Emotion Recognition from Voice in the Wild

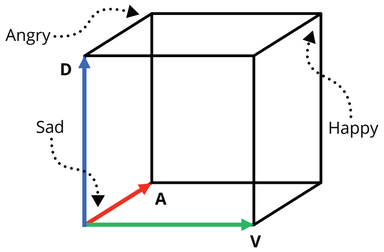
Introduction

Accurately recognizing emotion from voice is important in defense applications such as speaker profiling and human-machine teaming, but is currently infeasible. We introduce a new, continuous speech emotion recognition database, CMU-SER, and a set of micro-articulometry techniques that can capture finer nuances than the current state of the art.

The CMU-SER Database

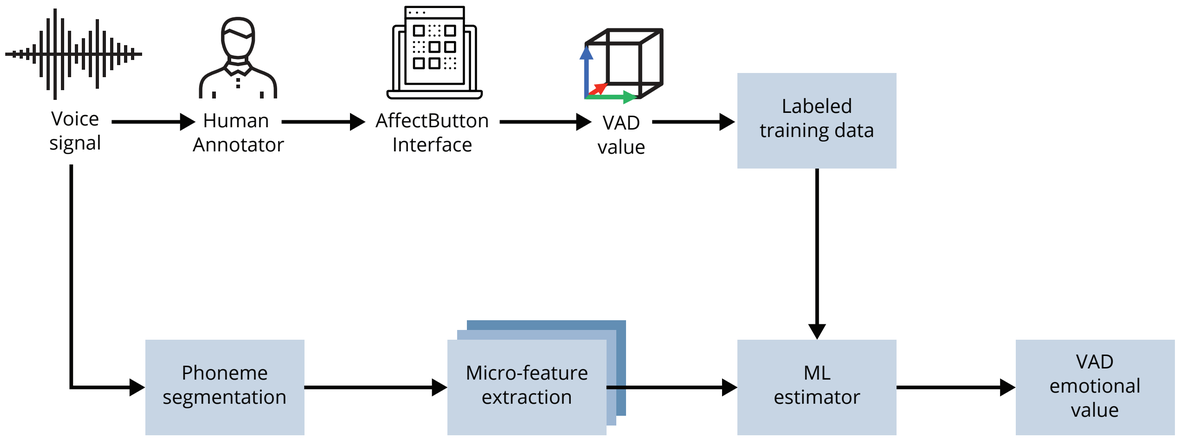
The CMU-SER database, to be released at the end of 2019, is the largest ever speech emotion recognition database. In-the-wild audio clips come from podcasts, radio, and television, and are annotated via crowdsourcing. Annotators used an interface based on the VAD emotional state model that allows users to pick from a continuum of emotions instead of discrete labels. Several annotators label each audio clip. CMU-SER features:

- Over **29,000** annotated audio clips, totaling over **54** hours of voice recordings
- Over **324,000** unique annotations



The VAD model: Valence, arousal, and dominance characterize affect in three dimensions.

We introduce a new in-the-wild **speech emotion recognition database,** and **novel extraction techniques** built with machine learning and micro-articulometry.

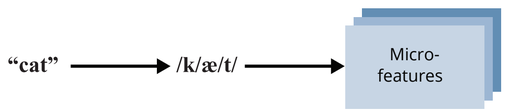


System diagram. Voice data is labeled by crowdsource participants using the AffectButton interface. This labeled data is then used to train classifiers and predict emotion.

The AffectButton: An interface first introduced for self-reporting human affect. The facial icon changes based on mouse movement, and each expression corresponds to a unique VAD score.

Micro-Articulometry and Machine Learning

Prior work in speech emotion recognition typically operates at the utterance level—the level of the spoken word or statement. Instead, our approach operates at the phoneme level—the level of the constituent units of speech—using micro-articulometry techniques. We use fine-grain voice features, such as formant position, in conjunction with deep learning to predict emotional state. Results will be published at the end of 2019.



Micro-articulometry: The measurement and modeling of articulatory properties at the phoneme level.

Example Voice Features:

- Diplophonicity
- Flutter
- Formant bandwidth
- Formant position
- Vocal fry
- Glottalization
- Nasality
- Raspiness
- Shimmer
- Tremor
- Voicing onset time
- Wobble

Micro-articulatory voice features are used to train classifiers and predict emotion. Each voice feature requires its own set of signal processing algorithms to extract and measure.

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