An Affective Model for Personalized Learning in Adaptive Educational Hypermedia Systems

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1 Introduction

The educational process is a complicated interaction between the teacher, the student and the environment where it takes place. It is important for a successful educational transaction for the teacher to recognize the learning and emotional needs of his student and to adapt the teaching and his behavior accordingly.

In this poster we present an affective model, which augments an Adaptive Educational Hypermedia System (AEHS), with affective dimensions. This model correlates the individual preferences of a student with his personality and his emotional states. For this purpose, the model recognizes these affective factors and adapts accordingly its teaching and pedagogical strategy.

The AEHS are intelligent systems that improve student’s performance by adapting their operation according to the student’s needs and interests supporting them with the appropriate learning strategy. An AEHS interacts dynamically with the student, using adaptation techniques like adaptability and adaptivity [3] and uses the student model, the domain knowledge, and the teaching model to achieve the adaptation of the system via the adaptive engine [2]. Thereby, an AEHS determines the educational content and the teaching process in a way that appertains the teaching in a real classroom.

In a live educational process, the teacher takes into consideration the emotional state of his student by motivating him effectively in order to achieve the desirable learning goals. Many researchers have demonstrated the pedagogical value of emotions and the personality of the student and they have incorporated this perception in their educational systems [1], [4], [6].

Our proposed model is being realized by a module called Affective Module (AM), which interacts with an AEHS.

2 The Affective Model

The operation of the AM is heavily based on the five factor model of personality (FFM) [7] and the OCC cognitive model of emotions [8]. The AM is being attached to the AEHS providing the system with the essential “emotional” information in order to determine the strategy of learning in collaboration with the cognitive information.

The AM has three main components: The Emotional Component (EC), the Mentor Component (MC) and the Visualization Component (VC), which are respectively responsible for a) the recognition of student’s personality, mood and emotions during the learning process, b) the selection of the suitable teaching and pedagogical strategy and c) the appropriate visualization of the educational environment.

The EC is composed of three subcomponents, the Personality Recognizer (PR), the Mood Recognizer (MR) and the Emotion Recognizer (ER), which are respectively responsible for the recognition of personality, mood and emotions of the student during the learning process.

When the student uses the system for the first time, the PR subcomponent selects a suitable dialogue specified by the FFM in order to assess the type of student's personality. As a result, the student's traits are being recognized and are being used by the MC for the suitable selection of the pedagogical and the teaching strategy. The MR subcomponent provides the system with a dialogue that can elicit emotions depending upon the semantics and its context. Based on this dialogue the student's mood is recognized either as positive or negative. In our approach good mood consists of...
emotions like joy, pride, hope, satisfaction, gratification, love and bad mood consists of emotions like sadness, fear, shame, frustration, anger, disappointment, anxiety. As a result, we have an initial evaluation about the current emotions of the student. Finally, the ER subcomponent at every moment is aware of the student's emotions during the learning process. Several ways have been proposed about the recognition of emotions. Some are based on the detection of physical and biological signs [11] and others, are based on AI techniques like Dynamic Decision Networks (DNNs) [4], or Transition Networks [10].

The MC consists of two subcomponents, the Teaching Generator (TG) and the Pedagogical Generator (PG), which are responsible respectively for the appropriate teaching and pedagogical strategy and provides the system with suitable examples and exercises in accordance to the learning material and goals.

The VC is responsible for the visualization of emotional processes that occur in the AM and the appropriate adaptation of user interface. The VC manages the ability of the educational environment to adapt to the student's needs as well as the context that could be significantly stimulating for the user and engage him to the learning process.

3 Further Work

The material, which we presented in this paper, is part of a doctoral proposal in progress. The main goal is to formalize and test the affective module using a formal student study. We are working in this direction with a view to incorporate this in an AEHS (the intention is to be incorporated in INSPIRE [9]), providing the already developed educational system with an affective dimension.

Furthermore, we are developing this model bearing in mind that this is going to be independent from the specific domain model of AEHS. Finally, we hope in future versions that this model will be evolved in the context of the collaborative learning environments, where student's personality and emotions are major factors for shaping learners' groups and formulating their effective collaboration.

References