Design of E-Learning Application through Web Mining

K.Umadevi [1], B.Uma Maheswari [2], P.Nithya [3]

[1] Research Scholar, Department of Computer Science, PSG College of Arts & Science, India.

[2, 3] Assistant Professor, Department of Computer Science, PSG College of Arts & Science, India.

ABSTRACT: The World Wide Web (WWW) offers several opportunities in the field of education. With the massive growth of information available on the web, web mining has become suitable for the web based educational systems. Learning through Online is one of the feasible modes of education. Educational Websites, virtual courses, Web-supported instructional shells, and digital books are some of the modes of delivering the Online Learning. Web mining is the series of task used for mining or extracting useful information from the web pages or web sites. It provides intrinsic knowledge of teaching and learning process for effective education planning by applying various techniques/tools. This paper discusses about the benefits and usefulness of web mining in e-learning.

KEYWORDS: Web mining, data mining, e-learning, web content mining, web structure mining, web usage mining

I. INTRODUCTION

The World Wide Web (WWW) is the subset of the Internet. E-Learning refers to the learning in which the learner and instructor are separated by time or space where the gap between two is bridged through the use of online technologies. With the help of web based learning, it is possible for learners to learn from anywhere at any time. The e-learning portals are maintained by many educational institutions. At present times, several researchers have worked on the application of data mining to examine or classify student's problem solving approaches with web-based educational systems. Hence here we would discuss how web mining can be helpful to make easy web based education system.

II. RELATED WORK

In [2] the author defines the present an overview of distance education in web mining. He describe the possibilities of application of Web mining to distance education, and, consequently, show that the use of Web mining for educational purposes is of great interest. Brijesh Bhradwaj[3] justifies the capabilities of data mining techniques in context of higher education by offering a data mining model for higher education system in the university. In his research, the classification task is used to evaluate student's performance and as there are many approaches that are used for data classification, the decision tree method is used. By this task the knowledge that describes students' performance in end semester examination are extracted. It helps earlier in identifying the dropouts and students who need special attention and allow the teacher to provide appropriate advising/counseling. In [4] the author builds a model of e-learning platform with learning resources recommendation based on web usage mining and finally make use of analog and SQL Server 2005 to mine the log files on the server. Farah Chanchary in [5] introduced a system called Learning Management System (LMS). While hit-counts indicate customers' interest in the product or purchasing behavior, a student's visits to a Learning Management System (LMS) do not necessarily involve transfer of learning. Data mining and statistical tools have been used to find relationships between students' LMS access behavior and overall performances. Results show that students having `Low' access obtained poor grade, on campus access was higher than access from home. Background of students is very important for effective usage of web resources. Majority of the student considered LMS to be a quite helpful tool as teaching-learning method.

Preparation and cleaning of the web-log files as well as application of data mining algorithms is important for learners' web usage analysis. In [6] the paper discusses how web mining technology can be helpful to the distance education system their techniques and usefulness in a user friendly manner. Romero, C., & Ventura, S in [7]   presented an introduction to e-learning systems, data mining and the interaction between the two areas. In the second part of the book several case studies and
Experiences of applying data mining techniques in e-learning systems were presented.

III.   WEB MINING

Data Mining is the process of analyzing data from different perspectives and summarizing the results as useful information. Web mining is one of the important branches in data mining. Extraction of useful information or pattern from the web data is called web mining. It can be classified into three following categories,

