

Chapter 32

Discovery Mechanism for Learning Semantic Web Service

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ABSTRACT

Nowadays, e-learning offers advantages over traditional learning in terms of independence. Moreover, adaptive e-learning systems take into account learner's profile, such as learning style and level of knowledge, in order to provide the most appropriate learning object. However, the essential challenge is finding and identifying the learning objects from a big corpus while ensuring their independence in different contexts. To overcome these problems of interoperability and accessibility of learning objects, the authors proposed to define a learning semantic Web service for each learning object. This service is an extension of OWLS that encompasses the description of the learning intention and the use of context that characterize a learning object. In this paper, the authors propose a new discovery mechanism based on learning intention and context use guided by the learner's intention and profile in order to offer a personalized learning path. Experimental results prove the efficiency of the proposed approach and approve its notable contribution.

1. INTRODUCTION

Currently, with the development of information and communication technologies we observe that the access to information and resources has become more flexible. In other terms, E-learning systems providing flexible access to available educational content anytime and anywhere are emerging at a very rapid rate. Unlike traditional teaching methods, whose interaction paradigm is the classroom, E-learning

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systems deal with a multitude of heterogeneous devices to make the interactions between the learner and the educational content possible. In most cases, the educational content comes in the form of learning objects that present certain problems related to their accessibility and use. At this stage, it is very important to add a semantic layer to learning objects for their common understanding by the systems. Therefore, many rules and metadata standards have been proposed as a solution to the problem of accessibility and interoperability of learning objects, and many norms and standards were created to achieve this. So, several standardization efforts have been launched including LOM and SCORM (Lee et al, 2006). These standard descriptions of learning resources focus on the characterization of the content rather than on its use.

In fact, the above standards have limitations in the context of heterogeneous learning objects. Some authors (Pernin, 2003) have mentioned the need to expand the descriptors of these standards with new fields describing the educational use of objects to improve reuse and ensure the relevance of search request. In addition, the definition of specialized courses according to desired skills requires a composition of learning objects to provide the learner with a personalized learning course. The problems of interoperability, reusability, and composition of learning content can be solved by using the principles of Web service paradigm. Web services are defined as open standards that provide a flexible solution for integrating heterogeneous and dynamic applications that enable interoperability between different systems. Currently, there are several frameworks and languages to, formally, describe Web services, each having its strengths and limitations. The Semantic Web services are a new technology resulting from the combination of two technologies, namely, the Web services (Burners-lee et al, 2001) and Semantic Web (Booth et al, 2004). The idea is to leverage the advantages of these technologies and complement them to develop new powerful applications.

A new vision of the semantic learning service is necessary to overcome the limitations of interoperability and reusability of learning objects. Therefore, we proposed to describe each learning object (LO) by a semantic learning web service (OWLS-LO). This OWLS-LO is an extension of OWLS that encompasses the description of the learning intention and the use of context that characterizes a learning object. Here, we propose a service discovery mechanism guided by the learner's intention and profile in order to offer a personalized learning path.

In this paper, we focus on search and matching mechanism to support automated OWLS-LO service discovery for the learner, and it is organized as follows: Section 2 presents a brief overview of the semantic Web services and Web services discovery approaches. In Section 3, we present some related works. We give an overview of our approach in Section 4. In Section 5, we present our extension of OWLS to support a learning object. In Section 6, we detail our proposed semantic OWLS service discovery mechanism. We present the algorithm of OWLS-LO service discovery in Section 7. Section 8 describes the implementation of the OWLS service discovery. Section 9 describes some experiments and evaluates the efficiency of our approach. In Section 10, we finish with a conclusion and some hints about future work.

2. BACKGROUND

Semantic Web services (SWS) represent an extension of the existing Web services technology. They expand the Web from a source of distributed information to a source of distributed services, where software resources can be assembled hurriedly to satisfy user's request (McIlraith et al, 2001). Thus, SWS

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