

論文内容の要旨

博士論文題目

Achieving Socio-affective Communication Support through Behavioral and Physiological Signal Processing

社会感情的なコミュニケーションの支援を実現するための生体信号処理

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(論文内容の要旨)

Socio-affective communication is associated with producing a good relationship. In this thesis, we work toward achieving socio-affective communication support. First, we investigate the relationship between social performance and behavioral signals. Identifying behavioral signals that affect social performance would help people realize the required skills. There are only English and French versions of the scale that have been used to measure social performance. We developed and evaluated a Japanese version of the scale. Then, we analyzed social performance measured by the scale and behavioral signals. We show the characteristics of behavioral signals that are related to the achievement of high social performance. Second, we propose a music generation system to induce appropriate emotions. Emotions are one of the factors that influence behavioral signals. People should regulate their emotions to make good socio-affective

communication. Music is often used for emotion induction. We try to use music to achieve appropriate emotions for encouraging socio-affective communication. However, the emotions felt when listening to music vary from person to person, and customized music is required. Therefore, we develop a system that predicts emotions using an electroencephalogram (EEG) and generates music based on the predicted emotions to induce a specific emotion. To predict emotions, we investigated the structure of emotion prediction models and how to train them using a small amount of EEG data. We made a system that generates adaptive music based on emotions predicted by EEG and evaluated the performance for emotion induction.

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(論文審査結果の要旨)

This thesis examines the relationship between subjective social performance and behavioral cues. A Japanese version of the social performance scale was newly developed and evaluated. Subsequently, an analysis was conducted on social performance in conjunction with behavioral signals in various social pathologies. Additionally, the thesis proposes a music generation system to elicit emotions to enhance socio-affective communication. It delves into the architecture of emotion prediction models and methods for training them using a small amount of EEG data. Finally, she built a system to generate adaptive music based on EEG-detected emotions, and its effectiveness was clearly evaluated.

Her research aims to construct a system that supports socio-affective communication through behavioral and physiological sensing techniques. The candidate successfully examined human gaze behaviors on online communication platforms, uncovering remarkable patterns associated with social anxiety and alexithymia, particularly regarding eye contact with the interlocutor. Beyond data analysis, she proposed an adaptive music generation system based on EEG-detected emotions. This thesis provides an essential analysis for understanding and facilitating interactions between humans and between humans and machines.

A series of her research resulted in two high-quality peer-reviewed international and domestic English journal papers and five peer-reviewed international conference papers. As a result, the thesis is sufficiently qualified as a doctoral thesis in engineering.