Project Proposal:
Real-time Facial Emotion Recognition on Mobile Devices.

Semih Sarıkoca, Dicle Çoban

Objective:

The project topic is to create a technology that can analyze facial expressions using **image processing technologies** and, as a result of this analysis, estimate what percentage of a person feels.

Methodology:

- **Face Detection:** Among the face detection algorithms **YuNet Face Detection** is the most suitable one for this project. We're planning to focus on this project with a laptop camera and the YuNet algorithm works well with laptop cameras. It provides real-time performance on the CPU.
- **Model Training:** The model will be worked on with available facial expression datasets such as FER2013 (can be diversified). The model will be optimized to predict the probability of emotions (happy, sad, excited, angry, fear, surprise)
- **Post-processing:** The outputs of emotions will be calculated as a percentage. For reducing the sudden swings, Temporal Smoothing (such as exponential moving average) can be used.
- **User Interface:** The application will be developed for displaying the face with predicted percentage of emotions in real time.

Possible Technology Stack:

- **Programming Language:** Python
- **Face Detection:** OpenCV YuNet
- **Deep Learning:** PyTorch, torchvision
- **Modal Deployment:** ONNX Runtime
- **Dataset(s):** FER2013

System Architecture Figure:

- **Input Layer** (Camera Input)
- **Processing Layer** (Preprocessing → Feature Extraction → CNN Model)
- **Output Layer** (Probability Output → Visualization → Client Integration)