

Chapter VII

Affective Issues in Adaptive Educational Environments

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ABSTRACT

Research in computer science recently began to take emotions into account because their influence in perception, reasoning, decision-making and learning is considered catalytic. In learning the appropriate sentimental background constitutes a significant requirement in order to be effective. However, many designers of adaptive learning systems develop their systems without taking into consideration the emotional factors that are related to the mood and the personality of the student. This omission deprives the learning process from a very important pedagogical dimension. In this chapter, the focus is on affective factors that are involved in the learning process and can be considered in designing adaptive learning environments. We present first the basic theories and models for affective computer. We deal with methods of affective elicitation and representation of affective knowledge. We then present affective educational applications. Finally, we discuss issues and future trends of affective computing in relation to the learning.

INTRODUCTION

From one point of view, human beings are intelligent information systems whose everyday activities are characterized by social, cognitive and affective attributes. Especially the affective

attribute is the most critical one in order for some person to interact effectually with other people and communicate with clarity his ideas. Regardless of the fact that emotions are a determined and discriminated factor for the human relations, almost until recently the emotional dimension

was absent from artificial intelligent information systems which are constructed as a mirror image of human beings.

A new field, that is located in the scientific area in the intersection of artificial intelligence, cognitive psychology and physiology, has come to surface with the promise to cover this deficiency and offers a wide range of methods, techniques and applications which take into account affectivity. This field is called affective computing and owes its name to Rosalind Picard who studied and developed in her book "Affective Computing" (Picard, 1997) methods and techniques related to the computer's capability to recognize, model, respond, and express emotions in order to interact effectively with users. These features which are basic components of human emotional intelligence (Goleman, 1995), remain today major concerns of the designers of affective machines.

Affective computing is a hopeful and fertile domain that promises to contribute to the integration of emotional and rational aspects of the human's behavior in machines. Its main purpose is the association of computers with the human beings' abilities such as the observation, interpretation and generation of emotions and the further improvement on the intelligence of computer systems and the human-computer interaction. While the effort to investigate emotional processes and to implement affective models is not new, the availability of accurate methods and advanced techniques in computer science contributed decisively to the implementation of powerful tools in order to support, refine and evaluate psychological theories of emotion.

Despite the importance of the affective aspect, in most educational systems this crucial parameter seems to have been ignored, since the significant process of learning is supported by methods which are mainly concentrating on the cognitive abilities of the student. Indeed, these systems in their majority develop their educational dimension, based only on cognitive parameters such as learning styles, without taking into consideration

the emotional factors that are related to the mood and the personality of the student. Many Web learning designers realize that this omission deprives the learning process from a very important pedagogical dimension. Thus, web designers are at the forefront of shifting attention to affective subjects that influence learning.

As a result, a notable few contemporary educational systems designers began to consider their operation under an affective perspective with the aim of modeling the emotional processes which are taking place during the educational session (Andre, 1999; Conati & Zhou 2002; Lester et al., 1999). Work conducted by Keller (1999), Oren and Ghasem-Aghaee (2003) and Martinho (2000), correspond to affective techniques are being incorporated more frequently in educational systems with the aim of recognizing student's emotions, mood and personality. These educational researchers have begun to examine how traditional student model can be modified in order to be capable of storing affective information.

At this time affective computing is one of the most active research areas in instructional systems and it appears to have increasingly serious attention. Innovative technologies such as speech recognition, text-to-speech, video processing and virtual reality are driving this interest and are providing sufficient tools to construct powerful affective systems. In spite of this ultimate progress, according to Picard there are two major concerns in this field. The first one is how to provide a computer system with a reliable inference engine for the detection of user's affective state and the second is how to devise an efficient mechanism to generate believable emotions and behaviour in human-like artifacts such as animated agents and robots.

The aim of this chapter is to deal with issues, which involve the field of affective computing. For this reason it concerns theories, methods, techniques, trends and applications in the aforementioned field. The structure of this chapter is articulated in order to comprise the following

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