Real-Time Emotion Detection Using Facial Landmarks

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Introduction to Emotion Detection

What is Emotion Detection?

Analyzing facial expressions in real-time using technology.

Key Applications

- Human-computer interaction
- Mental health monitoring
- Security and surveillance

Project Goal

Accurate, efficient detection via facial landmarks.

Why Important?

70-80% of human communication is non-verbal.

Understanding Facial Landmarks

Key Facial Points
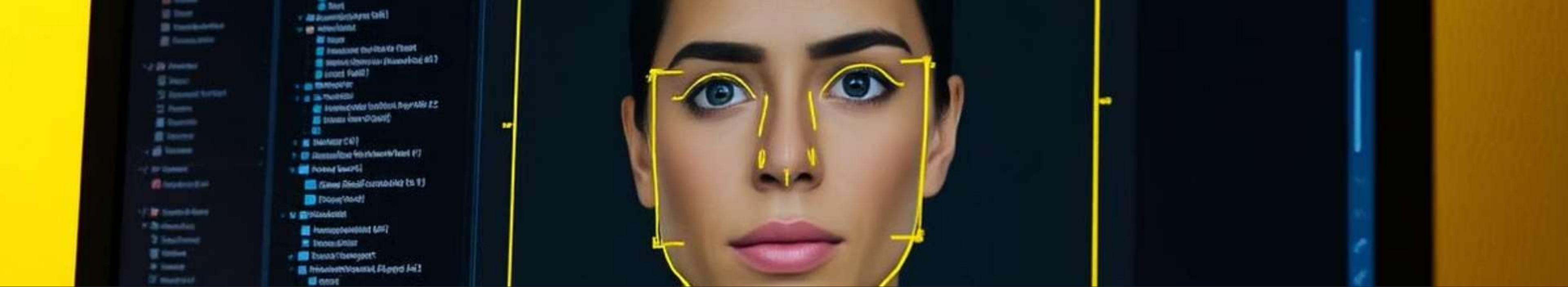
- Eyes, eyebrows
- Nose, mouth, jawline

Datasets & Models

Trained with FER-2013 with nearly 28000 images

Extraction algorithms like Active Shape Models.

Data Use

Coordinates of landmarks help classify emotions.

Real-Time System Implementation

Video Capture

Utilizing Yolo4 Object Detector to enable real-time, high-accuracy video stream processing for facial recognition.

Landmark Detection

Employing the Alexnet for precise and rapid detection of facial landmarks in live video frames.

Performance

Achieves a smooth 30 frames per second with an average processing time of only 0.03 seconds per frame, ensuring real-time responsiveness.

Hardware

Powered by an Intel i7 processor to deliver efficient and reliable computations required by the system.

Emotion Classification Results

Emotion Types

- Happiness
- Sadness
- Anger
- Surprise
- Fear, Disgust, Neutral

Model Training

Map landmark features to specific emotions.

Accuracy Highlights

Happiness detected with 85% precision and 80% recall.

Evaluation

Confusion matrix used for detailed accuracy assessment.

Applications and Impact

Mental Health
Monitor depression and anxiety via facial cues.

User Experience
Adaptive interfaces that respond to emotions.

Security
Detect suspicious behavior in real-time, e.g., airports.

Marketing
Gauge customer reactions to products and ads.

Future Directions

1 Improved Accuracy

Using deeper learning models for better detection.

2 Context Integration

Combine speech and body language information.

3 Personalization

Tailor emotion recognition to individual users.

4 Cross-Cultural Challenges

Study emotion expression differences among cultures.