    i.   Web structure mining
   ii.   Web content mining
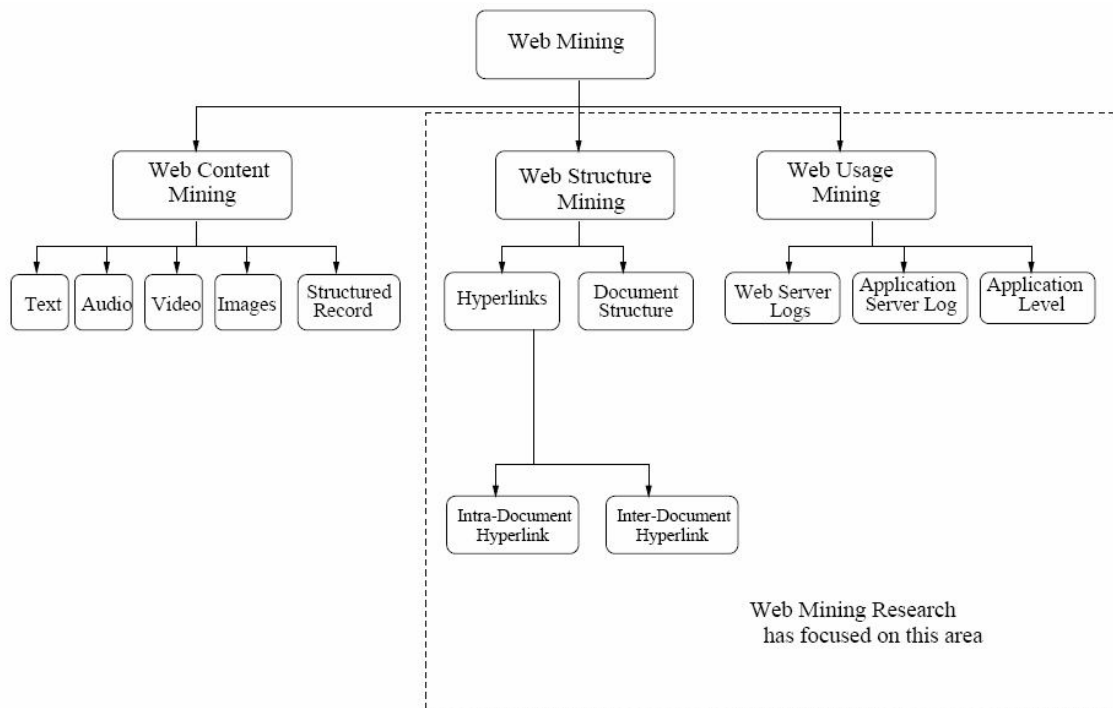 iii.   Web usage mining

Fig.1. Structure of Web mining

Web Structure mining:

    Web structure mining targets on analysis of the web and one of its uses is to identify more preferable documents. It helps to discover similarities between web sites or discovering significant sites for a specific topic or branch or in discovering web communities. It is also used to reveal the schema of web pages.

Web Content mining:

Web content mining refers to the extraction of useful information from the Web document's content. The content of the web page consist of text, images, audio, video etc., it includes the techniques like clustering or associating web pages according to the respective branches. It also helps in discovering patterns in web pages to mine useful data.

Web Usage mining:

The web log files can be generated when the user visits the website. The extraction of information from web log files is known as the web usage mining. The Usage data captures the identity of Web users along with their browsing behavior at a Web site. In general this type of mining includes several steps: data collection, data pretreatment, and knowledge discovery and pattern analysis in order to understand and better serve the needs of Web-based applications.

IV. WEB MINING APPLICABLE TO E-LEARNING

From a direct perspective, information extraction can is one of the forms of learning. Search engine technologies use the web mining techniques to extract or retrieve the most pertinent and important pages. However, the contribution of Web mining has not been restricted to such explicitly available information such as page content. The learning is frequently supported with inclusion of other kinds of data such as concept pecking order on which a Web structure is based or web usage information. These kinds of data do not directly reflect the information in the page but help in building the context and circumstances in which such information is sought. Web usage mining techniques can be used to discover user navigation patterns. in our case, the user is the self-directed learner. The creator of the Web pages would represent the expert who has designed the Web site to represent a series of notes. However, it is the usage information that actually reflects how a user is navigating or learning from the Web site. Such usage information can not only serve as a useful feedback to the experts about the learners approach, but can also suggest to learners from the 'navigation experience' of other user's on what they found useful. Initial work on analyzing Web logs to discover patterns and associations between Web pages visited provided the right direction for such kind of analysis, but did not especially address the issue of e-learning. These kinds of analysis can be done either offline or online, or integrating both. Web mining techniques coupled with integrated meta-information such as author info, download info, and other additional info explicitly defined by a domain expert helps to improve the learning process. Given a large, knowledge-dense website and a non-expert user seeking information, recommending relevant content becomes a significant challenge. Web mining is also referred as a useful tool for providing expert-driven recommendations to non-experts, helping them understand what they NEED to know, as opposed to what is popular among other users. Web Mining also has focused on modeling user navigation behavior. The popular techniques are based on the first order Markov model where the user is modeled as a random surfer. Other models include a Markov chain model and reducing the 'randomness' factor by introducing a bias either based on the past usage patterns or due to natural clustering of documents.

