A User-Intelligent Adaptive Learning Model For Learning Management System Using Data Mining And Artificial Intelligence

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Abstract

Entire world is revolving towards digital space as a result of the Internet and other emerging web technologies are helping the society to reach the universe. ICT and e-learning are growing radically fast and have captured a major role in higher educational systems. To develop the coast-to-coast purposes, institutions are changing the teaching style from chalk and talk to Learning Management System (LMS), called e-learning systems. Impact of e-learning introduces various delivery methods for teachers and different platforms to learn for learners. Teaching through LMS is most challenging because the difference in the learning styles and the nature of the course. Materials used for delivering the course are mostly static for all types of learners. Students are learning from the LMS tools, but not most effectively. To overcome this issues, the author(s) are recommending a new user intelligent adaptive learning model to be used in LMS. This allows the model to identify the learners learning style and endorses the appropriate learning materials for the learners. This method of delivering will be effective and efficient for different LMS learners.
Keywords: Learning Management System, Data Mining, Artificial Intelligences, e-learning, adaptive learning
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I. INTRODUCTION

Numerous Educational institutions have moved from traditional classroom delivery to Learning management Systems where web technologies and cognitive theories have been embedded in E-Learning technologies. (Education, n.d.) shows e-learning as "learning method and a technique for the presentation of academic /curricula via the Internet, intranet or any other electronic media inclusive of multimedia, compact discs, satellites, or other new education technologies".

There are several e-learning tools that are accessible freely like Moodle and commercial like Black board etc. E-learning supports organizations in many ways such as improving exercise outlays, decreases the equipment and environmental structures, increasing the results, standardization and consistency delivery. E-learning will also support learners as to have real time experiences, free from class as any time education, will recuperate the retention, improve the individual learning, will encourage sharing and knowledge gaining. E-learning Technologies are having issues in delivering the materials for learners. Instructors are framing or creating the materials for delivery and posting in the LMS platforms for learners to use the materials, but not thinking how useful the materials are? And how learners are adapting to the teaching styles are helpful? In e-learning, the materials will be used by different types of learners and some may be interested learning through audio, video, visual or presentations. But normally the materials are standard for all learners.

The main purpose of the research is to come up with an innovative adaptive tool for e-learning platform that can be used as an addin tool for Learning Management Systems. The tool can help with coming up with course contents that are tailor made to leaner's expectations, learning style and learners motivation.

II. BACKGROUND STUDY

According to (Yeu-Hui & Chiung-Wen, 2013) they describe the role that new technology play as "New technologies are changing rapidly and have the potential to play an important role in teaching and learning. Mobile and wireless technology brings new opportunities to traditional classroom-based learning as well as to lifelong learning outside the classroom". Change of teach from classroom to e-learning supports the learners to learn anytime, anywhere in saving the time, value and location.

(Docimini & Palumbo, 2015) mentions e-learning as "a dynamic and immediate learning environment through the use of internet to improve the quality of learning by providing students with access to resources and services, together with distant exchange and collaboration". In another aspect, e-learning improves the quality structure of an organization and also the learner's freedom of learning.

Tutors or subject experts are developing the delivery content, activities and exercises for the modules as generic. Problem is that an e-learning environment will have learners with different learning styles as well as different cultures from different states and regions. Generic materials may not help in all the cases. (Doherty, 2006) explains "The lack of effective interaction between students and the instructor and among students in the course often results in unsatisfying learning experiences and/or students dropping out or failing online courses". Learners will have challenges or may not be interested to use the materials and it can forced to stop-reading. (Kosta & Boris , 2015) refers to "to demonstrate the design and evaluation of an adaptive, intelligent and, most important, an individualised intelligent tutoring system (ITS) based on the cognitive characteristics of the individual learner".

Learning materials should be based on the learning style. Some learners may be interested to learn the materials through video's, audio, and animation, verbal or through text. The Author(s) are recommending a new User-Intelligent adaptive Learning Model for LMS to improve the learner's interest and involvement based on their learning style. To achieve this, the two main techniques data mining and artificial intelligences have begun used for drilling to find the learning style and based on the model will suggest the suitable learning materials.

III. OBJECTIVES

The main objectives of the research are listed below:
- To apply Data Mining Techniques to categorize learners learning styles
- To apply artificial intelligent techniques to come up with an enhanced new e-learning platform
- To explore contents necessary for learners based on the learning style through the new platform

