AIBO – Artificially Intelligent Brain Opera – An Artistic Work-in-Progress Rapid Prototype

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Abstract

Cloud-based analytic engines for emotionally intelligent artificial intelligence like Google API, IBM Watson, and others function through semantic analysis of speech-to-text input. They apply weighted values based on magnitude or strength of an emotional statement, and score an overall emotional analysis of the statement's positive, negative, or neutral qualities. These types of analyses can also be used by both speech to text and text to speech specialized chatbots, and incorporated into analytic engines tasked with making critical decisions on customer service, healthcare, jurisprudence, social sorting, employment, and migration among others. DARPA and Facebook Building 8 are developing initiatives for semantic analysis of thoughts in the brain that interact directly with computers and other devices that also rely on specialized types of semantic analysis. [1][2]

This AIBO work-in-progress opera depicts a proof of concept, initial rapid prototyped interaction between an emotionally intelligent artificial intelligence entity powered by machine learning and the human brain. It represents the sterility of algorithmic decisions versus a sentient human being's emotions, with a subject's brainwaves visible on their body highlighting inherent tensions between implicit mathematical analysis, and complex human irrationality.

Rapid Prototyping Proof of Concept

Over the course of four Saturdays an Art-A-Hack™, rapid prototyping collaboration was held, focusing on emotionally intelligent artificial intelligence and EEG wireless brain computer interfaces. [3] Two main aspects of the AIBO were developed. The first, written in Python software translated a person's speech into text that underwent emotional semantic analysis in the Google Cloud API, returning values of magnitude and score. Emotional sentiment analysis looks at all the input text in a sentence and decides the strongest emotion in order to determine if it is positive, negative or neutral. It does not indicate subtle differences between an emotion like "happy" and "joyful," determining both to be "positive." Neutral scores are texts with low emotion, or conflicted emotions that cancel out their respective weighted values resulting in a reading of 0. Magnitude is defined as the strength of an emotion, either positive or negative between 0.0 and +infinity that is not normalized. Score is then calculated as the overall emotion of a statement, positive or negative. [4]

Fig 1. *AIBO Proof of Concept*, 2018, Brainwave headset/LED bodysuit performance demonstrating the relationship between the brainwave of attention and a positive emotional sentiment analysis AI. Copyright Ellen Pearlman

For the proof of concept performance a subject wore a NeuroSky brainwave headset, and a LED display of an oversized necklace hooked up to an Arduino, which received data from a

NeuroSky headset. Simple questions were asked about feelings such as "What is something you hate?" or "What is something you love?" The verbal response lit up with the colors aqua for the brainwave of meditation, and magenta for attention. Concurrently the speech-to-text semantic analysis function analyzed the reply, and it was projected as a java script graphic also connected to their brainwaves. The projected graphic displayed attention as a magenta lattice and meditation as an aqua lattice. The size of the graphic would change according to the emotional score of the subject's response. A positive response would display a large lattice. Negative scores would display a small lattice. The change in brainwaves and the weighting of emotional scoring occurred simultaneously.
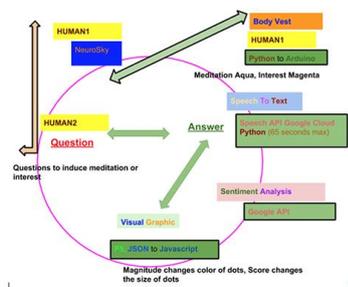

Fig 2. *AIBO Flow Chart*, 2018, brainwave headset/LED Bodysuit, Copyright Ellen Pearlman

Conclusion

A proof-of-concept rapid prototype was built in just four days to demonstrate the relationship between a subject's brainwaves consisting of attention and meditation, and an analysis of an emotionally intelligent artificial intelligence parsing of a verbal statement from speech to text using a NeuroSky headset, an LED necklace and the Google cloud-based API.

This prototype is the first step in developing AIBO, an artificially intelligent emotionally intelligent brain opera between a human being and an algorithmic machine learning entity. This sample demonstrates conclusively that a further build out is possible, including a feedback loop between various EEG brainwave

states; an artificial body of light; speech-to-text, and text to speech customized repositories; and an AI analysis in the computing cloud.

References

1. Eliza Strickland, *Director of Typing-by-Brain Project Discusses How Facebook Will Get Inside Your Head,* IEEE Spectrum: https://spectrum.ieee.org/the-human-os /biomedical/bionics/facebooks-director-of-typing-by-brain-project-discusses-the-plan.
2. National Research Council, Emerging Cognitive Neuroscience and Related Technologies: https://www.nap.edu/catalog /12177/emerging-cognitive-neuroscience-and-related-technologies.
3. Art-A-Hack, *Special Edition 2018*: https://artahack.io/projects/sentimental-feeling-second-skin/.
4. Google, Natural Language: https://cloud.google.com/natural-language /docs/basics.

Biography

Ellen Pearlman, an Assistant Professor, Senior Researcher at RISEBA University, Latvia and faculty at Parsons/New School University, New York, is a new media artist, critic, curator and writer. She is Director of ThoughtWorks Arts, President of Art-A-Hack ™ and Director of the Volumetric Society of New York. This prototype was made with the assistance of programmers Sarah Ing, Doori Rose, Danni Liu, and LED necklace builder Cynthia O'Neill.