



Modeling an e-teacher's decisions for e-learners' motivation using Decision Tree

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Abstract: In customary classroom frameworks, understudies are checked by the educators utilizing their everyday execution records and reports. While the e-learners and their educators are isolated by time and space/time or space. In this way, the e-learners experience the ill effects of different sorts of troubles and issues amid learning of any online course. Intelligent Tutoring systems use intelligent agents to assist the e-learners. This study attempts to model such an e-teacher (Intelligent Agent) which will be able to motivate the e-learners to learn the online course. Data Mining technique Decision Tree is used to understand the e-learners' behavior on learning management system and make decisions accordingly.

Keywords: E-learning ;E-teacher; Decision Tree algorithm; Agents; Intelligent Tutoring System

1. **INTRODUCTION**

The Monitoring and evaluation of understudies' execution records is a key technique utilized by the instructors to arrange their educating and pedagogical procedures in a customary classroom framework. Yet, in an electronic instruction frameworks, understudies' web logs give critical information to dissect the understudies' execution. e-learning frameworks give just instructional material on Learning Management System (LMS), this practice has restricted the part of an instructor just as a facilitator because of the absence of association between an educator and an e-learner. However, the personalized e-learning frameworks give answers for this issue, i.e., Adaptive Hypermedia Educational Systems (AHES) and Intelligent Tutoring Systems (ITS) (Chen, *et al.* 2000; Schiaffino, *et al.* 2008; Hsu, *et al.* 2010; Hwang, *et al.* 2013; Yang, *et al.* 2013). ITS include instructing specialists (Intelligent Agents) to perform different parts on LMS to help the e-learners amid learning process. Most of the studies, i.e., (Schiaffino, *et al.* 2008) utilized web logs for giving the instructional material to the understudies as indicated by their learning style.

This study is undertaken to model such an e-teacher (Intelligent Agent) which will have the capacity to motivate the e-learners to take in the course to upgrade learning. Kolb's learning styles model (KLSM) (Kolb 1985) is utilized to comprehend the understudies'

learning styles since this hypothesis expresses that learning is a complete life cycle. The utmost level of learning can be accomplished if the students should first be roused to learn a new course and afterward should be taken out from various phases of this life cycle. KLSM (Kolb 1985), distinguished four sorts of learners, i.e., Diverger, Assimilator, Accommodator and Converger. Decision Tree Induction (Quinlan 2014) is used to model the teaching strategies of e-teacher. The next section will preview the materials and methods.

2. **MATERIALS AND METHODS**

To show the e-instructor, it was required to comprehend the e-learners' learning styles. This comprehension was required to realize what learning styles need motivation to take in a course and which needn't bother with any inspiration. Then again, this comprehension would help the e-instructor to give the learning material of the understudies' enthusiasm for motivation. A survey of online students of a public university of Pakistan was conducted to distinguish the e-learners' learning style and comparing conduct on LMS. The members were enrolled in BSCS in various courses. The information investigation uncovered that an expansive number of all learning styles don't login on time to attend the online classes, no task accommodation or late entries, found no or less participation on online discussion boards. (Fig. 1) is used to mention the students' comparing conduct on discussion board.

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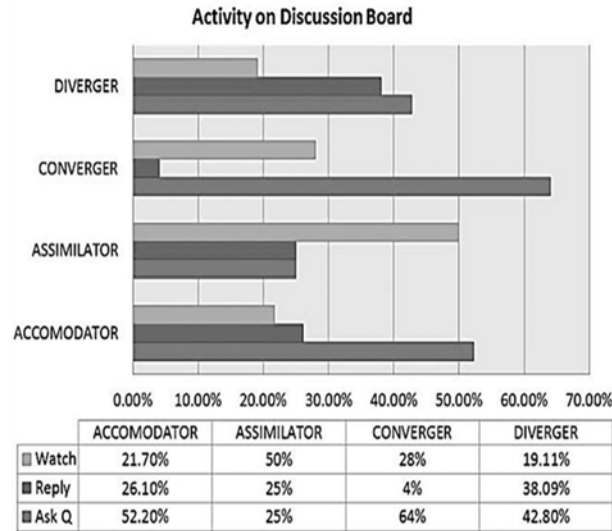


Fig. 1. Depicts the students' behavior on Discussion Board

From the investigation of data gathered, a few conclusions were closed, which displayed the e-teacher's decision strategies. (Table.1) is utilized to demonstrate the information investigation of understudies' conduct on LMS and comparing conclusion. To build the teaching methodology Model for e-teacher, Decision Tree is utilized. At the point when environment is obscure, Learning is vital, i.e., when designer lacks information, then Decision tree can be utilized to learn from the data and decide.

