Identifying the Psychological State of Human Subjects with Machine Learning Algorithms

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Topic Summary

In social interactions, people usually produce subtle signals (verbal and non-verbal) that support interaction and reveal their internal mental states. For example, people use different voice pitches, facial expressions, hand movements, etc. in their communications during conversations to present their inner thinking. By analyzing these signals, a system can identify people's psychological states like mood, desire, anxiety, depression, and so on. The aim of this project is to employ machine learning algorithms to analyze signals collected from human subjects to identify their psychological states.

Background

Affective computing which is defined as the study and design of systems that can recognize, interpret and process human affects is a growing field in artificial in telligence. While the importance of social signals in everyday communications is evident, the research in designing algorithms to detect social signals is progressing rapidly [5]. At the moment research is mainly performed on behavioral cues like gaze exchange, smiles, blinks, crossed arms, laughter [6] and head nods [4]; however, the studies of human social signals like empathy, flirting, attention, politeness, e tc. still are at their early stages [7]. Improvements in this area should result in a better understanding of cognitive and social sciences as well as the development of more naturalistic computing interfaces.

In social interactions, non-verbal behavior is a set of signals that reveal information about personality, feelings, mental state, etc [1]. This is performed via a set of non-verbal behavioral cues [2] that are displayed and perceived mainly unconsciously [3]. Behavioral cues are social signals that last for short intervals of time (in terms of milliseconds) as opposed to behaviors (like politeness or empathy) that last longer (in terms of seconds or minutes) [3].

Data Collection

In this research, we plan to collect a set of data from human subjects which can include voice and video signals. The candidate should participate in collecting, pre-processing, labeling, and preparing data. This includes recording voice and video signals from the subjects, editing the files if necessary, and preprocessing them for feature extractor algorithms. While there are some open-source feature extractor software available (like Opensmile and Openface), the candidate may need to develop algorithms to extract features.

Approach

Once the data are labeled and features are extracted, statistical analysis is performed to find significant features. Then via feature selection methods, the best features will be found and a learning algorithm will be developed to automatically identify psychological state of the subjects. The research tries to answer the following questions:

1- What type of signals contain more representative features?
2- What features are better in predicting the psychological states?
3- How to find the best set of features for the task?
4- What machine learning algorithms are better at predicting the psychological states?
5- How the current machine learning algorithms can be improved to perform better on these tasks?
6- What psychological states can be predicted by current machine learning algorithms?

Contact

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