"Adaptive E-Learning using E-Portfolio"

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Abstract – Prevalence of e-learning systems has opened new ways of dissemination of knowledge and has also resulted in a digital repository generally called as e-portfolio. At the same time the user expectations, in terms of personalized and adaptive content have raised to a level which cannot be ignored. E-portfolios comprise the artifacts including demonstrations, resources and accomplishments that represent an individual, group, or institution. E-Portfolio based learning offers real potential for autonomous and personalized learning. In this paper, we have proposed how e-portfolios can be used as a means for adaptation, retrieving relevant information and delivering the contents matching students' style, preference and current knowledge level.

Keywords: Adaptive E-Learning, E-Portfolio, Information Retrieval.

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INTRODUCTION

Information retrieval is the field concerned with the structure, analysis, organisation, storage, searching and retrieval of information [11]. The main task of an information retrieval system is to identify relevant documents, which satisfy a user's information need that is expressed by a query. Although this early definition of the field is very broad, traditionally information retrieval has focused on the retrieval of textual documents. Nowadays Information is available in an unlimited number of formats. The Modern Information Retrieval System's (MIRS) job is to provide access to tailored information for those who seek it. Under the circumstances, It becomes fascinating to think about the fact that MIRSs very rarely deal in actual information, but rather, deal with the information about information that helps them to locate what is sought. To make this concept far less esoteric, when locating information, MIRSs today primarily work with information storage and retrieval systems which house records that are representative of other information sources – whether books, journal articles, audio files, videos, e-portfolios, digital library or any other information repository.

Broadly, the e-portfolio is a purposeful selection of items (evidence) chosen at a point in time from a repository or archive, with a particular audience in mind. The processes that are required to create e-portfolios for any purpose include capturing and ongoing storage of material, selection, reflection and presentation [2]. Definitions of an e-portfolio tend to include the following elements:

- A collection of digital resources

- That provide evidence of an individual's progress and achievements

- Drawn from both formal and informal learning activities

- That are personally managed and owned by the learner

- That can be used for review, reflection and personal development planning

That can be selectively accessed by other interested parties e.g. teachers, peers, assessors, awarding bodies, prospective employers'. E-portfolio is a personal life-long content management system for collecting, reflection on, selecting and presenting learning outcomes [2]. It allows learners to archive their learning outputs as digital learning artifacts in a repository which can be used in future for specific purposes. E-portfolios may be of great help in adapting to the need of an individual's information by providing information about information sought that is most vital in the retrieval process.

It is impossible to speak about the design, query and evaluation of information storage and retrieval systems in isolation from each other. Within the e-porfolios, the information related to an individual is present in the day-to-day functions of their job. Ideally, modern information

retrieval system should be user-centric, dynamic and reliable. E-portfolios are posed to play vital role in enhancing the ability of MIRSs in personalized access of information.

This work focuses design and development of techniques for modern information retrieval from heterogeneous multimedia archives like e-portfolios, which may be employed for providing personalized and adaptive contents to its users.

1. BACKGROUND

E-learning turns out to be an important aspect for the educational area [7], as well as for companies as part of a holistic knowledge management approach [6]. The continuing development of a widespread digital infrastructure to support a range of knowledge based activities coupled with the increasing use of information technology within education has highlighted the growing importance of e-learning.

The static approach to learning content limits the willingness of many people to use ICTs in order to learn. Especially in academic environments the realization of e-learning usually is limited to the deployment of a well-known e-learning platform such as WebCT, BlackBoard, Learning Space etc, and the adaptation of learning content to the specific supported format for learning objects [10]. E-learning requires much more effort for equivalent or improved learning outcomes in comparison to traditional learning. But unfortunately technology is only a driver not a catalyst. The e-learning value proposition and consequently the e-learning loyalty and hence the higher acceptance of e-learning depends on joint efforts that combine teachers, students, technology, learning processes, dynamic futures and so on.

Garcia *et al.* (2004) suggested the need for a paradigm shift from consumption of static learning contents to well-tailored, highly personalised learning sessions. Modritscher *et al.* (2005) also believe that adaptation and personalisation improve the learning process. Therefore, an e-learning environment has to provide methods to adapt to the learner as well as to the teacher.

