Quantifying Tactile Emotional Communication through Anthropomorphic Artificial Skin

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Abstract

Interpersonal touch plays a crucial role in social interaction and communication, preceding verbal language (Hertenstein, 2002/2009; Ackerley et al., 2014). While previous studies have shown the effectiveness of touch in conveying emotions, the specific strategies and physical characteristics of tactile interaction remain less explored (Jung et al., 2015; Masson & Op de Beeck, 2018). This study aims to quantify tactile emotional communication strategies through anthropomorphic artificial skin (e-skin) (Massari et al., 2022) with sensing capabilities used to extract quantifiable signals and features related to tactile communication. Additionally, the study aims to establish a tactile lexicon by classifying individual emotions based on extracted features. The findings will contribute to developing biologically faithful tactile technologies and designing naturalistic stimuli to be employed in research and experimental practice. Participants are instructed to communicate emotions by touching the e-skin using the tactile modalities they deem most effective. The signals extracted are visualized as wavelengths and analyzed using signal segmentation and Dynamic Time-Warping (DTW) techniques. Distinct features associated with each emotion are identified, and patterns across the study population are detected. Preliminary analysis of a sample population revealed recurring patterns characterizing individual emotions conveyed through touch representative of tactile modalities employed (e.g., caressing, grabbing, etc.). Within-subject DTW demonstrated consistency between trials, with participants using the same touch modalities for the same emotion and different modalities for different emotions. Moreover, the promising ongoing between-subject analysis showed congruency of tactile patterns revealing the possibility of communicative modalities common among different subjects.

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