

ENRICHING YOUR APPS WITH EMOTIONS



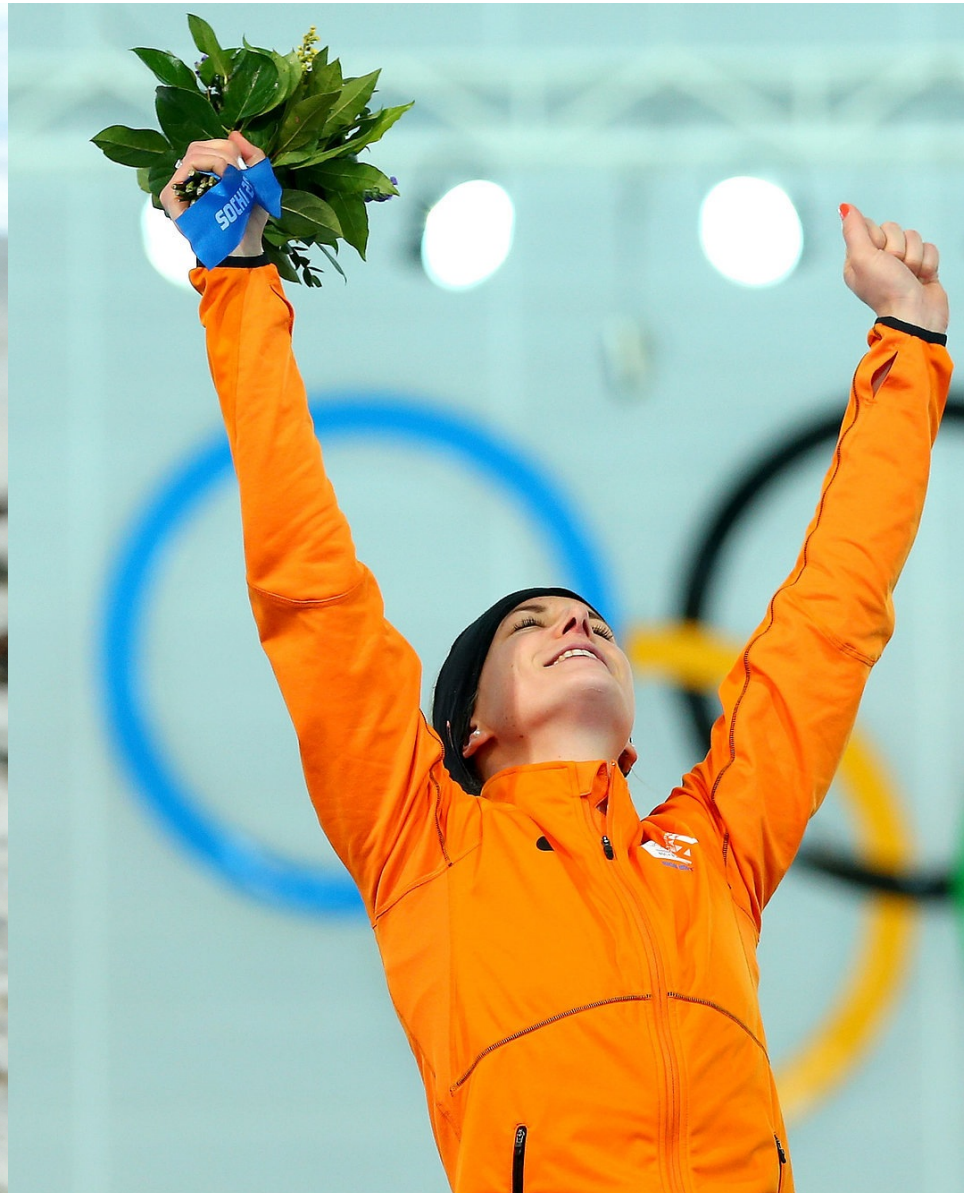
BOISY G. PITRE
MOBILE VISIONARY



Our emotions influence every aspect of our lives.



They drive our decisions and passions.