Various Processes in Web Mining:

1. Associated mining technology:

This technology is the knowledge discovery that a user access to the knowledge of sequence association rule. Association rule mining is web mining technique to extract information of visited pages by user and their session. One of the common association rules is Apriori algorithm. Web association rule is a time consuming process, as it uses huge amount of data. Most of the researchers focus on technical reduction of search space. To search for user access session and pages, the association can be used.

2. Cluster analysis:

The process of grouping the user with parallel properties and data item together is called as the Cluster analysis. Target user clustering and web clustering is one of the means to web usage mining. The target user clustering refers to

classifying the user by the standard of browsing mode.The personalized information service for different user can be provided by user classification. To institute a group of pages with related content can be done by web clustering.

3. Classification:

With the help of classification rule, the difference between data and similarity of web can be tapped. Whenever the fresh data is stored to database, it is classified in respective Division of similarity and dissimilarity. Web mining classification is used for extracting the information of user who accesses the server. User identification can be extract by the information register by the user on those web sites. The brief information can be retrieved about types of user by using classification. Bayesian method and Decision tree are some of the methods used in classification.

Web mining based E-learning System:

The e-learning system consist three parts. Teaching resource library, learning platform and user. Education resource library is a storage server to store different types of resource which is related to education. The learner of that web based system is the user. Web server is the Learning platform that gives web based learning platform to user. The E-learning system which is based on web mining will progress the learning because it will supply learning substance according to the user's delicate information. The e-learning is also used to analyze the web logs and site files, personal information of learners Learning results, learning behavior, and use data mining to meet the needs of different user. E-learning websites contain user information, learning results, behavior of learning by the use of web mining.

Examples for Web based E-Learning Application:

A number of examples of e-learning exist. We focus on some of the most important open source e-learning applications and give a short overview of what each has to offer.

eFront:

Fig.2.eFront with Ajax interface

eFront is a complete e-learning software with a good looking Ajaxed interface. It enables admin to create **&** manage lessons easily with various tools like:

- content editors (has a flexible visual content editor and support for pictures, sound, video, flash or java)
- file manager & digital library (for file sharing),test builders, ability to assign projects, Creating surveys & more.
- The system is multilingual & modular. It requires PHP & MySQL to run.

Dokeos:

Fig.3.Dokeos Flash based video conferencing

- Dokeos**,** besides the standard course management features, offers Flash based videoconferencing which enables you to organise live training and meetings remotely.

- Powerpoint presentations can be imported and converted in to SCORM courses.

- The system has a "coaching" feature to interact with the learners through agenda, forums, chat, videoconference, open questions-answers and assignment feedbacks.

- It requires PHP & MySQL to run.

Ilias Learning Management:

Fig.4.Ilias e-learning application

- Ilias is a powerful web-based learning application where every user has a comprehensive personal desktop to use the system, keep notes, bookmarks, etc.

- It offers a cooperative learning environment where user can create working groups, or groups of certain interests.

- Ilias has a flexible test system where time based tests can be created with multiple choice, single choice, allocation questions, cloze questions (free text, select box), ordering, matching, hot spot and more question types.

- You need PHP & MySQL to run the system.

Moodle:

Fig.5.Features in Moodle

- Moodle is one of the most popular open source e-learning system. It is built with PHP & uses MySQL or PostgreSQL to store data.

- It has powerful course management features that covers creating lessons, assignments, quizzes, documents & more.

- There are various modules that help students & teachers to interact with each other like chat, forum, survey or workshop.

- It is used in 1000s of websites, has a detailed documentation & a wide community.

V. CONCLUSION

With the help of web mining technology, the importance of e-learning is in advance. The web mining gives the personalized education. By using various mining techniques, both the learner and the teacher can achieve benefits. Thus, the process of learning becomes simpler and affordable. With the advancement in web mining, the education through e-learning is improved.

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