A Computational Vision on Human Emotion

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Dependable Computing and Networking Laboratory
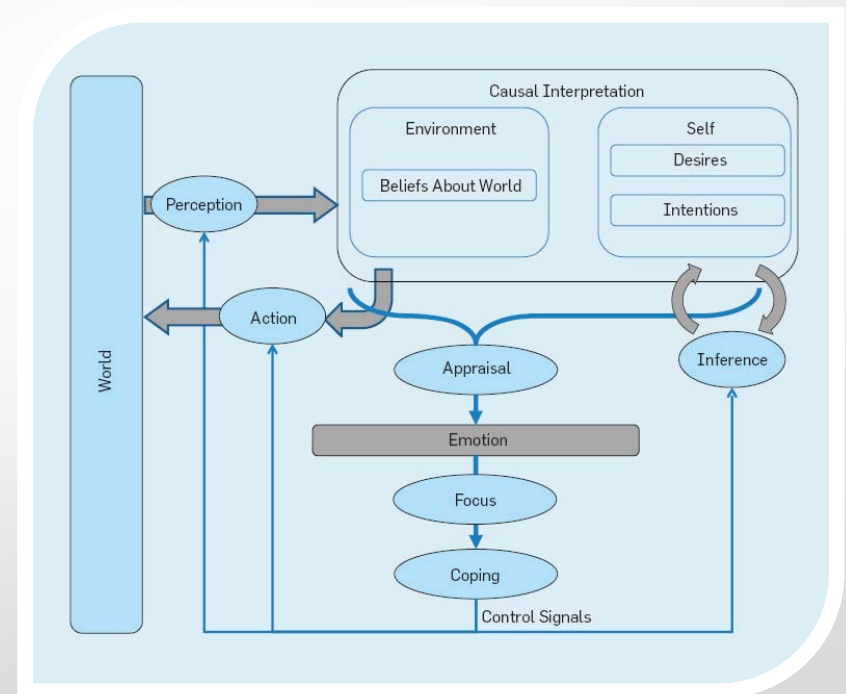
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Emotion

- Oxford Advanced Learner's Dictionary
  - a strong feeling such as love, fear or anger; the part of a person's character that consists of feelings
- US English Oxford Dictionaries
  - a natural instinctive state of mind deriving from one's circumstances, mood, or relationships with others
- The American Heritage Medical Dictionary
  - an intense mental state that arises subjectively rather than through conscious effort and is often accompanied by physiological changes.

Emotion Modeling

- Goal
  - Understanding emotion in natural agents
  - Enabling emotion in artificial agents
- Models
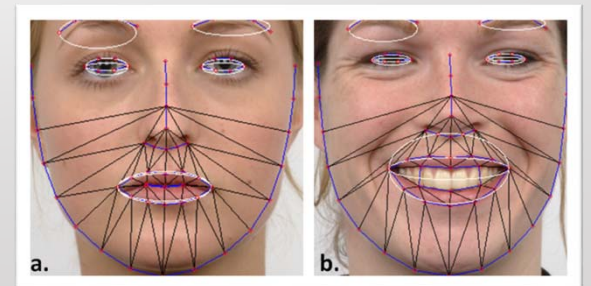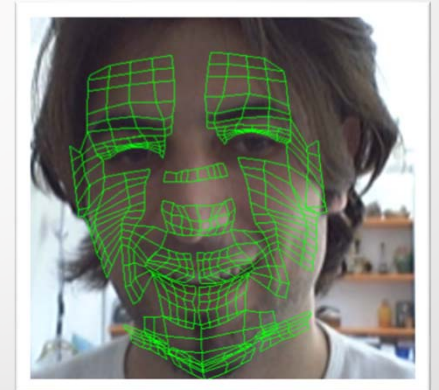 - Symbolic (psychological)
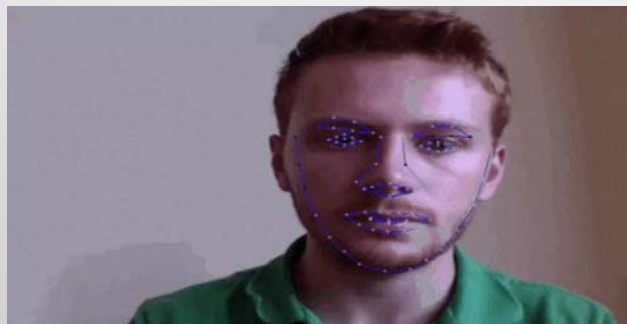 - Neurophysiological (nervous system)

Motivation

- Improving interactions
    - Human-computer
    - Human-human
- Improve artificial cognitive decision making
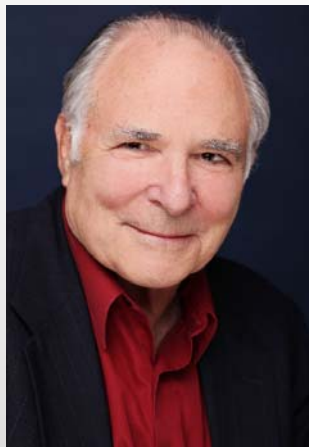
Computer Vision & Human Emotion

- Emotional communication through face
- Emotion detection
- Emotion measurement

What's Been Done?