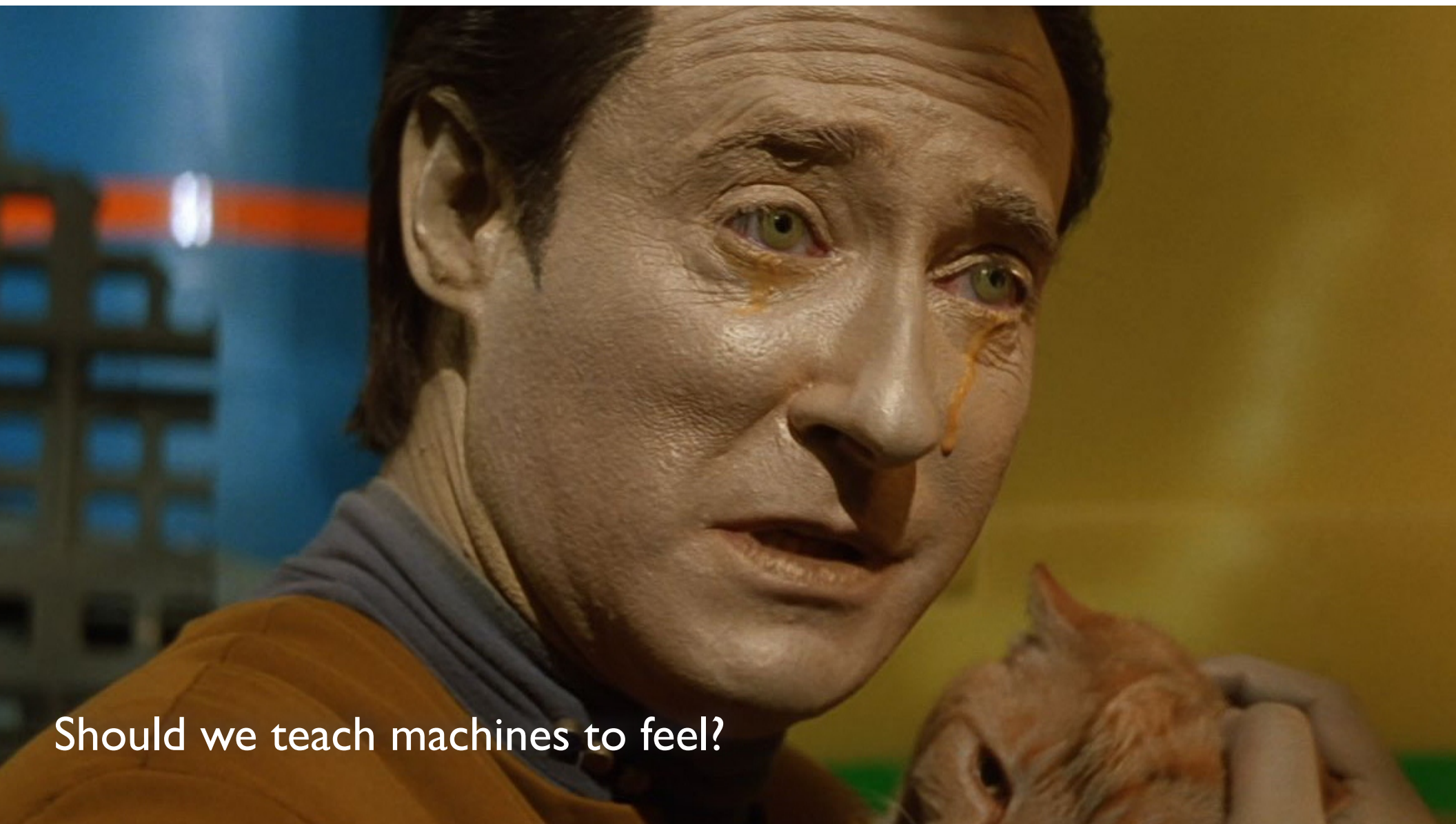




Emotions are an inseparable part of who we are.



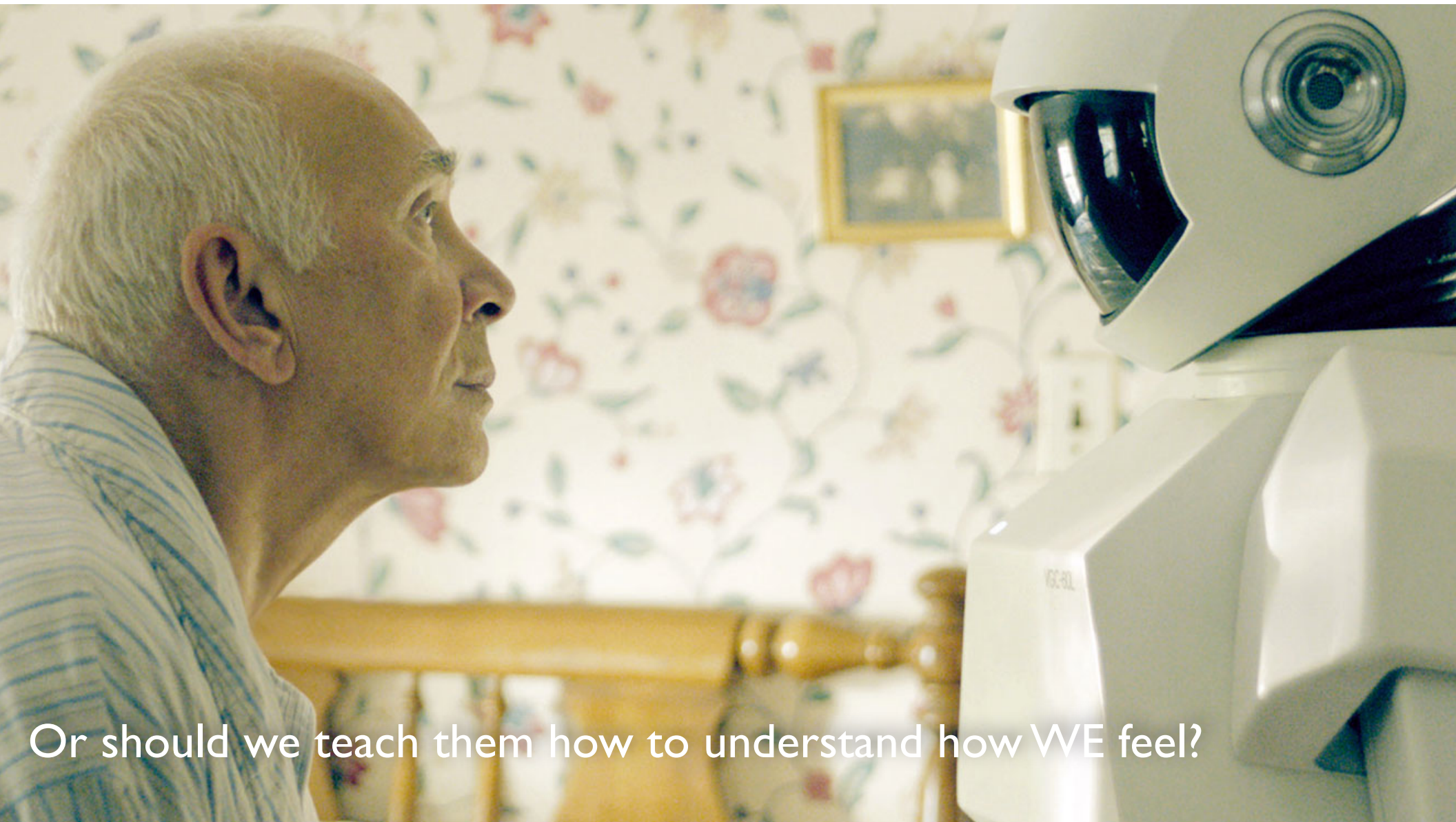
Unless you're this guy...



