

A Rule-Based Recommender System to Suggest Learning Tasks^{*}

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Abstract. Learner-centered learning can be defined as an approach to learning in which learners choose the topic to study and learning tasks. Because of available choices, learners can find it difficult to make a decision about which of the topics/tasks would be more appropriate for them. Identifying other learners with similar characteristics and then considering the tasks that worked well, makes it possible to suggest appropriate tasks to a learner. Based on this concept, we introduce a rule-based recommender system that supports learner-centered learning and helps learners to select learning tasks that are most suitable for them, with the focus on maximizing their learning.

Keywords: Personalization, Learning Management Systems, Recommender System.

1 Introduction

Nowadays, recommender systems in e-learning are gaining a lot of attention as these systems support learners by providing relevant and personalized information that is likely of interest to them. In learner-centered learning, learners can choose the topics to learn and tasks to complete. The benefit of such approach is that it motivates learners and can enhance their performance [1]. When learners make choices about what to learn then typically they decide based on their interest and knowledge. However, sometimes, learners can find it difficult to choose what to learn. In such cases, recommender systems can help making appropriate selections.

In this paper, we propose a rule-based recommender system that supports learners in learner-centered settings where courses have assignments that allow learners to select from a number of available learning tasks with different difficulty levels (e.g., easy, moderate and challenging). In such assignments, learners can select different combinations of tasks (e.g., many easy tasks, a few challenging tasks, etc.). Our proposed system provides recommendations of which learning tasks are most suitable for learners, considering the different difficulty levels of the learning tasks. The provided

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recommendations are based on the learner's previous performance, the tasks that the learner planned to do and the performance of learners with similar characteristics. The system has been designed to be integrated in any learning management system. The architecture of the proposed recommender system is presented in Fig 1.

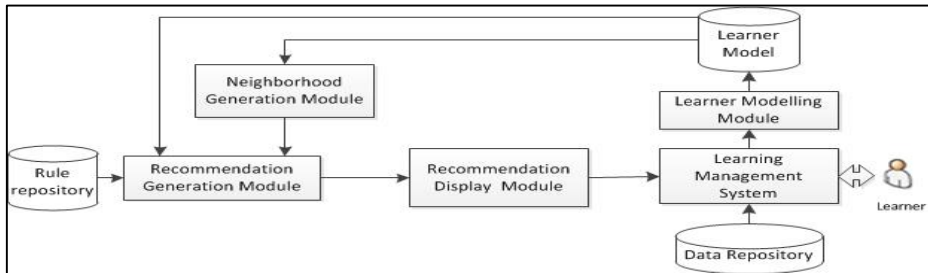


Fig. 1. Architecture of Rule-Based Recommender System

As shown in Fig. 1, the proposed recommender system consists of four modules:

- **Learner Modelling Module** aims at gathering information about the learners' learning styles based on the Felder-Silverman learning style model [2], prior knowledge, expertise level and performance.
- **Neighborhood Generation Module** aims to find learners who share the same characteristics as a target learner (a learner for whom a recommendation is calculated).
- **Recommendation Generation Module** aims to generate suitable recommendations for a target learner. These recommendations are generated based on a set of rules which are used to rank the appropriateness of difficulty levels and then select the appropriate learning tasks.
- **Recommendation Display Module** displays recommendations to the learner.

The main benefit of the proposed system is that instead of ratings from learners (which are often used in recommender systems), the proposed system uses actual performance of other similar learners to identify which tasks worked well for those similar learners. In addition, the proposed recommender system uses an advanced neighborhood approach to find similar learners. This enables our system to generate more suitable recommendations that support learners more effectively, leading to a better selection of learning tasks from which learners can benefit most.

References

1. Rich, J.D., Colon, A.N., Mines, D., Council, C.: Learner-centered assessment strategies for greater student retention. *Universal Journal of Education and General Studies* 2(6), 196–199 (2013)
2. Felder, R.M., Silverman, L.K.: Learning and Teaching Styles in Engineering Education. *Engineering Education* 78(7), 674–681 (1988) Proceeded by a preface in 2002, <http://www4.ncsu.edu/unity/lockers/users/f/felder/public/Papers/LS-1988.pdf>