A Federated Recommender System for Online Learning Environments

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Abstract. From e-commerce to social networking sites, recommender systems are gaining more and more interest. They provide connections, news, resources, or products of interest. This paper presents a federated recommender system, which exploits data from different online learning platforms and delivers personalized recommendation. The underlying educational objective is to enable academic institutions to provide a Web 2.0 dashboard bringing together open resources from the Cloud and proprietary content from in-house learning management systems. The paper describes the main aspects of the federated recommender system, including its adopted architecture, the common data model used to harvest the different learning platforms, the recommendation algorithm, as well as the recommendation display widget.

Keywords: Technology-Enhanced Learning, Personal Learning Environments, Federated Recommender System, Web 2.0.

1 Introduction

Recommender systems have let to a shift from the user-active mode in search engines to the information-active mode in information discovery where interesting items are channeled to the user without (necessarily) an explicit request [1].

From e-commerce (e.g. Amazon¹) to social networking sites (e.g. Facebook², LinkedIn³), recommender systems are gaining more and more popularity whether to recommend connections, news, resources to access, or products to purchase.

¹ http://www.amazon.com, 06-06-2012
² http://www.facebook.com, 06-06-2012
³ http://www.linkedin.com, 06-06-2012
With the development of computer technology, learning is no longer limited to classrooms. Technology-Enhanced Learning (TEL) aims at designing, developing and testing socio-technical innovations to support learning practices at both the individual and the organizational level [2]. It helps the learners to learn anywhere and anytime. More and more online platforms, such as Symbaloo\(^4\) and Graasp\(^5\), enable users to access, share, and organize learning resources of all kinds, and manage their own Personal Learning Environments (PLEs). PLEs give students the opportunity to create, organize, repurpose and package their learning content and tools, increasing by that the learning efficiency and effectiveness [3]. Unlike traditional LMS (Learning Management Systems), PLEs are user-centered rather than teacher or course-centered. The shift from LMS to PLEs regarding educational resources introduces an overflow and a distortion: with course-centered LMSs, students are directly provided with a limited amount of selected and dedicated resources whereas with learner-centered PLEs, students have to face a large amount of resources for which they have to perform their own selection. Recommender systems therefore play a key role in open environments such as PLEs helping learners find what matches their interests from a pool of resources which, far from being preplanned and limited, can be added, augmented, and repurposed at run time [4].

Throughout their studies in Swiss universities, students are often exposed to more than one online learning platform. As a matter of fact, the mobility of students across different universities is rising. At the same time, Swiss universities do not all rely on the same online learning platform, even though they have adopted a common single sign-on mechanism. In addition, within a single university, there could be more than one platform used [5]. It becomes essential to establish a system that integrates resources from different platforms, so that students can construct a richer learning environment and access additional distributed resources.

In this paper, we propose a federated recommender system that relies on people’s interaction with distributed resources in order to deliver rich and relevant recommendations. Such recommendations can serve as a central access point for learners, enrich platforms used locally (within one institution) by bringing data from other universities and help create learning networks across Switzerland. The platforms themselves consist of LMS and PLEs serving different learning communities from Swiss Universities and including Graasp, Moodle\(^6\), and Mahara\(^7\).

The rest of the paper is organized as follows. Section 2 discusses related work. Section 3 describes the main components of the federated recommender system. Section 4 concludes the paper and discusses future work.

2 Related Work

In this section, we discuss existing research around the two essential aspects of federated search or recommendation in learning contexts: the federation approach and

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\(^4\) http://www.symbaloo.com, 06-06-2012

\(^5\) http://graasp.epfl.ch, 06-06-2012

\(^6\) http://moodle.unifr.ch, 06-06-2012

\(^7\) https://mahara.org, 06-06-2012