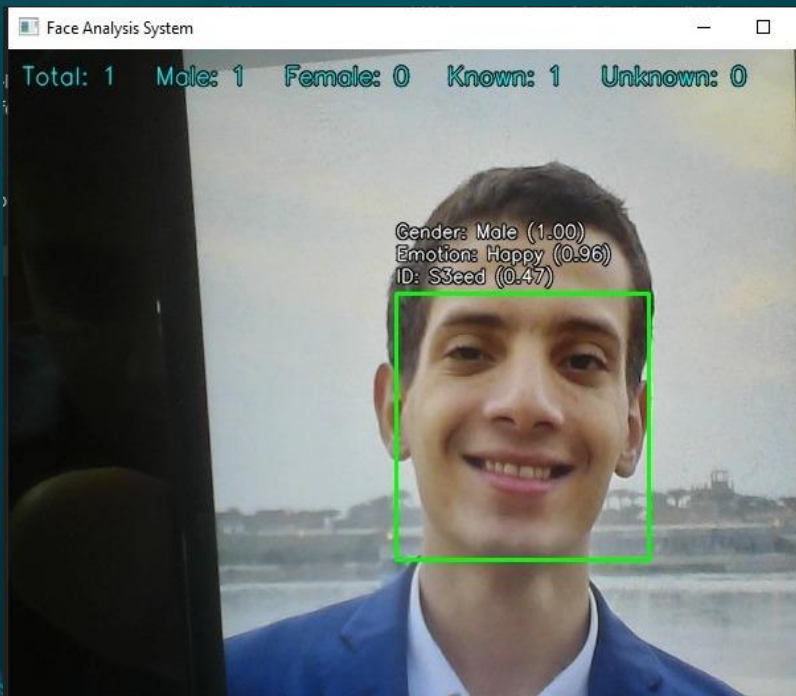
Use: Shows the **total number of faces** detected in the current fram



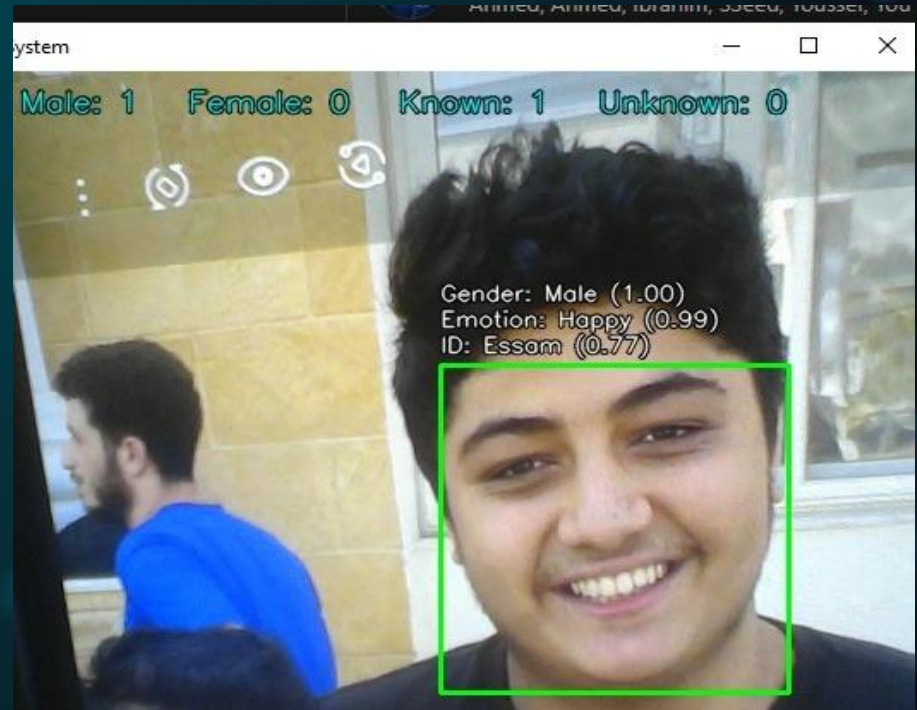
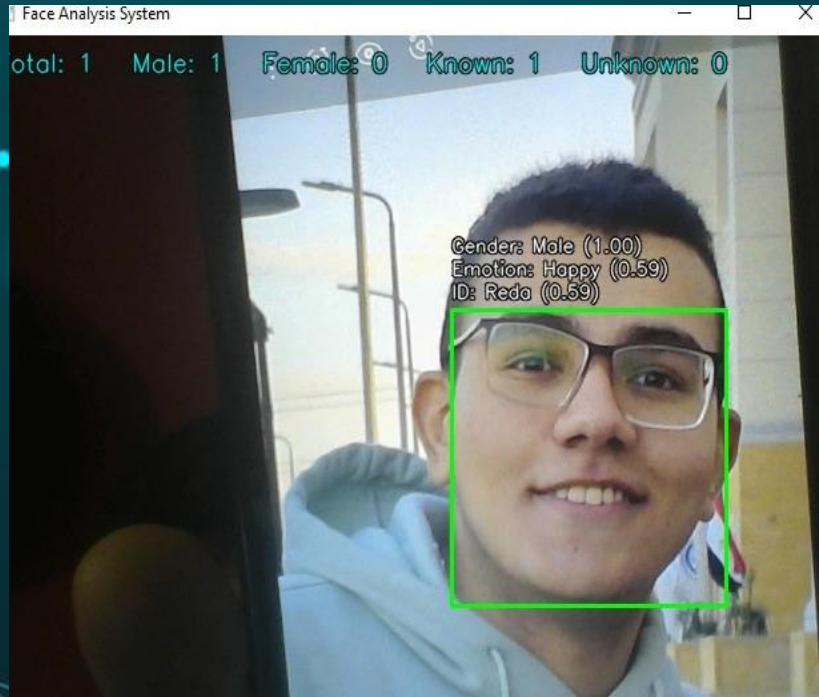
FINAL RESULTS