Should we teach machines to feel?



**“MY FATHER TRIED TO TEACH ME HUMAN EMOTIONS.
THEY ARE... DIFFICULT.”**



Or should we teach them how to understand how WE feel?

THE SCIENCE BEHIND EMOTIONS



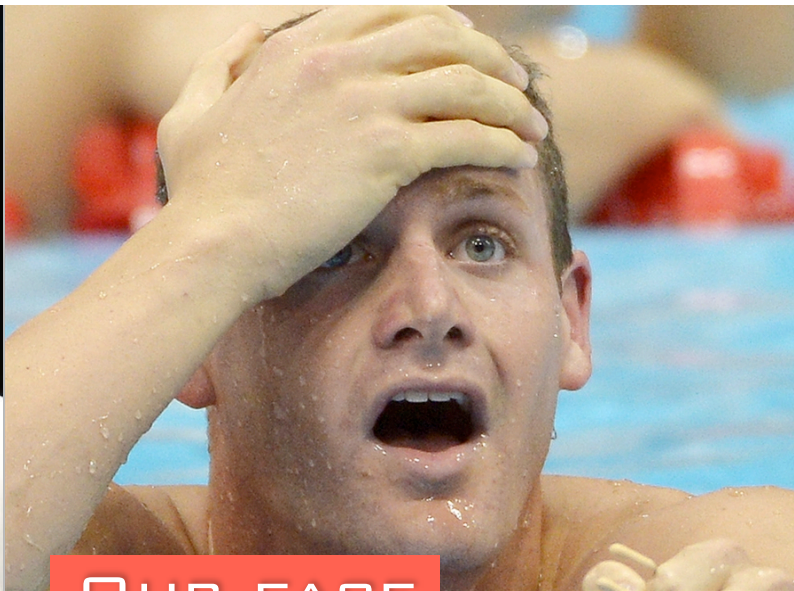
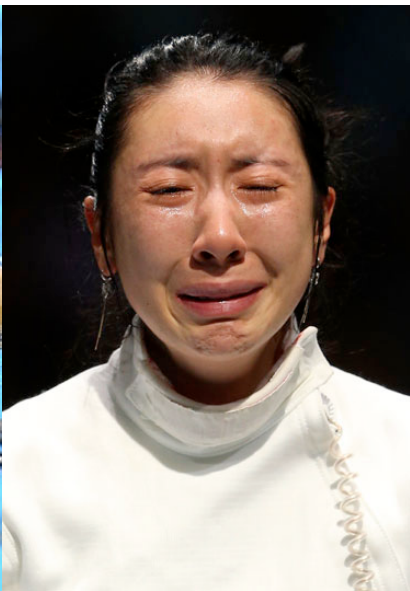
HOW DO WE COMMUNICATE EMOTION?



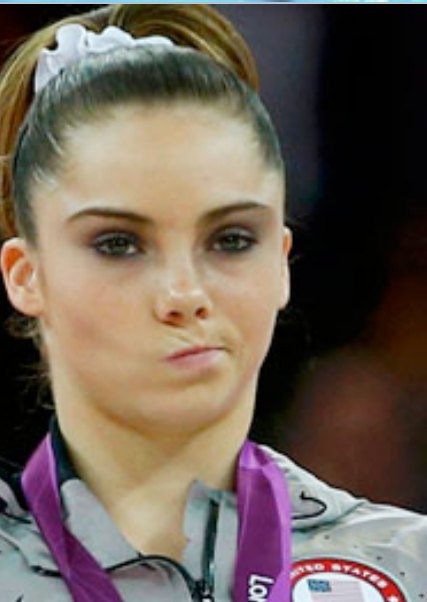


OUR VOICE





OUR FACE



THE FACE IS A RICH CANVAS FOR
EXPRESSING OUR EMOTIONS



HOW MANY FACIAL
MUSCLES DO WE HAVE?



