Project Documentation: Face Recognition Attendance System

- Purpose: Automate attendance marking using face recognition.
- Motivation: Reduce manual errors, provide real-time logging, and track break times.
- Deployment: Streamlit Cloud with browser camera (st.camera_input) and local webcam (cv2.VideoCapture).

WORKFLOW

The system uses **Convolutional Neural Network (CNN)** trained for face recognition. CNNs are well-suited for image tasks because they automatically learn spatial hierarchies of features (edges, textures, facial landmarks). In this project, the trained model is saved as fine_tuned_model.h5 and loaded at runtime. The class labels (names of individuals) are stored in real_names.pkl.

- **Face Detection**: MTCNN (Multi-task Cascaded Convolutional Networks) is used to locate faces in the image.
- **Face Recognition**: The cropped face is resized to 128×128 pixels and passed into the CNN for classification.
- **Output**: A probability vector across all enrolled identities. The highest probability (argmax) gives the predicted label and confidence.

FEATURES

The app provides face recognition with confidence scores, attendance logging, and break time calculation. It includes styled buttons for Confirm and Quit, emoji feedback, and a background image. Timezone handling ensures timestamps are recorded in IST. The system also distinguishes between Login, Break, and Logout events.

CONCLUSION

This project demonstrates a robust attendance system that blends AI recognition with a polished Streamlit interface. It balances backend rigor with frontend clarity, ensuring professional results and reliable tracking.