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# A New Adaptive Hybrid Recommender Framework for Learning Material Recommendation

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**Abstract**—Recommender system is a promising technology in online learning environments to present personalized offers for supporting activity of users. According to difficulty of locating appropriate learning materials to learners, this paper proposes an adaptive hybrid recommender framework that considers dynamic interests of learners and multi-attribute of materials in the unified model. Since learners express their preference based on some specific attributes of materials, learner preference matrix (LPM) is introduced that can model the interest of learners based on attributes of materials using historical rating of accessed materials by learners. Then, the approach uses collaborative filtering and content based filtering to generate hybrid recommendation. In addition, a new adaptive strategy is used to model dynamic preference of learners. The experiments show that our proposed method outperforms the previous algorithms on precision, recall and intra-list similarity measure and also can alleviate the sparsity problem.

**Keywords**- *Personalized Recommendation, Collaborative Filtering, Learning Material, E-learning, Adaptive Recommender, Dynamic Interests*

## I. INTRODUCTION

The Internet is one communication tool that has the potential to radically change society in the 21st century. In the recent years, with advances in wireless networking and mobile broadband Internet access technologies, and also the maturing of portable mobile devices, online e-learning has become a relatively widespread learning method. But one of the most important problems in e-learning is recommendation of appropriate learning material for each learner.

By increasing learning materials available on the e-learning systems, the delivery of appropriate learning materials to learners is difficult using keyword searching method. Hence, locating the suitable learning materials has become a big challenge. One way to address this challenge is the use of recommender systems [1]. In addition, up to the very recent years, several researches have addressed the need for personalization in the e-learning environment. In fact, one of the new forms of personalization in e-learning environment is to give recommendations to learners in order to support and help them through the