- Facial Action Coding System (FACS)
  - Paul Ekman
  - 6 universal emotions
  - 64 action units
  - Discrete measurements
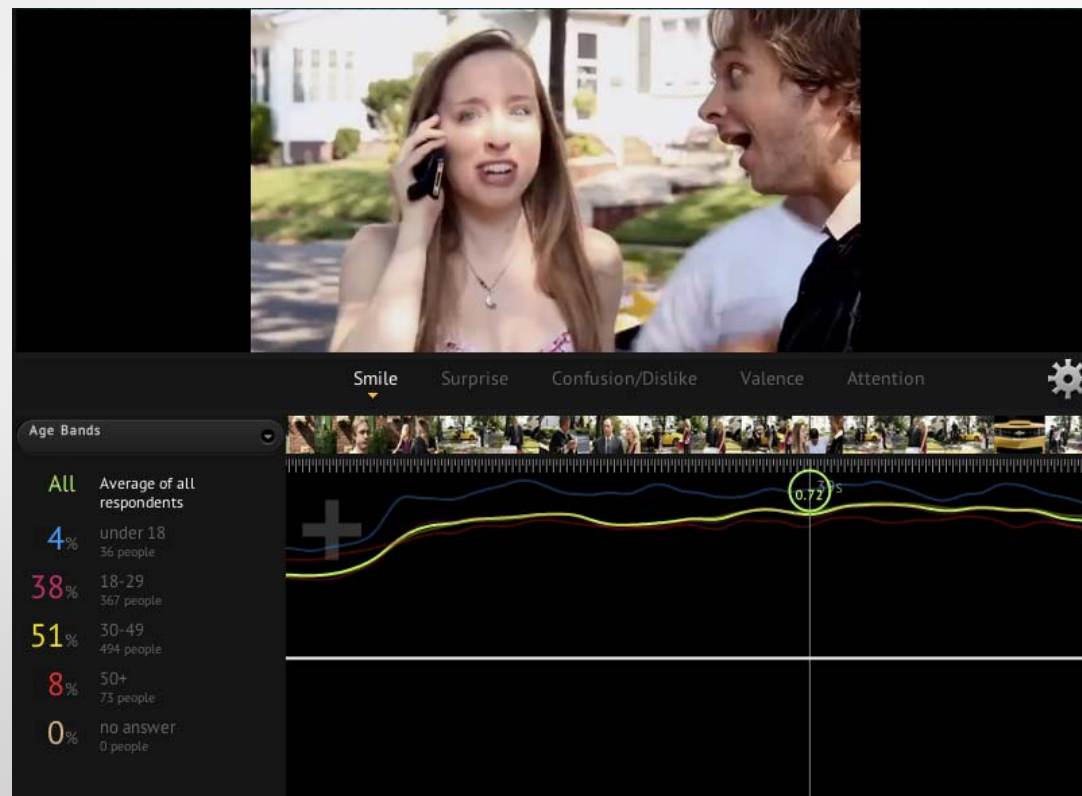
- Affdex
  - Affectiva (Rana Kaliouby)
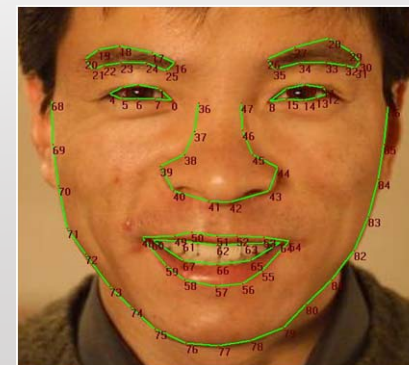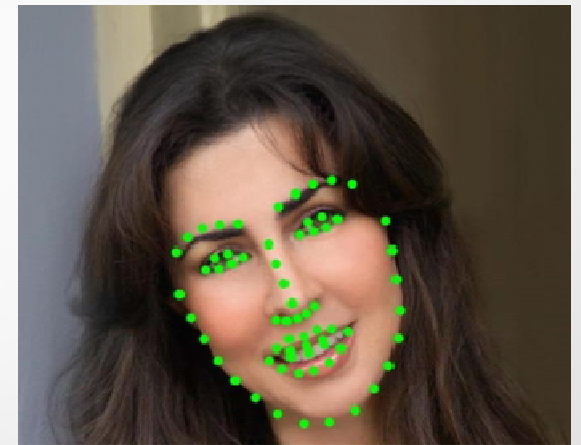 - Captures valence
  - Captures expressiveness
  - Continuous measurements

FACS Sample

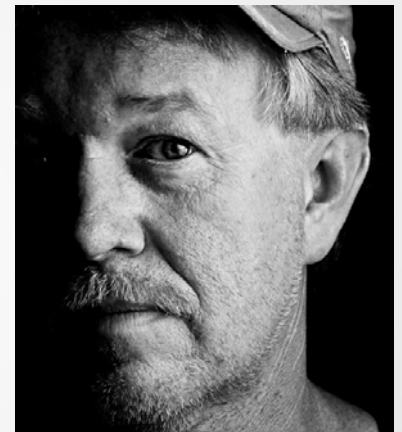| Action Unit	Description	Facial Muscle	Example Image
9	Nose Wrinkler	*Levator labii superioris alaquae nasi*	
6	Cheek Raiser	*Orbicularis oculi, pars orbitalis*	
10	Upper Lip Raiser	*Levator labii superioris*	
12	Lip Corner Puller	*Orbicularis oris*	

Affdex Execution Sample

How Do They Do It?

- Detect features
- Track features
- Process geometry
- Probabilistic methods or Machine Learning

What's Next?

- Variation in illumination
- Variation in head poses
- Variation in complexions
- Discrete Vs. Continuous

What Am I Working On?

- Automated "Like" for Streaming Media Applications

- Computer Vision + Machine learning

- Tools

  - OpenCV with Java

Some of Many Applications

- Video-editing

- Legal testament validation

- Aiding the emotionally challenged

- Market research

Thank you!

Questions?