Enhancing Web Learning System Using Cluster Algorithm Based On Cognition

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Abstract – *The main aim of this research Paper is to enhance the web learning system based on cognition of the learner. Learners' satisfaction is the primary objective in any web learning environments. In traditional teaching and learning process mentors are able to predict students' learning experience in face to face interaction and communication. Even though evaluation of learners can be done with the help of questionnaire and feedbacks qualitative evaluation of students learning experience in a web based environments is not easy. Educators must look for different approaches for obtaining students learning satisfaction in web learning system. This research work explores the quality attributes contributing to learners' satisfaction in web learning system. This study proposes a research model that examines the student's interest and involvement in web learning system based on clustering techniques in data mining. This research work aims to improve learners' satisfaction in web learning system. This paper investigates the learners' satisfaction on educational data. Clustering technique is used to extract and study the learners' satisfaction.*

Key Words: *web learning system, Cognition, students' learning experience, Data mining, clustering technique, learners' satisfaction*

1. INTRODUCTION

Educational technologists agree that data mining is one of the fruitful ways to study the learners' satisfaction level in a learning environment [1]. Especially in the web learning environment it is one of the best way to solve the issues in teaching and understanding. Data mining finds valuable information hidden in large volumes of data that need to be turned into useful information. Data mining is also called KDD-Knowledge Discovery in Databases. It is considered to deal with huge amounts of data which are kept in the database. Data mining is the analysis of data and the use of software techniques for finding hidden patterns and regularities. Knowledge discovery from the large data set has many processes such as cleaning the data, integrating the data, selecting the data and interpreting the data [2]. It includes the processes such as pattern evaluation and knowledge representation. Data cleaning is the initial phase in which irrelevant data are removed from the large data. The increase in demand of finding pattern from huge data is improved by means of data mining algorithms and techniques. Data mining can be applied in many fields like genetics, software engineering, educational technology, business, sales, forensic science, biotechnology, etc. Educational data mining can be used to predict the learners' satisfaction in web learning system. New algorithm development is possible in prediction and classification of the learners. It can be applied both in supervised learning and unsupervised learning.

2. RELEVANCE OF THE RESEARCH

In recent years, educational data mining has been developing concept in the use of data mining to improve the web learning system. It is worthwhile to use students' individual preferences based on cognition to enhance the web learning system. Students' preferences level in web links, menus, colors, learning hierarchies, play important roles in the study of web learning system [3]. In this research clustering concept is applied to extract useful data to study the web earning system. Clustering is the most common unsupervised data mining method. Clustering is a data mining technique which groups' objects or data into clusters in which objects within the clusters have similarity in nature. Clusters are defined based on the attribute type of data. There are various clustering methods have been proposed and they are classified as partitioning methods, density based, grid based, model based method and hierarchical methods and so on. Web based learning content can be in the form of tutorials online discussion group or virtual platform for hands on training. Web based learning uses internet as a communication medium for all the aspects of learning. The learning system would be successful only if the students are having knowledge regarding how to use them. A well designed web layout improves the performance of the students.

Web mining is a new area of educational data mining which helps to study the connections between, learners'

preferences, learners' interests, learners' needs, learners' expectations, etc.   Web mining has three main domains. They are web content mining, web structure mining and web usage mining [5]. Web learning system can be studied with three aspects; web learning usage, web learning system structure and web learning system content. Web learning system usage can be used to study the learners' general access pattern, individual preferences and grouping.

2 (a). CLUSTERING

Clustering is the most common unsupervised data mining method. Clustering is a data mining technique which groups' objects or data into clusters in which objects within the clusters have similarity in nature. Clusters are defined based on the attribute type of data. There are various clustering methods have been proposed and they are classified as partitioning methods [6], density based, grid based, model based method and hierarchical methods and so on. The main objective of clustering is to find data points that naturally group together and splitting the data into clusters.   Clustering is useful when the common points within the data not known well in advance. Clustering algorithms can be started with a hypothesis or can be started without a known hypothesis. Clustering is a phase in which relevant data are grouped and irrelevant noisy data are removed.

Clustering loops:

- Finding the clusters with closet distance

- Create them to new group

- Calculating the distance between groups

- Repeating the process to find cluster

Clustering algorithm solve two issues within the web learning system. It is useful to predict the best suitable web learning system based on the individual likes and dislikes and to predict the best suitable web learning system construct. Hierarchical clustering is a method which seeks to build a hierarchy of groups. Metric i.e. distance between pairs, is used create a new cluster in the data [7].

