

# Mapping Emotive Biometrics to Social Media Data

Prepared by Olivia Jeffers  
via Compassionate Technologies

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Do you believe that you can tell how someone is feeling by looking at their face? If you have watched the popular show ‘Lie to Me’ then you might believe that you can spot a liar by reading their face, or spot a genuine smile with crinkled eyes (Duchenne’s Marker) versus a fake one. These markers are based on the Facial Action Coding System (FACS), which theorizes that people across cultures express emotions using the same facial expressions. FACS has been used to train law enforcement professionals, and is based on years of cross-cultural studies.

But, what if FACS is wrong, but seems right? New studies are emerging from the field of affective neuroscience that point to systematic oversights in methodology that cover cultural bias in the experiments. New theories point to emotions as predictive constructions of the mind, which is trying to make sense of and budget energy for the billions of individual body sensations occurring in every moment. Similar to waves on the surface of a deep ocean, we experience the grand summary of these sensations as **affect**, or general mood or feeling, at any given moment.

This means that among a cultural group that shares similar mental concepts about emotions, FACS might appear accurate — but the danger is in believing that a FACS-based analysis will hold accurate for members of different cultures, such as an American law enforcement officer on the lookout for a potential ISIS member. In this case, culturally specific facial cues might be more accurate and life saving.

So, if not by using the face, how do we measure emotion?

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## I. Proposed Methodologies

By taking away the middle-man of emotive words or facial expressions, we can go straight for affective reality, by measuring physical sensations and reactions in the body.

**Emotive Biometric Data.** I propose to measure ‘emotional muscles’ using electromyography (EMG) tests in conjunction with fMRI, heart rate, breath rate, blood oxygenation, and skin conductance data. Emotional muscles are the important or tiny muscles that are difficult to consciously control or notice. They are linked to breathing and feelings such as ‘butterflies in my stomach’ or ‘chest tight with anxiety’, i.e. the sternocleidomastoid (SCM) in the neck, masseter muscles in the face, or intercostal muscles in the chest.

**Word and Concepts Data.** The biometric data will be recorded while the subject views certain words, combinations of words, and then words in various social media contexts (Twitter online,

Twitter mobile, Snapchat, Facebook mobile, Facebook NewsFeed, etc.) Does the visual venue significantly alter the biological emotive reaction? Or is the reaction based on words alone? Care should be taken to measure emotive biometrics across cultural groups.

**Connecting Biometrics to Social Media Data.** Once enough data is collected, we can begin to use machine learning algorithms to find the patterns. By letting machines, and not human scientists, interpret the data, we are minimizing potential for human bias. If we can reliably match certain biometric states to certain words in social media, then we can effectively map how people are feeling at any given time, using social media data.

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## **II. Use of Methodologies**

**Prediction.** These methodologies can be used to geographically map spread of affect, to predict rising physical tensions that may lead to violence. Events such as the alt-right protest in Charlottesville and Occupy Wall Street were likely easily predictable by any human active in those social circles. Because of the filtered view of the Internet, it is difficult for an alt-right member to be aware of what is going on with the Occupy Wall Street crowd, and vice versa.

**Antidote & Resolution.** If certain words or concepts make certain populations feel unpleasant sensation, then an antidote of healing words and emotions can help those populations deescalate negative affect. Combined with cultural awareness and education, the conceptual source of unpleasant affect can be decoupled from the sensations, allowing for deeper and non-judgmental peace without resorting to manipulative and/or secretive propaganda techniques.

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## **III. Warnings for Use of Methodologies**

Extreme care should be taken to remove bias, as in all scientific experiments, and the predictions should be used to gain insight into potential conflict and create cost-effective and life-effective verbal and non-violent methods for resolution. These predictions should never be used for predictive punishment or punitive action.

## IV. Practicalities, Legalities, Funding

### Who has the resources to do these experiments already?

*Currently asking around.*

Emotion Recognition in the Wild via Convolutional Neural Networks and Mapped Binary Patterns

Affective Neuroscience Lab, Northeastern, Feldman-Barrett

Affectiva

Apple's Secret Exercise Lab

### Funding

#### What grants are there available?

NSF, DOD, Templeton

List from Northeastern Affective Neuroscience Lab

#### Venture Capital

Collaborative Fund, others

### Team (volunteer basis)

*(tentative commitments)*

2 Machine Learning Professionals

1 Social Media Data Analyst

1 Science and Grant Writer

*(needed)*

Data Scientists

Emotive Biometric Measurers (collaboration needed with medical lab)

### Plan of Action

Begin to establish Compassionate Technologies as research nonprofit (1-year)

Draft research methodology, research proposal

Begin contacting labs, soft circling commitment to assist if funding comes through

Apply for funding, NIH Grant Funding, Templeton, etc.