Chapter 7

Adaptive Content Delivery in E-Learning Systems using Mobile Agents

S. R. Mangalwede
Gogte Institute of Technology, India

D. H. Rao
Jain College of Engineering, India

ABSTRACT

The e-Learning refers to the use of networking technologies to create, foster, deliver and facilitate learning anytime, anywhere. This chapter discusses our research on personalization of e-Learning content based on the learner’s profile. After justifying the feasibility of using mobile agents in distributed computing systems for information retrieval, processing and mining, the authors deal with the relevance of mobile agents in e-Learning domain. The chapter discusses the proposed Case-Based Reasoning (CBR) as an approach to context-aware adaptive content delivery. Different parameters like technological, cultural and educational background of a learner are taken as the basis for forming the case-base that determines the type of content to be delivered. Along with the CBR, a diagnostic assessment to gauge an insight into the student’s current skills is done to determine the type of content to deliver. The implementation observations of such implementation vis-à-vis traditional e-Learning are also documented.

INTRODUCTION

With the advent of information and communication technology and widespread acceptance of Internet, e-Learning coupled with multimedia and network technology has proven to provide new methods and ideas for traditional teaching. The e-Learning can be defined as a learning environment supported by continually evolving, collaborative processes focused on increasing individual and organizational performance. The e-Learning has become the unifying term to describe the fields of online learning, web-based training, and technology-
delivered instruction. However, the emphasis of
e-Learning has shifted from computer-based train-
ing to web-based content delivery to personalized,
context-aware service based on learner profile and
modern pedagogy. The importance of e-Learning
has shifted from how to solve the limitation of
space-time problem in traditional teaching to build
up the personalized learning environment, and
offer personalized content delivery (Wu Yanwen
& Luo Qi., 2006). There exists a great deal of
difference in the profile of individual learners.
Adapting the learning content and delivering it
to realize teaching according to learners’ needs
is the need of the day (S.R. Mangalwede & D.H.
Rao, 2009; Wu Yanwen & Wu Zhonghong, 2004).

A Mobile Agent (MA) can be defined as a
problem solving computational entity that is
capable of autonomously performing operations
in dynamic unpredictable environments (Danny
B. Lange, 1998). A Multi-Agent System (MAS)
is defined as “a loosely-coupled network of MAs
that work together to solve problems that are be-
yond their individual capabilities.” The primary
characteristics of MA are mobility and autonomy.
The mobility borrows a lot from process migra-
tion which consists of transferring a process from
one computer to another. The code, the data, and
the running state of the MA are all moved to the
destination when migration occurs. The autonomy
also gives MA some artificial intelligence features.
An MA not only decides what to do next according
to its autonomous strategy, but also can change
it to fit in with the new situation that some exter-
nal changes cause. Because agents exhibit these
characteristics they can be used to implement an
optimal personalized e-Learning environment that
helps in making intelligent decisions and ensures
interoperability between different systems that are
to be integrated into an operational e-Learning
system. Besides that, it solves the problem of het-
erogeneity and low-bandwidth, reduces network
traffic, process data locally instead of transmit-
ting the data over a network (Danny B. Lange &
Mitsuru Oshima, 1999).

This chapter focuses on issues in current e-
Learning systems and how agents can be used
in such e-Learning systems in the context of
distributed computing systems for information
retrieval, processing and mining. The chapter also
discusses the use of CBR for adaptive content
delivery. Experimental experiences of the work
carried out are also presented.

BACKGROUND

The e-Learning can be defined as a learning en-
vironment supported by continuously evolving,
collaborative processes focused on increasing
individual and organizational performance. Many
organizations are working to develop e-Learning
standards. Core development specifications
include metadata, learner profiling, content se-
quencing, web-based courseware, and computer
managed instruction. Some of them include (but
not limited to):

- **LTSC (Learning Technology Standards
  Committee)** chartered by IEEE Computer
  Society Standards Activity Board.
- **Learning Object Metadata (LOM)** group
  that specifies data schema that defines the
  structure of a metadata instance for a learn-
ing object.
- **ADL**, an initiative of Department of
  Defense (DoD) to develop strategy for using
  learning and information technologies to
  modernize education and training and
to promote cooperation between govern-
ment, industry and academia to develop
e-Learning standardization. It has speci-
fied SCORM (Sharable Content Object
Reference Model) that defines an Internet-
based learning “Content Aggregation
Model” and “Run-Time Environment” for
learning objects.
- **AICC (Aviation Industry CBT
  Computer-Based Training) Committee**
Related Content

Multimodal Software Engineering
www.igi-global.com/chapter/multimodal-software-engineering/21782?camid=4v1a

X3D-based Virtual Prototype Robot Mechanism Simulation
www.igi-global.com/article/x3d-based-virtual-prototype-robot-mechanism-simulation/131457?camid=4v1a

The Rise of Robotics Data for Real-Time Management Based on New NoSQL Solution
www.igi-global.com/article/the-rise-of-robotics-data-for-real-time-management-based-on-new-nosql-solution/228098?camid=4v1a

Research on Integrated Parameter Measurement and Control System of Low Voltage Distribution Network
www.igi-global.com/article/research-on-integrated-parameter-measurement-and-control-system-of-low-voltage-distribution-network/187092?camid=4v1a