Recommendations support in standard-based learning management systems

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Abstract. This research is focused on a semantic recommendations model that affects the life cycle of eLearning and can be used to build a knowledge-based recommender system to provide adaptive capabilities to existing learning management systems with the aim to support users in an inclusive and personalized way.

Keywords. Recommender systems, Recommendations model, eLearning lifecycle.

Introduction

This research emerges because of the idea that the eLearning life cycle is divided into four stages (design, publication, use and validation) [1] which should be focused on the user needs and not on the technology used to support the learning process. This approach draws on an information management process among the stages, which is modeled by specifications and standards.

1. Research approach

Taking the above idea as the starting point, this research proposes a semantic model to describe recommendations in the educational domain that affect the full life cycle of eLearning [2]. These recommendations can be used to build a knowledge-based recommender system [3] to provide adaptive capabilities to existing learning management systems (LMS) with the aim to support users in an inclusive and personalized way. This research focuses on the needs of the learners, and states that if the recommendation strategies are considered along the full life cycle of the learning process, then learning effectiveness and the efficacy, and the learner satisfaction in the stages where learners are involved (i.e. runtime) improves.

This Ph.D aims to offer a global solution to care about the learners’ needs. The following research questions have been posed: 1) What do recommendations for eLearning scenarios look like?, 2) Are recommendations different depending on the phases/situations detected in eLearning scenarios, 3) Can recommendations be modeled in a way that are understandable both to humans and artificial intelligence algorithms?, and 4) If this semantic model is applied along the eLearning life cycle, does it impact positively on the users?
2. Methodology

The methodology proposed defines the following tasks along the stages of the cycle:

**Design stage:** preparation of the materials for the learning process

- **Definition of a semantic recommendations model.** This model is based on i) studies from literature and ii) the experience of the aDeNu Group.
- **Population of the model with meaningful recommendations.** User-centered design methods are proposed to elicit psycho-educational sound recommendations from experts in on-line teaching and learners. In particular, questionnaires, interviews and observations are being considered. As a result of this process, a bank of recommendations defined in terms of the model and semantically validated by the users is obtained.

**Publication stage:** preparation of the environment for the learning process

- **Loading of recommendations.** Recommendations from that bank – elicited and validated by users – are loaded in the LMS.

**Use stage:** interactions with contents and services in the LMS

- **Instantiation of recommendations.** Loaded recommendations whose semantic description matches the runtime context are instantiated and offered to the learner.
- **Monitoring and analysis of interactions.** Both quantitative (from data logs) and qualitative (from questionnaires) information is obtained and analyzed to evaluate the impact on the users. Classification, clustering and collaborative filtering techniques can be used to learn usage indicators from the interactions. Pre/post tests can be used to compute the learning performance.

**Validation stage:** assess the learning experience to adjust future iterations

- **Visualization of the recommender performance.** A visual representation of the recommendations offered and followed can help to understand the behavior of the recommender.
- **Feedback to the model.** Use the results from the course experience to modify the values of the elements of the model.

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References