

Chapter 19

Application of Fuzzy User's Profile for Mining Reusable E-Learning Repositories on Web through Lightweight Mobile Agent

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ABSTRACT

The creditability of an e-Learning system depends on its content, services and presentation of the material to the learners. Besides providing material on demand, an e-Learning system also manages knowledge for future use. It is observed that the learning material available on different locations may be reused in a proper way. The work presented here discusses generic design of an e-Learning system with various reusable learning material repositories. The architecture described here uses light weight mobile agents in order to access these repositories by taking help of fuzzy user profile. With notion of the fuzzy user profile, the system knows more about users' need and can present customized content to the users. Besides the architecture of the e-Learning system, the chapter also discusses the necessary concepts about the fuzzy logic and agent based systems, in depth literature survey, structure of the user profile, fuzzy membership function and design of the light weight mobile agent with necessary implementation details. At the end, the chapter concludes with the applications, advantages and future scope of the research work possible in the domain.

INTRODUCTION

Advances of Information and Communication Technology (ICT) such as internet and the Web have accelerated scope and usability of the system to a high extent. It can be stated that majority of the modern information systems are distributed systems. Web enable e-Learning system is also an example of such distributed system. Primary goal of any e-Learning system is to provide learning material and enable

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users to learn anytime, anywhere. Secondary goal of such systems is knowledge management by documenting knowledge and reusing the knowledge in future for problem solving and training.

Following are the crucial aspects that must be taken care while developing any e-Learning system in general.

- Quality and amount of material.
- User interface, access and choices through efficient learning processes and flexible content delivery.
- Technical infrastructures.
- Cost effectiveness.
- Meeting the existing standards of the content and technology.

Since most of the repositories storing e-Learning material are stored on distributed platform, it becomes trivial to efficiently retrieve learning material to the intended user. Lightweight mobile agents are good alternative for required content retrieval.

An agent is a software program or entity that acts on behalf of its users in co-operative, autonomous and pro-active manner. Agents are categorized according to their nature and application into various classes such as query agent, information agent, interface agent, mobile agent, and intelligent agent. An agent may combine philosophy and structure of two or more agents; in this case the agent is called hybrid agents. Agents offer advantages of robustness, improve cost-effectiveness of the solution and increases overall efficiency of the business. A mobile agent is an agent that moves between given list of location with necessary permission as well as supporting information and remotely executes various tasks.

This chapter discusses design of lightweight mobile agent for an e-Learning system. This type of agents travel within the specified territories or websites to extract required learning material for users. Mobile agent designed in this system use minimal code to accomplish its task. A mobile agent has to be smaller, simpler and faster as it needs frequent movement to remote locations. Writing minimum code within mobile agents makes them 'lightweight' and mobility of the agent is accelerated. The mobile agent described in this work uses some vague meta-knowledge about users and learners in form of fuzzy user profile.

Besides requirement of the Web enable distributed platform for e-Learning system along with lightweight mobile agent, the e-Learning content stored in various repositories (or databases) must be reusable. It is observed that there are so many common topics in various courses at different levels. Content within the repository must be reusable to design various courses to avoid conflict and redundancy while presenting material to the users.

This chapter illustrates generic design of multi layer structure of e-Learning system along with reusable content repositories and design of a lightweight mobile agent. The chapter organization is as follows. Section 2 presents a brief conceptual background for fuzzy logic and agents. Section 3 presents a literature survey and justifies the need of the proposed work by highlighting observations from the study and enlisting limitations of the existing solutions. Section 4 discusses generic structure of multi layer structure of web based e-Learning system with reusable repositories and structure of fuzzy user profile with membership functions. Section 5 discusses the design of lightweight mobile agent. Section 6 presents results, discussion on experiment and benefits of the research work and concludes the work presented with limitations and possible future extension.

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