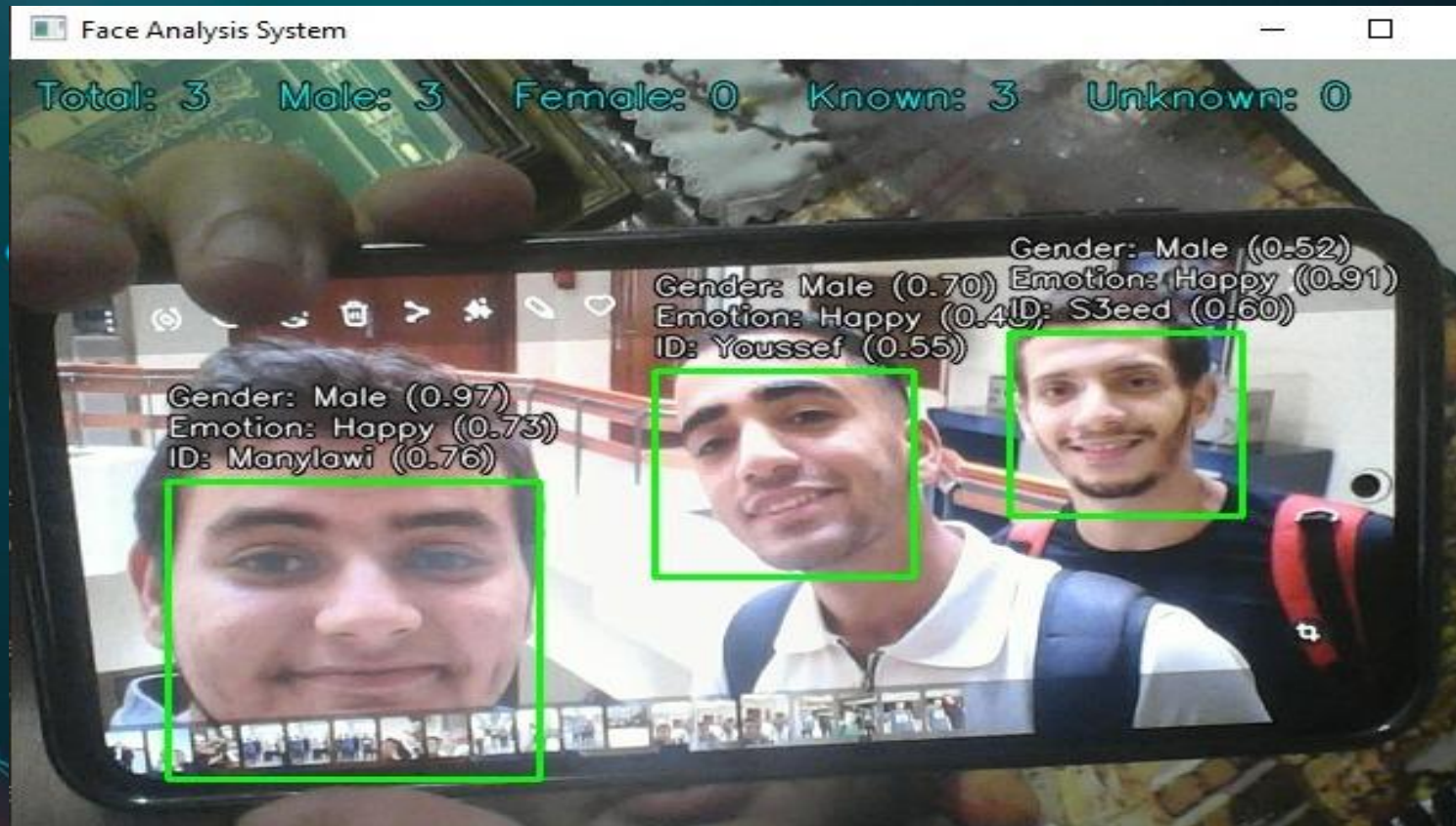
FINAL RESULTS



FINAL RESULTS



FINAL RESULTS



FINAL RESULTS

