Minimlist approach to show emotions via a flock of smileys

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Abstract

This paper proposes and explores an approach to express emotions which intends to minimize the user's expectations. The approach uses a flock of virtual beings where each virtual being is represented as a simple smiley. Emotions are represented in terms of the arousal and the valence dimensions and they are visually expressed in a simple way through the behaviour and appearance of the individuals in the flock. In particular, the arousal value parameterizes the flocking algorithm, and the valence value determines the curvature of the smiley's mouth. Furthermore, the paper describes a user experiment which investigated whether the arousal and the valence expressed by our model are appropriately perceived by the users or not. The results suggest that combinations of movement and mouth curvature are perceived correctly as particular emotions, that movement and mouth curvature are perceived as arousal and valence respectively and that they are independent of each other. The experiment also compared our approach with both a state-of-the-art virtual character and a minimalist character in terms of user's expectations. The results suggest that the proposed model generates less expectations than the compared models.

1. Introduction

The digital treatment of emotions is a rising research area. Three major research clusters can be outlined: sensing and recognizing human emotional signals, modelling emotions through digital architectures, and expressing emotions via digital media. The work presented in this paper falls within the latter area.

Nowadays, virtual characters are the most frequently used technique to show emotions in digital contexts. Thus, the research on creation and animation of virtual characters is amply developed and has already provided many useful tools and techniques, including the expression of emotional states through both gestures and postures. The idea behind more human-like computer interfaces, by using embodied intelligent agents, is making them more engaging. Nevertheless, at the same time, a conflict arises. As stated by Norman (1994), people have over-exaggerated expectations about intelligent agents, since much more appears to be promised than can be delivered. Norman argues that it is partly due to people's tendency to false anthropomorphizing, seeing human attributes in any action that appears in the least intelligent. As stated in Dehn and van Mulken (2000), the human-like behaviour of the agent in some aspects may lead the user to believe that the agent resembles human beings in other cognitive and emotional aspects as well. This generalization leads users to ascribe capacities to the system that it does not possess, thus leading to wrong expectations about the system's behaviour.

The danger of employing animated virtual characters is that wrong expectations are easily generated. Expectations can be defined as how we expect a system to respond and react when we use it within the study of human computer interaction. Noyes (2006) has recently warned that while 50 years ago expectations were recognized as having a role to play in human–machine interactions, in recent times expectations are often neglected to a great extent in the design process.

Expectations are intrinsically associated to consistency, which we define as the match between what people expect and what they perceive when actually using the system. In design terms, consistency can also be interpreted as compatibility (i.e., compatibility between what we expect and what we get). In this sense, the more realistic and complex a virtual character is, people expect a more real-life like behaviour which, on the other hand, makes design consistency difficult. Thus, in order to decrease users' expectations and make consistency easier, we propose the use of simple and iconic characters.

According to the comic theorist Mccloud (1994), the simplest and most iconic character is a face consisting of a circle containing only two points (representing the eyes) and a line (representing the mouth). Simple and iconic characters have already been proposed to express emotions, but none as simple. The simplest models we found in literature express the emotions through the mouth curvature (influenced by the valence value), the eye opening (influenced by the arousal value) and the eyebrow shape...