Chapter 6

The Artificial Intelligence in the Support of e-Learning Management and Quality Maintenance

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ABSTRACT

This chapter presents how Artificial Intelligence (AI) could be used to support the management of e-learning platforms and maintenance of e-learning qualities. Two AI applications in e-learning presented herein will be analyzed. The first one evaluates Learning Management System users. It was tested on a real life situation for blended-learning process and could be used to support the management of e-learning or further extended to any virtual community, where team members cooperate as a geo-graphically distributed team. The second application analyzes adaptive courses and their features that should be perceived from Web 3.0 perspective. The chapter addresses features relating to the quality of e-learning and how Artificial Intelligence helps to maintain the high quality for e-learning content. For more complex and advanced learning processes AI is analyzed in a manner to reveal its potential to be a solution to educational systems where increasing demands for quantity and quality cause that managerial issues could be efficiently coped only via the intelligent supporting software systems.

INTRODUCTION

The educational industry is changing very rapidly with the technological Web advancement. The changes that are taking place cause the technological and organizational revolution of education and this economical sector must face a fact of increasing popularity of distance learning that becomes a strong competitor to the traditional learning.

This process is also multiplied by the concept of Life Long Learning. E-learning or blended learning are the best choices for people with an

advanced professional carrier or stabilized family situation that cannot easily adjust their schedules to match the requirements of other forms of education. The flexibility of distance learning allows them to find a compromise between the professional, family and educational activities. This results in an increasing demand for quantity and quality of distance learning. Learners already know the benefits of this form of education and they expect from educational organizations not only to offer e-content via web services, but to do it with the highest available quality and this term starts to incorporate also the tailoring to individual characteristic of learner.

It must be noted that, herein we will analyze the selected aspects of distance learning process, causing that the majority of observations, opinions and results apply both to the e-learning and blended learning processes. Therefore, by mentioning about e-learning we also think about a part of blended learning done via means of e-learning.

The scale and complexity of learning processes involving web systems, causes that their management is harder to perform. Due to that, the educational industry looks for the supporting mechanisms that will provide important managerial information and allow the staff to focus on important information relating to the managed process, not to analyze large and complex informational structures.

Herein, we will focus on e-learning as a component of blended learning and we will explain how to efficiently deal with increasing issues relating to e-learning by using the methods of Artificial Intelligence. Moreover, the processes taking place in the distance learning fit into a general process of transformation of web systems from the social Web 2.0 into the intelligent Web 3.0 data platform. AI applications in the e-learning are examples how data or learning content should be provided to match users' demands.

APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN E-LEARNING

The application of Artificial Intelligence and Data Mining (they share many the same methods, thus we will mainly use the term of AI later) in e-learning have a similar history as e-learning itself. Every day Learning Management Systems (LMS) generate a lot of data about e-learning users, their actions and behaviors. An analysis of these huge data sets using only human power is not a trivial task. Baker and Yacef (2009) analyzed the popularity of AI & DM methods in research done over distance learning. Research sample contained papers involving each type of EDM (Educational Data Mining) method in the proceedings of Educational Data Mining 2008 and 2009. The results of their research are as follows:

- Relationship mining: 9%,
- Clustering: 15%,
- Prediction: 42%,
- Human judgment/exploratory data analysis: 12%,
- Discovery with model: 19%,
- None of the above: 28%.

The numbers do not add-up to 100%, because some papers used multiple methods and these papers were counted toward multiple categories.

The most popular applications of Artificial Intelligence in e-learning are aimed at the observation, control and predication of users' behavior or their performance. Among various papers relating to these aspects of AI in e-learning (e.g., Ventura, Romero, & Hervás, 2008) presented how the decision trees may be used by teacher to find relationships between students marks and their activity. In other paper (Delgao Calvo-Flores, Gibaja Galindo, Pegalajar Jiménez, & Pérez Piñeiro, 2006) used the neural networks to predict students' marks and a comparison of different classifiers used as students' grades predictors was described by Romero and Ventura (2007). Other papers relate

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