Real-time Human Emotion Recognition

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Background

- Recognizing Human Facial Expression (1994) - Yaser Yacoob and Larry S. Davis

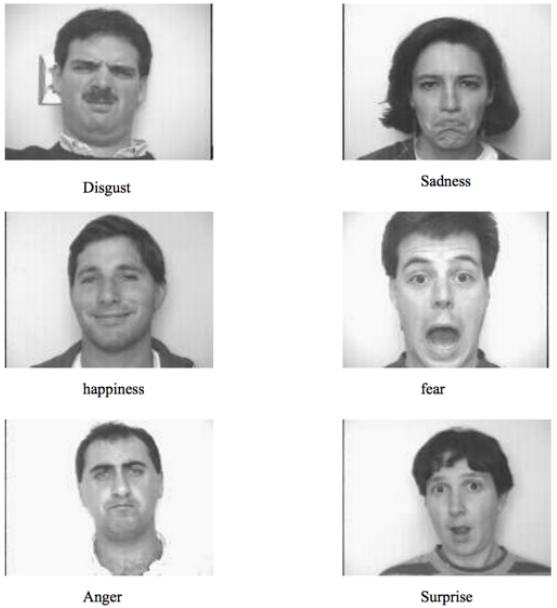


Figure 1: Six universal (i.e., pan-cultural) expressions expressed by six faces.

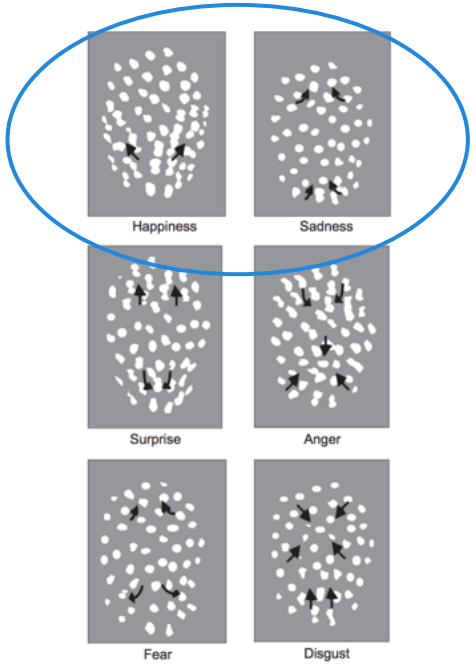


Figure 5: The cues for facial expression as suggested by Bassili.

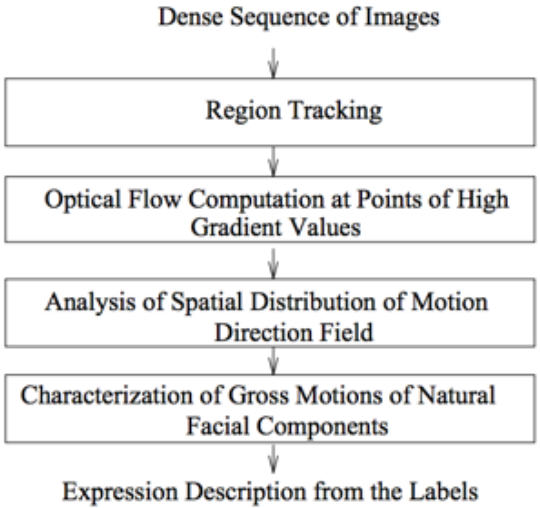


Figure 2: The flow of the facial analysis algorithm.

Original Objectives

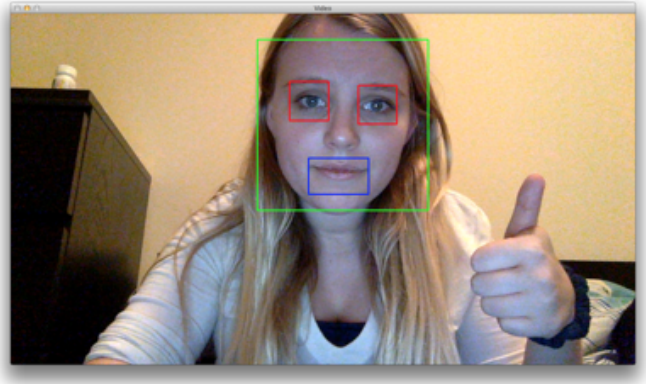
1. Real--time Face Tracking
2. Recognize different emotions from static images
3. Recognize emotion from real--time video

Final Objectives

1. Use computer's webcam to implement real-time face tracking
2. Detect eyes and mouth from a face in a live video
3. Recognize basic emotions from a face in a live video using Yacoob and Davis' research methods

Methods - Face Tracking

- Haar cascade classifiers
- Known layout of a face
  - i.e. mouth is below eyes and above bottom of face, there are only two eyes, etc.

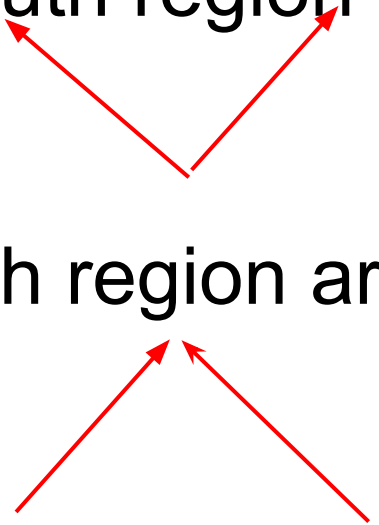


Methods - Optical Flow

- Definition: the apparent motion of brightness patterns in the image
  - Sensitive to lighting changes
- Can be used to calculate the motion of points in a video across frames
- For emotion recognition, we care about the direction of the motion of points in key regions, such as the mouth

Methods - Emotion Recognition

- Happiness - points in the mouth region are moving upward and outward
- Sadness - points in the mouth region are moving upward and inward
- Neutrality - baseline



Results - Successes

- Detect and track key facial regions
- Use optical flow to calculate the direction the points in these key regions are moving
- Recognize happiness, sadness, and neutrality from a live video feed

Results - Limitations

- Single face
- Plain background, good and consistent lighting
- Only detecting change in emotion from a neutral state
- Relies heavily on accuracy of mouth detection

Demo

Q&A

Any questions?