Analysis and Modeling of Haptic Interaction

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Abstract

Nowadays modern computer systems are mainly operated through natural user interfaces. This input scenario can be a problem for elderly people or people with disabilities. Therefore it is important to support these users' input activities. A possible solution for this problem is the automated adaptation of interaction. On the one hand this solution helps people to interact with a natural interface in general; on the other hand it also helps users to avoid input errors. This is also very important in the industrial sector because productivity could be increased due to fewer erroneous interaction activities.

For automated adaptation it is important to firstly analyze a user's interaction abilities. The results of this analysis are different features which are stored in a user model. These features are the basis for the adaptation process of an interaction scenario or user interface. This master thesis mainly focuses on *haptic- and multimodal interaction*, especially the interaction through physical pressure by using a standard smartphone and its built-in sensors. At first there are three different approaches described for measuring physical pressure with a smartphone. The different approaches are vibration-, magnetic- and audio-based. Each interaction approach uses the *Myo* armband to generate haptic feedback. Each of the interaction approaches consists of interaction tests which are executed by users of the target group. The results of these interaction tests include different features which are stored in a user model and give an impression of how well the user performed. The type of the designed user model is based on a feature-based approach. The raw data of the executed interaction are transmitted to a server application which calculates each feature's value. Therefore, there are two main parts of the master thesis: First, the description of the architecture of the user model and second, the explanation of interaction analysis and the transmission process of the interaction data from the smartphone to the analysis application on the server. The interaction tests, the transmission process, and the management of the user model were already implemented in the context of the thesis. The aforementioned interaction tests were also evaluated in a user study with several people with disabilities in a lab setting.

The link to the full version of this master thesis will be published on the ABIS website.

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