2 (b) COGNITION AND COGNITIVE LOAD

Cognitive theory says learning is the mental process involved in acquiring knowledge and understanding through thought, experience and senses. Cognitive load is classified into three types: Intrinsic, extraneous and generic cognitive load. Intrinsic cognitive loads are defined as the characteristics of the material themselves and cannot be altered due to the nature of material [8]. Extraneous cognitive load refers to the way information or tasks are presented to a learner. It can be altered with

instructional intervention [9]. It may be unnecessary information presented within the text or forma of the instructional design and it may cause an overload and may negatively affect the learners. Germane cognitive load refers to the student's effort to process and understand the information [10]. It can also be altered. Understanding the three elements of cognitive load theory will address the limitation of working memory by reduction of unnecessary information. So web learning can be enhanced by enhancing the cognitive process of learners. Web layout is designed in such a way that easy to learn, easy to use and improves the attraction to the learners.

2 © WEGA TOOL

Waikato environment for knowledge analysis is developed by the Waikato University which is developed by the application of JAVA. It helps to develop the cluster algorithm to study the individual preferences among the computer science students [11].

Wega tool is used to cluster the 60 computer science learners to identify the individual preferences based on cognition and their geographical area.

3 RESEARCH METHODOLOGY

The model of the newly proposed web based learning system is as follows.
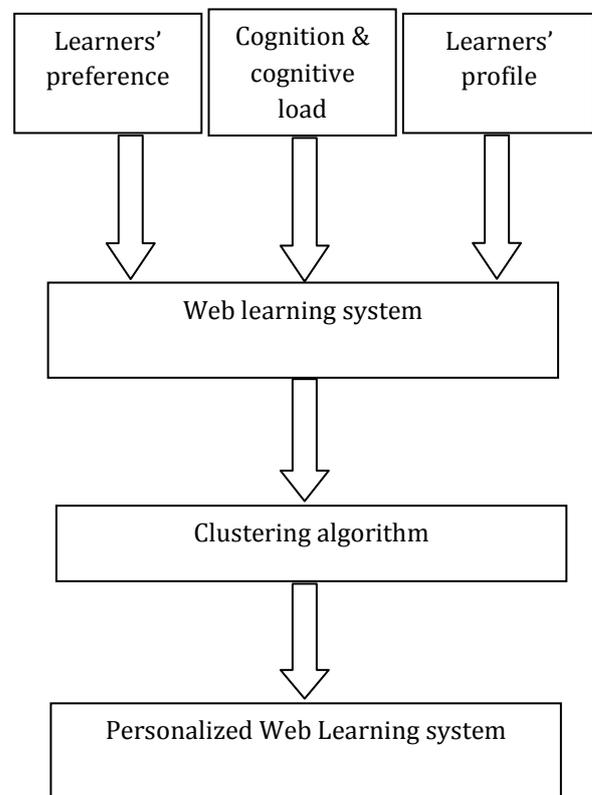
4 SAMPLING

60 students studying B.Sc computer science were selected for this experiment. A questionnaire was used to collect the feedback data about the individual preferences among the learners. After the pre-test a total of 60 students were selected and divided to separate groups (30 City based background students and 30 Rural based background students). The questionnaire was given to the two groups to study the individual preferences. The results showed that the city based background students improved significantly in post-test condition on web learning module's performance.

5 LIMITATIONS OF THE RESEARCH

I.   Generalizing the statements to all the geographical area may not be possible due to the differences in computer literacy level.

II. Technical factors such as loading time, internet usage time should be considered in order to get accurate result.

III. Social and emotional factors should be considered

IV. Comparing the web learning system and its' design will improve the accuracy of the result.

6 CONCLUSIONS

We learning system improvement can solve issues in learning and teaching. In particular, the detailed study of individual preferences on web content, web structure and web usage with the help of clustering algorithm might have importance in the development of individualized web learning system. This study proposed effective web learning system based on clustering technique. Cognition theory is used to frame the clusters. Cognitive based feedback questionnaire is used to predict the likes and dislikes of the learners. Questionnaire was framed based on the mental aspects of the learners. The Students were classified based on the answers they have given to the questionnaire. The feedback from the learners helps to identify the areas of improvement in web learning system. Cognition based clustering approach will find a way to improve user satisfaction in web learning system. It is possible to enhance the web learning system content, web learning system structure and web learning system usage level. Individual preferences based intelligent human computer interaction is possible in web learning system. .

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