HOW MANY FACIAL
MUSCLES DO WE HAVE?

43





Paul Ekman





**AU 10+12+
16+25**



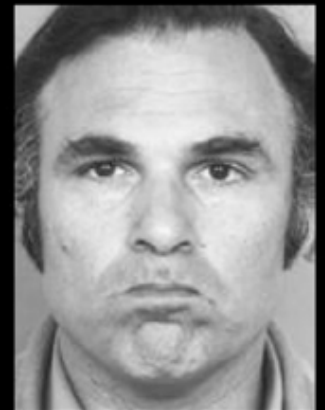
AU 22+25+26



AU 12+25+26



**AU 6+10+
12+16+25+27**



AU 17+24



Bared-teeth



Pant-hoot



Play face



Scream



Bulging-lip face

READING EMOTIONS IN THE FACE





NAME THIS EMOTION...





HOW MANY MUSCLES
DOES IT TAKE TO
SMILE?





HOW MANY MUSCLES
DOES IT TAKE TO
SMILE?

12





NAME THIS EMOTION...





NAME THIS EMOTION...





NAME THIS EMOTION...

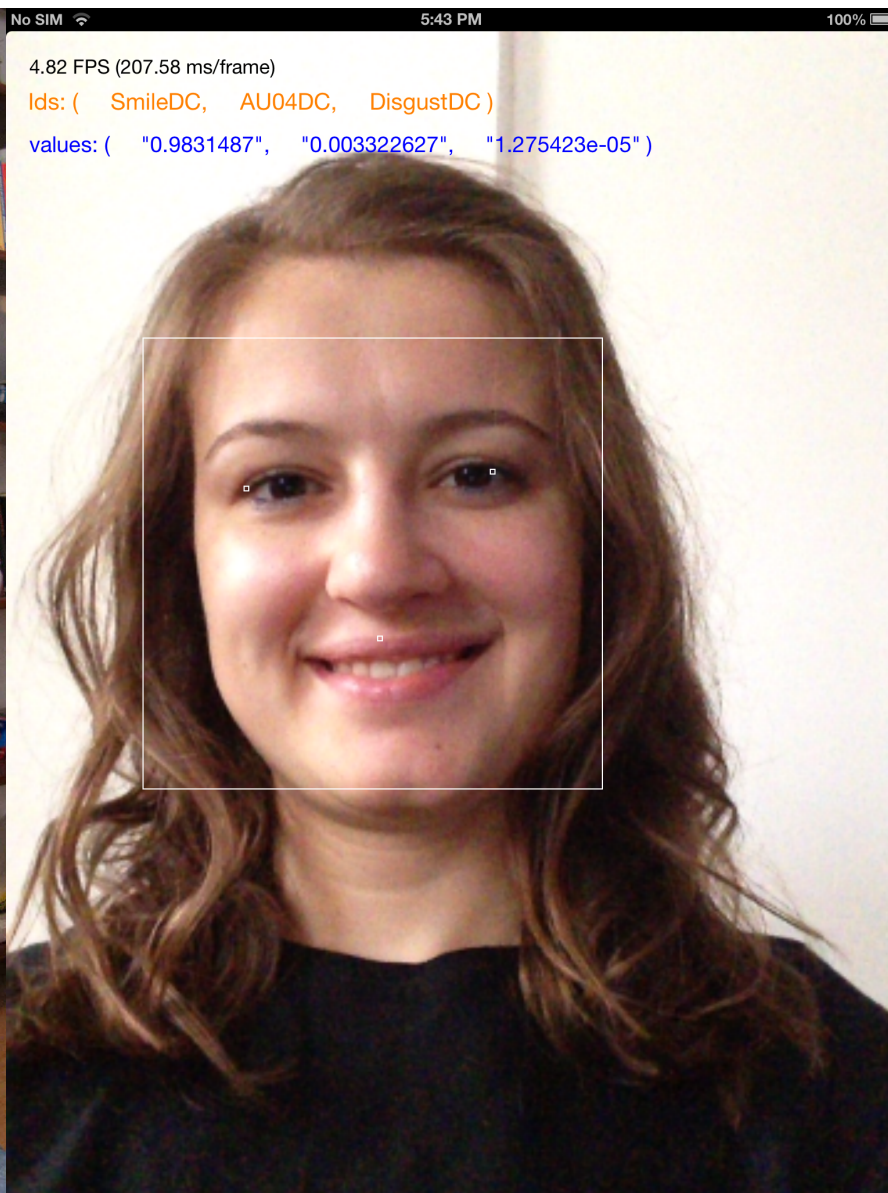
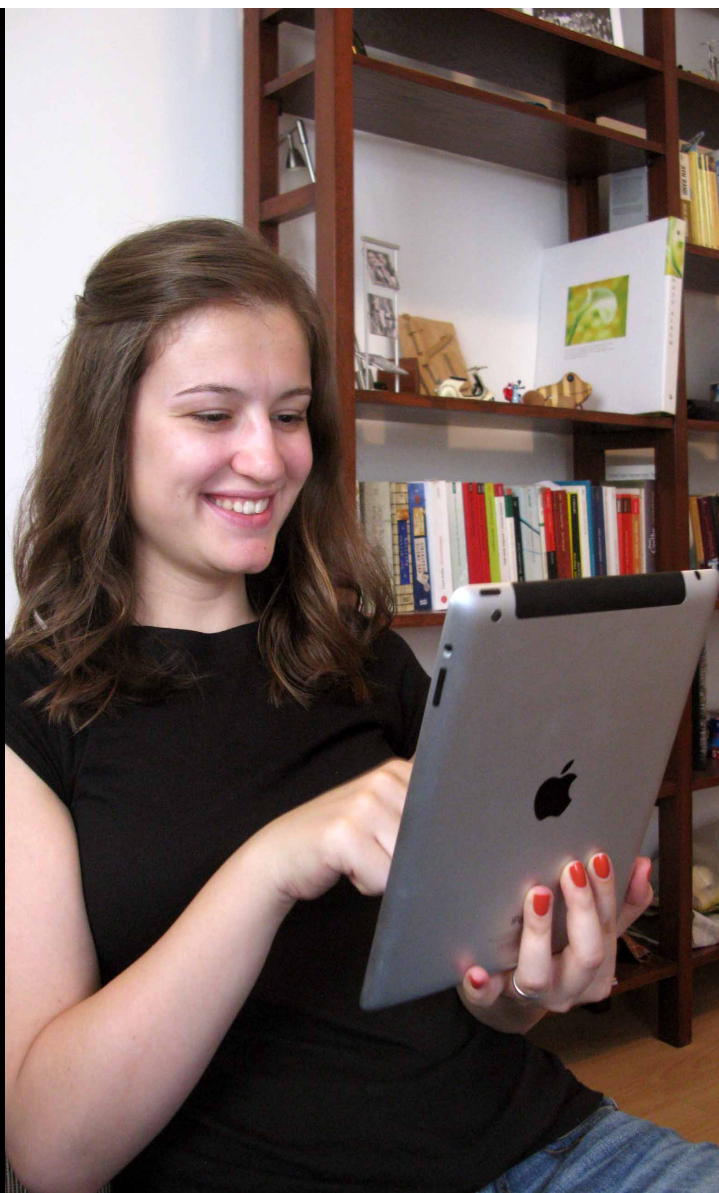