IV. TOOLS AND METHODOLOGIES

A new User-Intelligent Adaptive Learning Model for Learning Management System is shaped for e-learning platform as shown in Figure 1.
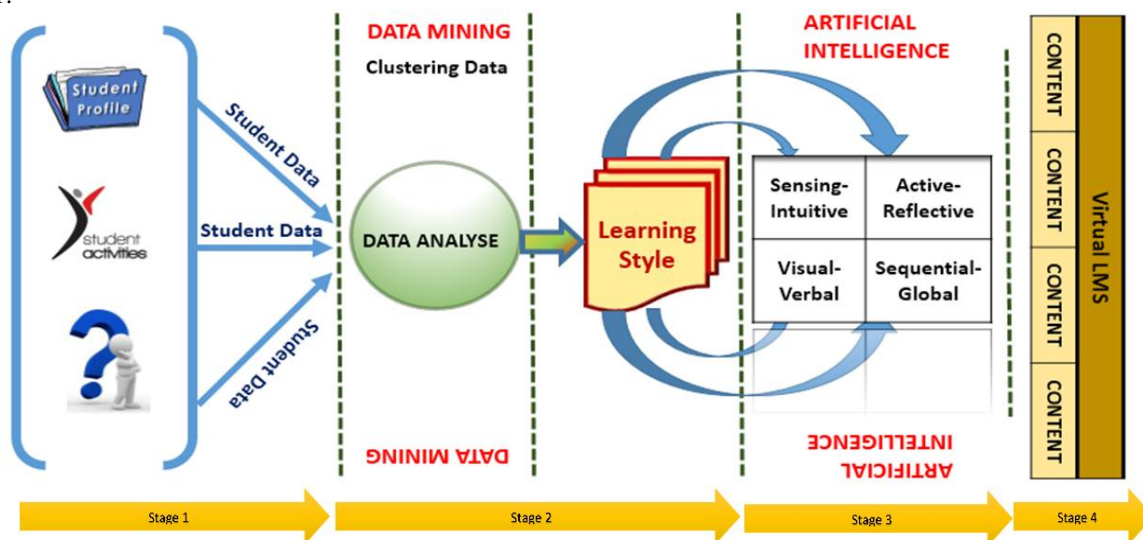

Fig. 1: User-Intelligent Adaptive Learning Model

A. The Overhead Presented Model Has Four Stages:
Under this section we can use present tense like : "Students demographics data are gathered from the student profile which will be collected"
- Stage 1: Students demographics data are gathered from the student profile which will be collected at the time of students admission, and their performance data will be monitored and recorded in their profile. The web logs in the Learning management system help us to get the information about student interaction in the LMS on a specific module. (Hanna, 2004) describes e-learning is a source which "automatically collected data is web server logs; these are vast collections of data relating the accessing of specific web pages ". According to (Zorrilla, et al., 2005) refers "students typically log in to such systems, keeping track of users and sessions—a major hurdle in examining server logs". For course personalization and identifying the learning style of learners a questionnaire should be prepared to know the learner

preliminary knowledge on the course as well to know the learning characteristics. The student data are recorded from above sources as the students activities and usage are used as a dataset for further processing in stage 2.

– Stage 2: The Student data set which was retrieved from Stage 1 will preprocessed using Feature selection technique to clean and remove the redundant data as the data set gathered may have different types of unrelated data and this may be difficult to characterize the student's behavior so there is need to preprocess and find the most relevant attributes that will be needed for mining. Now to classify the students based on their learning style we use Clustering algorithm. (Chapple, 2015) defines cluster as "technique used to place data elements into related groups without advance knowledge of the group definitions". By using this, the students can be grouped based on their learning styles and behavior.

– Stage 3: In this third stage, the students learning style are found based on the student data

– Stage 4: Felder and Silverman (1988) have defined four learning style dimensions, which can relate for a particular learning style and behaviours. Felder and Silverman describe the learning style as Sensing-Intuitive, Active-Reflective, Visual-Verbal and Sequential-Global learners as shown in the Figure 2.

Type of Learners	Learning Preferences
Sensing Learners	concrete, practical, oriented towards facts and procedures
Intuitive Learners	conceptual, innovative, oriented towards theories and meanings
Visual Learners	prefer visual representations of presented material – pictures, diagrams, flow charts
verbal Learners	prefer written and spoken explanations
Active Learners	learn by trying thins out, working with others
reflective Learners	learn by thinking things through, working alone
Sequential Learners	linear, orderly, learn in small incremental steps
global Learners	holistic, systems thinkers, learn in large leaps

Fig. 2: Felder Learning Style Dimensions

The clustered group of learner from stage 2 can be mapped within the four dimensions of learning styles. For example, if a student learning style is identified as visual-verbal, then this model should provide the learning material based on pictures, diagram, flowcharts, written and spoken explanations. Now the learning materials can be personalized based on the learning style for the learners who are clustered as a group as discussed in stage 2.

Stage 4: The course specialist or course developer should create the content's for all types of learning styles (i.e.,) the rich learning contents should be prepared as video based content, audio based content, handout based activities, animated content, pictures based brilliance and hypertext materials etc.,

The AI techniques will be used to facilitate the extraction of learners needs bases on variables that influence learners academic performance. Artificial intelligent has always been a branch of computers that can be used to facilitate intelligent tutoring, decision support, assessment of learning outcomes and theories of teaching in education. AI and associated applications under e-learning play a crucial role in providing e-learning systems that are intelligence and in some instances behavior based. Considering different cultures, learning styles, different teaching styles there is needed to incorporate intelligence in learning management systems to enhance learners behaviour. Such techniques such as Fuzzy logic, incorporating intelligence, machine learning and confidence factors in Knowledge Based Systems and Decision support systems can extensively benefit LMS where deep searching techniques can be used to come up with content that highlights behaviour of a learner. Once the learners profile deduce from Data mining an adaptive e-learning style can be adopted by embedding instructural design theory into the LMS. The learners can use the Virtual LMS to access the recommended content of learning style by model. Because of this, the leaners will have more interest in utilizing the system.

V. CHALLENGES

The innovative developed model has certain confines
- Instructors or subject expert need to develop different materials based on the learning style
- Time consuming and cost of development will increase
- Learners will be forced to use only the suggested materials

VI. CONCLUSION

The research is based on the usages and performance of e-learning tools in the educational fields and found the materials should be characterized constructed on the learners learning style. The author(s) recommends to use this model to be effective and

efficient for e-learning tools like Learning Management Systems. This model will motivate the learners to handle the e-learning tools very successfully and the tutors need to be familiar with the characteristics in preparing the learning materials.

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