An adaptive educational system is a Web-based hypermedia system that incorporates complex intelligent tutoring techniques, which enable the system to recognize an individual user, their needs and consequently adapt the instructional sequence. Ever increasing deployment of e-learning systems coupled with technological advancement gave birth to a digital repository called as e-portfolio which can store students' records and relevant information of learning activities like scores, credits, and reports and an

authorized person can access and review the students' e-portfolio records. Although an e-portfolio maintains records related to various learning activities, it does not provide the students' learning context. The proposed work aims to design a model to identify learning context, which may further be used for adaptation to provide personalized learning support.

E-portfolio contains various records including hidden knowledge. Knowledge rules may be discovered from these records and context is found out [1]. This work proposes an adaptive learning support mechanism which uses a student's learning context for providing personalized contents to the students [8]. Based on specific context-knowledge view and the students' profile, the system can adaptively provide knowledge documents to assist dynamic learning.

2. RATIONALE

Adaptive systems may be used for a variety of tasks, namely, searching relevant information from huge information space, providing tailored information to the users, recommending suitable products to the users, adapting to the users choice related to visual display and input interface, providing helps during editing with word processing software, finding collaborators with similar interests in a distributed workspace environment, supporting learning process in e-learning environment, etc.

Adaptation and personalization are two important aspects of modern e-learning. Through the incorporation of more complex intelligent tutoring techniques into traditional hypermedia, it enables educational systems to recognize individual users, their needs and consequently adapt the instructional sequence. Such systems are also able to adapt information and its presentation to each individual user, and dynamically support user's navigation through the hypermedia material. This ability to adapt to an individual user's needs can significantly improve the teaching process since it has been shown that the best method of teaching is individualized tutoring [4].

An adaptive hypermedia system has the following features [3]:

- is based on hypermedia,

- includes a domain model for dynamic knowledge representation

- maintains an explicit user model that records individual user properties, and

- is able to adapt some visual or functional parts of

the system according to the user model.

To enable adaptation, the system has to be aware of the teaching domain (knowledge representation), the individual users and their knowledge (user modeling), and has to monitor and access their learning progress (dynamic assessment). Dynamic Knowledge Representation and User Modeling constitute the key components of any e-learning system.

Although e-learning systems lack face-to-face interaction between teachers and students, they have the major advantage of enabling people to access learning facilities regardless of their location and whenever it is most convenient to them. Large networked repositories of learning material may be accessed by students, but it is necessary to narrow down the available resources to a particular individual based on the learning context, *i.e.*, to take into account learning objectives, pedagogical approaches and profile of the individual learner. A group of related materials is organized in an abstract knowledge space so that when the student wants to learn more about a given topic, the navigation engine can follow the knowledge space relationships between documents to derive the links relevant to the students' interests and objectives. To achieve this, there needs to be a way to classify and organize learning materials in terms of knowledge domains. The proposed approach to this problem is to use soft computing and data mining techniques to dynamically discover document relationships and context of user.

Traditional machine learning techniques used to create user models are usually too rigid to capture the inherent uncertainty of human behavior. In this context, soft computing techniques can be used to handle and process human uncertainty and to simulate human decision-making. The soft computing differs from the conventional (hard) computing since it accepts inaccuracies, uncertainties, partial truths and indeterminacy and are better suited to model human behaviour.

3.   PROPOSED WORK

A system is called adaptive only if it is an interactive system that changes its behavior depending on the individual user's behavior on the basis of nontrivial inferences from information about the user. Adaptive systems receive the information about the user from observations of the user and in this work the source of adaptation is e-portfolio. The prime aim of this research is to find out the semantics (or context) from the information collected in e-portfolio [8]. Once the context/semantics is discovered, we work out how the search queries of user can be adapted to this context/semantics.

In this paper, we propose a model which provides adaptive and personalized contents to the students using e-portfolios as a means for adaptation. The parameters used for adaptation is the interest, preference, learning style, and the current knowledge level of the students. The content management and delivery system based on the pedagogical instruction from the intelligence tutor system delivers the content to the students. Once the learning of a particular topic is completed, tests are conducted to determine the learning level of the students and updating the student model. We also aim at developing a dynamic user model with an objective to support adaptation using soft computing and information retrieval techniques.

4.   CONCLUSION

Adaptation may be used to accomplish variety of tasks. Adaptive systems receive the information about the user from observations of the user and in this work e-portfolio has been used as the source of adaptation. The proposed work aims to find out the semantics (or context) from the information collected in e-portfolio and devise methodology how the search queries of user can be adapted to this context. We discussed how e-portfolios can be used as a source for adaptation and proposed e-portfolio based adaptive learning system for providing autonomous and personalized learning to the students.

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