First Impressions in Human-Agent Virtual Encounters

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Abstract

Relational Agents (RAs) are virtual anthropomorphic characters able to engage in multimodal (i.e. using both verbal and nonverbal behavior) face-to-face interactions with users in real-time. RAs are also capable of establishing and maintaining a long-term relationship with the user, which has been shown to improve task outcomes in application domains such as education, coaching and entertainment. In all of these applications, it is crucial that users do not outright reject the agent after the initial moments of interaction, therefore first impressions become important. This thesis presents a theoretical framework for analyzing and modeling human nonverbal behavior for managing impressions, and how RAs can exploit this in their first encounters with human users. The focus is on nonverbal behavior (smile, gaze and proxemics) aimed at exhibiting personality and interpersonal attitudes. First the thesis describes the theoretical background of nonverbal communicative behavior in the context of first impressions among humans. It then presents a theoretical framework demonstrating that impressions of an agent's personality are quickly formed by users based on proxemics, whereas interpersonal attitude is conveyed through smiles and gaze behavior. The thesis furthermore demonstrates that interpersonal attitude has greater impact than personality on a user's decision to spend time with the agent. The design and implementation of a SAIBA compliant computational solution built on this framework is presented. This solution automates the real-time generation of nonverbal behavior for an RA during a greeting encounter. The multimodal behavior exhibited accomplishes both to serve the communicative functions associated with greetings as well as managing impressions of personality and interpersonal attitude towards the user. The agent's communicative functions are represented in Function Markup Language, an emerging SAIBA standard, which this thesis furthers through a detailed design specification and concrete language proposal. Finally, a practical application in the context of a 3D Virtual Learning Environment is demonstrated and the impact and further developments of this thesis discussed.