Title: Face Detection,

Tracking & Re-identification using RetinaFace, Deep SORT & ArcFace

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What is this?

This is a **Python-based real-time face tracking system** that:

- Detects faces in a video frame
- Assigns a consistent ID to each detected face (even when it leaves and re-enters the frame)
- Recognizes faces based on visual similarity (not just tracker ID)
- Outputs a video with bounding boxes and ID labels

How does it work?

1. **Face Detection**
    - RetinaFace detects all faces in the current frame
    - Outputs bounding boxes [x1, y1, x2, y2]
2. **Face Tracking (Deep SORT)**
    - Assigns unique IDs to detected faces
    - Tracks them based on bounding box movement & overlap (IoU)
3. **Face Recognition (ArcFace)**
    - Crops each face and gets its embedding using InsightFace
    - Compares current embedding to saved embeddings using cosine similarity
4. **Re-identification**
    - If similarity > threshold (e.g. 0.6), it's the same person → assign same ID
    - If not, create new identity and store its embedding
5. **Result Rendering**
    - Draw bounding boxes and consistent IDs on the frame
    - Write the output frame to video

Dependencies

1.Install these libraries:

pip install opencv-python torch numpy scikit-learn insightface

2.Customization

a. Change SIM_THRESHOLD to control how strict the face matching is:
SIM_THRESHOLD = 0.6

- Lower value → more matches; higher → stricter identity check

b. Change input/output video path:
video = cv2.VideoCapture("input.mp4")

- out = cv2.VideoWriter("output_tracked.mp4", ...)

Google Drive Link for sample input/output and .ipynb

https://drive.google.com/drive/folders/1KYgDc7iC8eE1VIb1bGFNrStd96Xs1NHY?usp=drive_link