Chapter VII
Infering Emotions and Applying Affective Tactics for a Better Learning

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ABSTRACT

This chapter aims to present an animated pedagogical agent, called Pat, that has the role of providing emotional support to the student: motivating and encouraging him/her, making him/her believe in his/her self-ability, and promoting a positive mood in him/her, which fosters learning. This careful support of the agent, its affective tactics, is expressed through emotional behavior and encouragement messages of the life-like character. In order to respond appropriately to the student, the agent infers the student’s emotions: joy/distress, satisfaction/disappointment, anger/gratitude, and shame, from the students’ observable behavior; that is, their actions in the interface of the educational system. It adopted a mental states approach, more specifically, the BDI model, to implement the affective user model, the affective diagnosis, and the selection of the affective tactics, because it allows simple revisions and frequent modifications on the information concerning the student, which is convenient since emotions are very dynamic.

INTRODUCTION

Due to their motivational potential, many educational systems have been implemented as animated pedagogical agents (André, Rist, & Muller, 1999; Johnson, Rickel, & Lester, 2000; Lester, Voerman, Towns, & Callaway, 1999b; Paiva, Machado, & Martinho, 1999). The animated pedagogical agents are tutoring agents that use multimedia resources to provide the student with an animated character with characteristics similar
to ones of intelligent live creatures. These characteristics, such as facial expressions, gestures, and understanding of human emotions, with a good dialogue interface with the user, turn the agents more attractive to the students since they explore more life-like modes of interaction. Animated pedagogical agents offer great promise for increasing the communication capacity of educational systems (Johnson et al., 2000), amusing the student (André et al., 1999) and increasing the ability of these systems to engage and motivate the students (Lester, Converse, Kahler, Barlow, Stone, & Bhogal, 1997). They exploit the natural tendency of people to engage in social interactions with computers, termed The media equation by Reeves and Nass (1996).

On the other hand, psychologists and pedagogues have already pointed out the way that emotions affect learning (Goleman, 1995; Piaget, 1989; Vygotsky, 1994). According to Piaget (1989), it is incontestable that affect has an accelerating or perturbing role in learning. A good part of the students that are weak in mathematics fails due to an affective blockage. Coles (1998) suggests that negative emotions can impair learning; and positive emotions can contribute to learning achievement.

This way, some educational systems have given attention to generation of emotion in pedagogical environments (emotion expression and emotion synthesis) (Abou-Jaoude & Frasson, 1998; Lester et al., 1997; Lester, Towns, & FitzGerald, 1999a; Paiva et al., 1999) and to the student’s emotion recognition (Conati, 2002; Del Soldato & De Boulay, 1995; Elliot, Rickel, & Lester, 1999), pointing out the richness presented in affective interaction between student and tutor.

Researchers also observed the importance of integrating emotions in animated pedagogical agents (Elliot et al., 1999; Lester et al., 1997; Lester et al., 1999a; Okonkwo & Vassileva, 2001; Paiva et al., 1999). According to Elliot and colleagues (1999), an emotive pedagogical agent, which shows that it cares about the student’s progress, can encourage the student to give more attention to her/his own progress. Besides, the use of emotions makes possible to transmit more enthusiasm to the subject to be learned and, thus, to the learning. They make learning become more entertaining/funnier and motivate the student (Lester et al., 1997; Okonkwo & Vassileva, 2001).

This chapter aims to present our efforts to handle student’s emotions in educational computing systems. We describe an animated pedagogical agent, called Pat, that has the role of providing emotional support to the student: motivating and encouraging him/her, making him/her believe in his/her self-ability, and promoting a positive mood in him/her that fosters learning. This careful support of the agent, its affective tactics, is expressed through emotional behavior and encouraging messages from the life-like character. Due to human social tendency of anthropomorphizing software (Reeves & Nass, 1996), we believe that a software agent can accomplish this affective role. In order to choose the adequate affective tactics, the agent should also know the student’s emotions. The proposed agent recognizes the student’s emotions: joy/distress, satisfaction/disappointment, anger/gratitude, and shame, from the student’s observable behavior, that is, his/her actions in the interface of the educational system. The inference of emotions is psychologically grounded on the cognitive theory of emotions. More specifically, we use the OCC model (Ortony, Clore, & Collins, 1988), which is based on the cognitive approach of emotion and can be computationally implemented.

This chapter is organized as follows: first of all, we present an introduction about emotions and affectivity. We also introduce the OCC model, a psychological model of emotions that is based on the cognitive approach of emotions and that is used by this work to ground the inference of emotions. In the section entitled “Affective Computing” we introduce affective computing: a research field of the artificial intelligence area interested in studying, modeling, and implementing emotions