IT TURNS OUT THAT HUMANS ARE
PRETTY GOOD AT READING
EMOTIONS...



BUT CAN OUR DEVICES DO
AS GOOD A JOB?



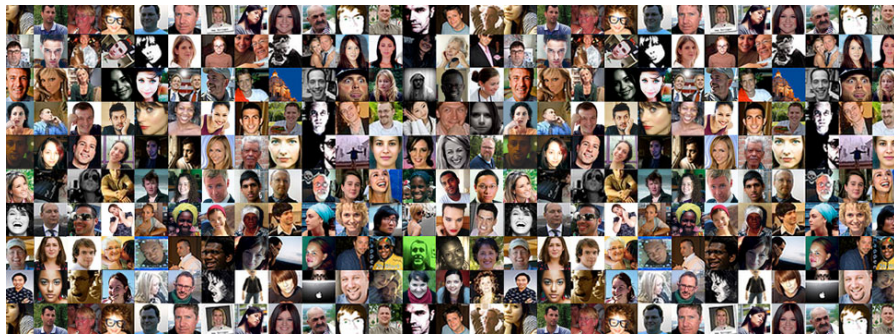


THE TECHNOLOGY



Teaching a Computer to Read Human Emotions

1. Start with 300 million+ facial frames

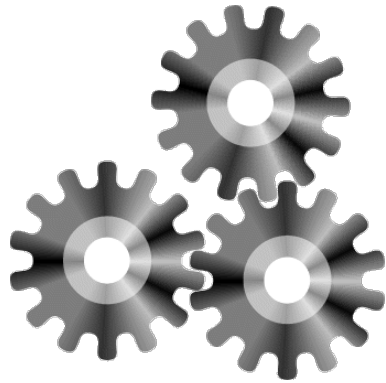


2. Utilize Human Labelers

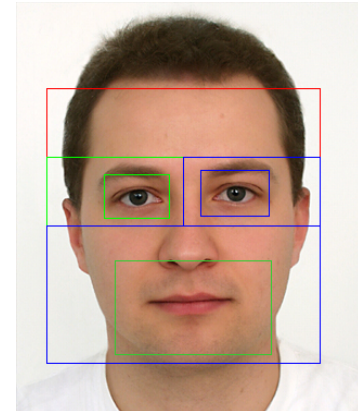


Teaching a Computer to Read Human Emotions

3. Feed into Machine Learning Algorithms

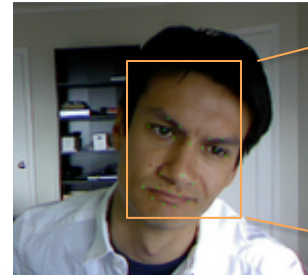


4. Trained Classifiers



How A Computer Reads Your Emotions

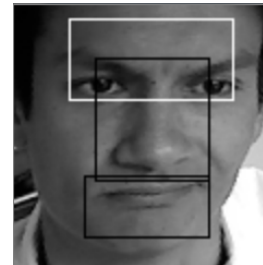
1 Extract key feature points on the face (“landmarks”)



“A human face!”

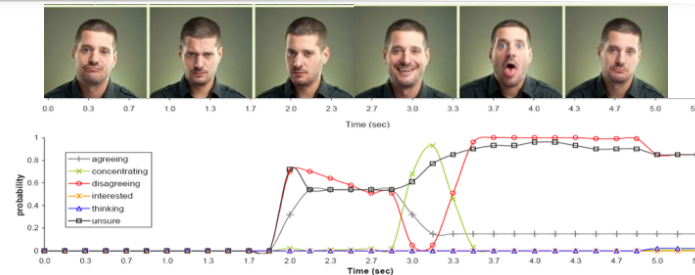


2 Assess movement, shape and texture of entire face at pixel level



Affine transformation regularizes face in preparation for full-face processing

3 Infer emotional and mental states to feed analytical models



Challenges Do Exist

- Faces can be occluded or angled badly
- Lighting may not be ideal
- Mobile environments are messy
- The camera cannot be utilized in the background on iOS



AN EMOTIONAL SDK FOR IOS



Affdex SDK for iOS Feature Overview

Supports iPhone/iPad/iPod Touch (iOS 7+)

