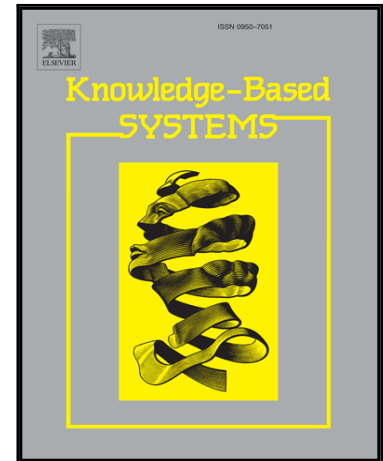


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# An E-learning Recommendation Approach Based on the Self-Organization of Learning Resource

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## Abstract

In e-learning, most content-based (CB) recommender systems provide recommendations depending on matching rules between learners and learning objects (LOs). Such learner-oriented approaches are limited when it comes to detecting learners' changes, furthermore, the recommendations show low adaptability and diversity. In this study, in order to improve the adaptability and diversity of recommendations, we incorporate an LO-oriented recommendation mechanism to learner-oriented recommender systems, and propose an LO self-organization based recommendation approach (Self). LO self-organization means LO interacts with each other in a spontaneous and autonomous way. Such self-organization behavior is conducive to generating a stable LO structure through information propagation. The proposed approach works as follows: firstly, LOs are simulated as intelligent entities using the self-organization theory. LOs can receive information, transmit information, as well as move. Secondly, an environment perception module is designed. This module can capture and perceive learner's preference drifts by analyzing LOs' self-organization behaviors. Finally, according to learners' explicit requirements and implicit preference drifts, recommendations are generated through LOs' self-organization behaviors. Based on application to real-life learning processes, the ample experimental results demonstrate the high adaptability, diversity, and personalization of the recommendations.

*Keywords:* personalized recommender system, e-learning, self-organization, diversity, adaptability

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## 1. Introduction

E-learning recommender systems aim to recommend a sequence of items to learners, that is, to suggest the most efficient or effective paths through a plethora of learning resources to achieve a certain competence [1, 2]. However, over specification and excessive searching in e-learning recommender systems result in information overload. Learners do not have enough time to deal with these massive recommendations. In addition, the adaptability and diversity of recommendations are desirable in e-learning recommender systems, because learners' preferences and abilities keep changing, and also because the functionality of some learning resources for active learners keeps changing. The diverse and adaptive recommendations should be presented to motivate learning potential of learners and ensure a long-term learning experience. In this study, we aim to improve the adaptability and diversity of content-based (CB) recommendations.

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