MoodBox: Vocal Screening for Depression and Gamified Relief

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Depression is a mental health disorder that affects over 280 million people worldwide and negatively impacts mood, energy, and productivity. Despite its prevalence, misdiagnosis rates reach up to 55% due to subjective assessment by physicians that focus on physical symptoms and imprecise health questionnaires. Moreover, stigma around mental health prevents those who are suffering from seeking out diagnosis due to fear of prejudicial attitudes. MoodBox is a web application that offers a more objective and remotely operated screening system for depression by combining natural language processing and spectral analysis of vocal features into a novel neural network. Prior research has shown that patients with depression tend to speak in a lower, flatter tone with reduced speed and use vocabulary reflecting negative emotions and absolutist thinking. Thus, MoodBox's screening model takes in user audio to calculate descriptive vocal features from the audio spectrum and create word embeddings from transcribed transcripts that are then fed into bidirectional long short-term memory layers. Leveraging both audio and textual data, the bimodal neural network achieves over 85% accuracy, outperforming clinical diagnoses. In addition, MoodBox provides fast-paced video games to reduce depressive rumination and evoke a positive mood through in-game success, bypassing the monetary and geographical barriers of conventional treatments. This research suggests the high potential of MoodBox to readily screen for depression at no cost to patients and provide relief capabilities to prevent the progression of depression across the globe.

Awards Won:
Second Award of $2,000