Processes from the device's camera, static images and video files

Provides real-time results on a per-frame basis

Easy to integrate into existing iOS apps

Supported Metrics

Smile

Confusion

Disgust

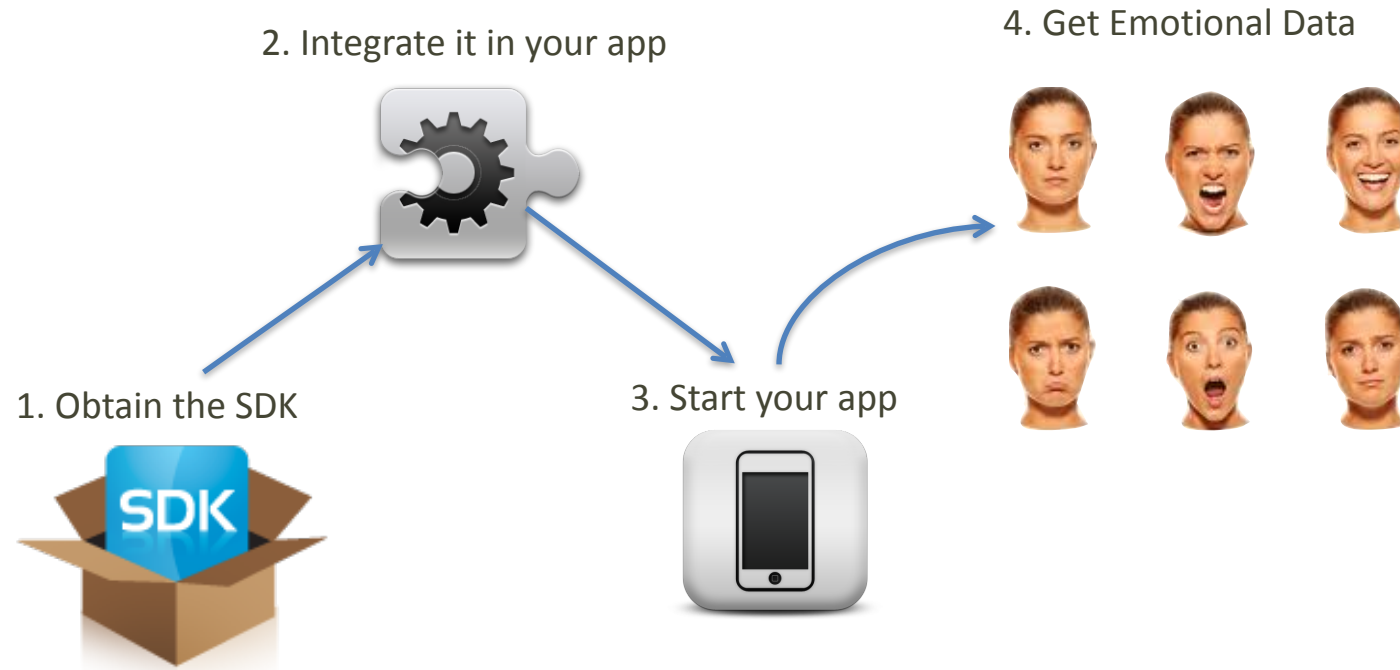
Surprise

Expressiveness

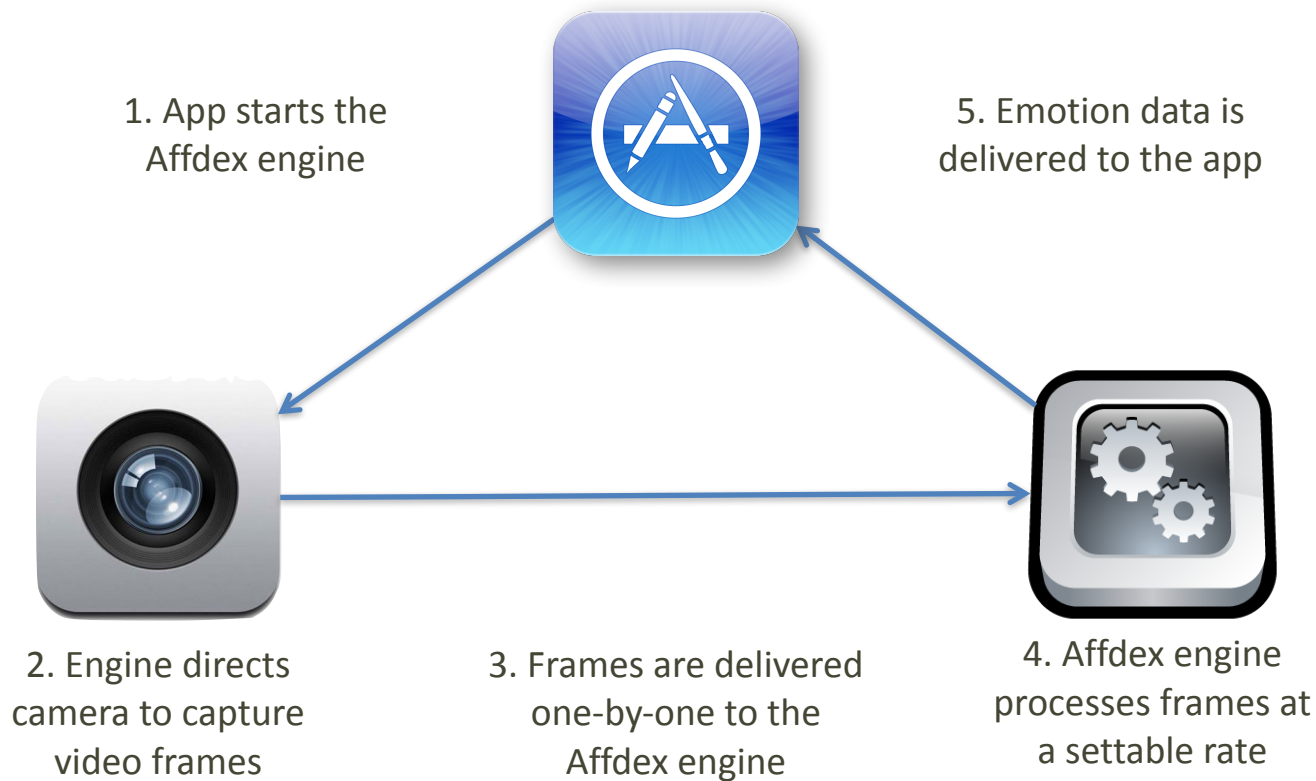
Valence



Emotion-Enable your App In Four Easy Steps



How Your App Gains Emotional Insight



The Objective-C Class Structure

- AFDXDetector
 - Drives the engine that detects expressions
- AFDXMetric
 - The base class for all expressions:
 - Expression value stored in class (typically 0 – 100)
 - Subclasses are used for specific expressions
 - AFDXSmileMetric, AFDXBrowFurrowMetric, etc
 - Use reflection to determine expression
 - `[metric isKindOfClass:[AFDXSmileMetric class]]`



What the SDK Provides

- One library: libAffdex.a
 - Your iOS app links to this static library
- Two header files
 - AFDXDetector.h
 - AFDXMetric.h
- Sample iOS source on GitHub
 - <https://github.com/Affectiva/affdex-ios>



Initializing the Detector

- Adopt the Protocol

```
@class MyClass : NSObject <AFDXDetectorDelegate>
```

- Create and setup an AFDXDetector object

```
#import "AFDXDetector.h"
```

- Camera case

```
AFDXDetector *detector = [[AFDXDetector alloc] initWithDelegate:self  
                        usingCamera:AFDX_CAMERA_FRONT];
```

- File case

```
AFDXDetector *detector = [[AFDXDetector alloc] initWithDelegate:self  
                        usingCamera:AFDX_CAMERA_FRONT];
```

- Static Image case

```
AFDXDetector *detector = [[AFDXDetector alloc] initWithDelegate:self  
                        usingDiscreteImages:TRUE];
```



Setting up the Detector

```
detector.smile = YES;  
detector.browFurrow = YES;  
detector.browRaise = YES;  
detector.lipCornerDepressor = YES;  
detector.valence = YES;  
detector.maxProcessRate = 5;
```

- Turn on the classifiers you want
- Set the processing frame rate (5 fps is adequate for accuracy)
- Each classifier returns a number between 0 and 100 indicating the intensity of the expression)
- Valence is a special case: -100 to 100



Starting the Detector

```
[detector start]
```

- The detector is started
- Camera case: detector will obtain frames, process at a predetermined rate, and pass results to your app
- Video file case: detector will open the video file and process each frame and deliver results sequentially
- Static image case: detector is ready to receive frames pushed by the developer.



