

Chapter 14

Creating a Personalized Artificial Intelligence Course: WELSA Case Study

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ABSTRACT

This paper illustrates the use of WELSA adaptive educational system for the implementation of an Artificial Intelligence (AI) course which is individualized to the learning style of each student. Several of the issues addressed throughout this paper are describing similar approaches existing in literature, how the AI course is created, and what kind of personalization is provided in the course including the underlying adaptation mechanism. The authors also focus on whether the course is used effectively by the stakeholders (teachers and students respectively). Results obtained in the paper confirm the practical applicability of WELSA and its potential for meeting the personalization needs and expectations of the digital native students.

INTRODUCTION

The advent and omnipresence of information systems have been revolutionizing and changing not only the way we communicate access information and conduct businesses, but also the way we learn. In the world of pervasive Internet, learners

are also evolving: the so-called “digital natives” want to be in constant communication with their peers, they expect an individualized instruction and a personalized learning environment. In this context, we present such an adaptive educational system, called WELSA, illustrating it with a course module on “Artificial Intelligence”. According to Brusilovsky and Millan (2007), adaptation can be done with respect to various factors, such as

DOI: 10.4018/978-1-4666-1852-7.ch014

knowledge, interests, goals, background, individual traits and context of work. In this paper we base our adaptation on one of the students' individual traits, namely their learning style (i.e., a specific manner of approaching a learning task, the preferred learning strategies activated in order to fulfill that task).

Motivation

Our endeavor was motivated by several aspects.

First, many educational psychologists support the use of learning styles, claiming that they have an important effect on the learning process (Popescu, 2010a); however this is not to say that the domain is free from controversies (Coffield et al., 2004).

Secondly, during the past several years, quite a few researchers dedicated their time to the development of learning style based adaptive educational systems (LSAES), as we will see in the next section. Most of them reported positive experimental results with their systems, finding improvements in student learning gain and/or satisfaction (Bajraktarevic et al., 2003; Carver et al., 1999; Graf et al., 2009; Lee et al., 2005; Limongelli et al., 2009; Papanikolaou et al., 2003; Sangineto et al., 2008; Triantafillou et al., 2004; Wang et al., 2008). Once again, contrary results have also been reported, with (Brown et al., 2009) being a representative study in this respect.

Thirdly, due to the huge expansion of the Web, the amount of information made available in current e-learning systems is very large, definitely larger than what could be presented by traditional teaching means. While being a positive aspect, this availability can also have a downside - it could easily become overwhelming for the students. It is therefore of a particular importance to filter the content in order to avoid cognitive overload of the learners. Furthermore, it is important to decide how to best present this content and in what sequence (the navigation type).

WELSA Overview

The e-learning platform used in our study is called WELSA (Web-based Educational system with Learning Style Adaptation). More details about the system and the principles behind it can be found in (Popescu et al., 2009). Basically, WELSA's main pedagogical goal is to provide an educational experience that best suits the learning preferences of each student, in terms of perception modality, way of processing and organizing information, as well as motivational and social aspects. All these preferences are condensed in a so-called Unified Learning Style Model (ULSM). A detailed description of the ULSM components, together with its rationale and its advantages in Web-based learning settings over traditional learning style models are provided in (Popescu, 2010a).

WELSA is composed of three main modules:

- An authoring tool for the teachers, allowing them to create courses conforming to the internal WELSA format (XML-based representation)
- A data analysis tool, which is responsible for interpreting the behavior of the students and consequently building and updating the learner model, as well as providing various aggregated information about the learners
- A course player (basic learning management system) for the students, enhanced with two special capabilities: i) learner tracking functionality (monitoring the student interaction with the system); ii) adaptation functionality (incorporating adaptation logic and offering individualized course pages)

The rest of the paper is structured as follows: the next section includes a review of other courses deployed using related LSAES (i.e., courses adapted to students' learning styles). The following two sections present an AI course (inspired from

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