Project Title: Intelligent Face Recognition System using Siamese Networks

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🎯 Objective

Develop a real-time, identity verification system using a Siamese Neural Network trained on facial image pairs. The system should detect faces, compare them against known identities using similarity scores, and display recognition results through a Flask-based web app.

Project Scope

📁 Dataset Collection & Preprocessing

- Use **LFW (Labeled Faces in the Wild)** or **custom images**.
- Preprocess images: grayscale or RGB, resize (100x100), normalize.
- Create **image pairs**: positive (same person), negative (different people).
- Optional: Implement a face alignment step for higher accuracy.

Model Development

Use Siamese Neural Network for:

- **Feature Extraction** using CNN layers.
- **Similarity Measurement** using Euclidean distance.
- **Loss Function**: Contrastive Loss (or Triplet Loss optionally).

Functionality:

- Train Siamese Network on face pairs.
- After training:
    - Extract embeddings of known faces.
    - Compare test faces via similarity scores.
- Apply a **threshold** to determine match or mismatch.

Real-Time Face Detection & Matching

Integrate OpenCV, Dlib, or MTCNN for face detection from webcam or uploaded videos. Match detected faces against stored known embeddings.

Display:

Face bounding box.

Person name or “Unknown.”

Confidence or distance metric.

Flask Web Application

User Interface to:

- Upload an image/video or stream from a webcam.
- Show live annotated feed with detected faces.
- Display names of recognized individuals in real-time.
- Include a registration tab to add new people to the database.
- Provide matching statistics/logs (match count, distances, etc.).