Pushing a Frame (Static Image Case Only)

```
UIImage *image = ....  
  
[detector processImage:image];
```

- Obtain a UIImage from some source
- Pass it to the processImage: method
- Useful in two cases:
 - You're interested in analyzing still images
 - Your camera wants to retain control of the camera for other reasons



Processing a Frame

```
(void)detector:(AFDXDetector *)detector hasResults:(NSArray *)metrics forImage:
(UIImage *)image atTime:(NSTimeInterval)time;
{
    for (AFDXMetric *metric in metrics)
    {
        if ([metric isKindOfClass:[AFDXSmileMetric class]])
        {
            // capture the smile value and do something
            float v = [metric.value floatValue];
            . . .
        }
        else if ([metric isKindOfClass:[AFDxBrowFurrowMetric class]])
        {
            // capture the brow furrow value and do something
            float v = [metric.value floatValue];
            . . .
        }
        else if (. . .)
        }
    }
}
```



Stopping the Detector

```
[detector stop]
```

- The detector is stopped
- Camera case: detector will release the camera
- Video file case: detector cease processing the video file



Other Events of Interest

- When a face appears

```
- (void)detectorDidStartDetectingFace:(AFDXDetector *)detector;  
{  
    NSLog(@"Now we see you!");  
}
```

- When a face goes away

```
- (void)detectorDidStopDetectingFace:(AFDXDetector *)detector;  
{  
    NSLog(@"Now we don't!");  
}
```



What's Coming in the Affdex SDK

- Multiple face detection
- Improved performance in face detection and tracking
- More classifiers
- Additional criteria
 - Age, Gender
 - Attention, Heart Rate



DEMO



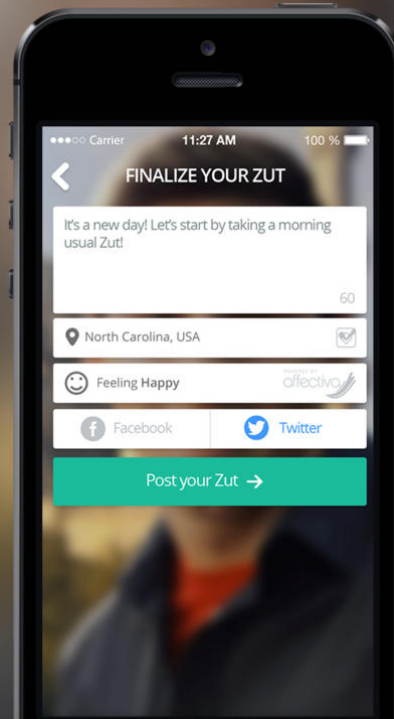
EXPLORING APPS AROUND EMOTION



We can detect how you feel
without even you knowing.



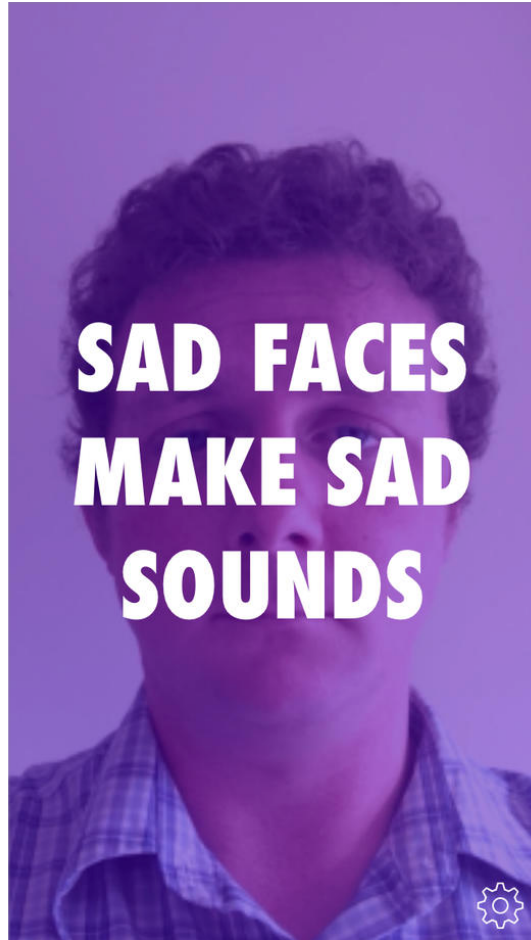
Share your Zuts with friends
on Facebook and Twitter.



Interact with your friends
through the flow.



ZUT



Smilophone





Flinch



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