Table. 1 Depicts the Analysis Results from the Survey Data

E-learners' Behavior	Result
Not punctual to login	Un-motivated
No contact with teacher	Un-motivated
No participation on DB	Not login or no visit
Visit the DB only	Reflective

For modeling the teaching decisions for an e-teacher C4.5 (Quinlan 2014) algorithm of Decision Tree was utilized. Decision tree depends upon the Entropy and Information gain to build the tree.

$$Entropy(p) = -\sum_{i=1}^n p_i \times \log(p_i) \quad \text{Eq.1}$$

$$Gain(S, A) = E(S) - I(S, A) = E(S) - \sum_i \frac{|S_i|}{|S|} \cdot E(S_i) \quad \text{Eq.2}$$

The e-teacher will analyze the online students' log files from data base of LMS. This information will be useful for e-teacher to distinguish the learner's learning style and settle on choices in like manner. Experienced archives (Harb, Durrant et al. 1993; Healey and Jenkins 2000; Healey and Jenkins 2000; Gohar and Sadeghi2015) were utilized to arrange the e-educator's choices in different circumstances and the instructional procedures are extricated from different exploration

considers in such manner The data is preprocessed and then proceed to construct the decision tree using software C4.5 Decision Tree algorithm. (Fig. 2) shows knowledge flow of the Decision Tree Model. (Fig. 3) is used to demonstrate the Decision Tree for students' web logs' analysis to implement pedagogical strategies accordingly. Decision Tree algorithm extracted and presented the pedagogical instructions in a flow chart like structure. For e-learner's motivation towards a course, the first step is to motivate them to attend the lectures on time and involve in discussion board participations to learn the course contents. Therefore Fig. 4 demonstrated the Decision Tree which will be the decisions of e-teacher after analyzing the e-learner's login conduct. (Table 2) is demonstrating the instructional strategies, the e-teacher has to implement

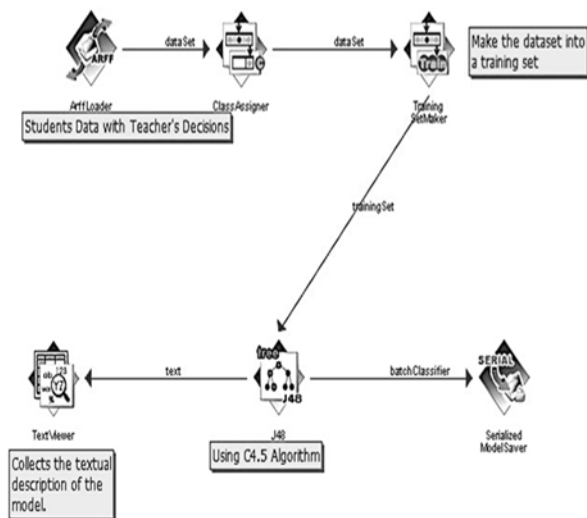


Fig. 2.depicts the knowledge Flow of Decision Tree Model

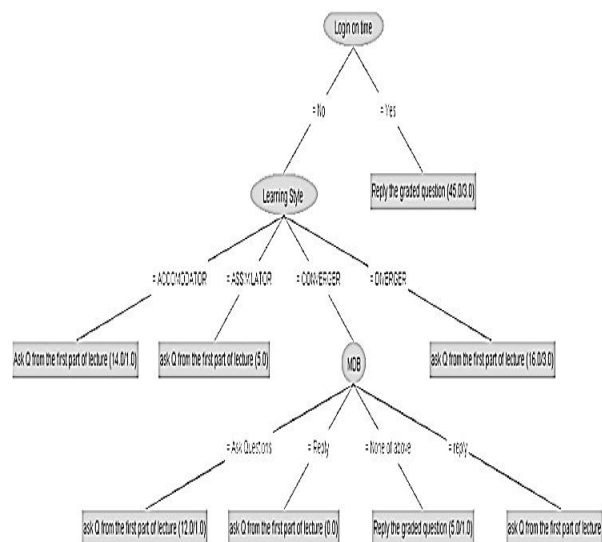


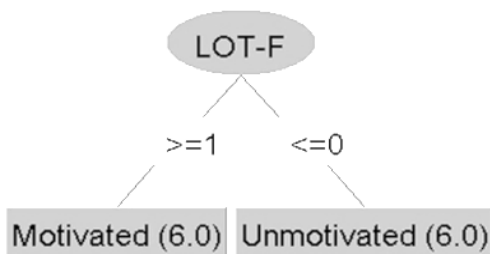
Fig. 3. Depicts the Decisions assisted by the Decision Tree for e-teacher

Table 2. Demonstration of E-teacher's decisions assisted by Decision Tree

Attribute	Student Behavior	E-teacher's (Agent's) Strategy
Login on time	punctual	Reply the Graded Questions on Discussion Board
No punctuality for login	Not punctual	Ask Question from first part of lecture

The Decision Tree C4.5 software is used to discover the various students' reaction after implementing the e-teacher's instructional strategies. The students' behavioral change can be analyzed by analyzing the frequency of login on time for online lectures. The e-teacher has to check the log files of student to check the frequency before and after implementing the strategy to motivate the e-learners to login on time.

The LOT-F is used to mention "login on time frequency" after implementing the e-teacher's strategy. The student will be considered "motivated" if the logs shows one "login on time" log more than the previous login on time record. (Fig. 4) is used to demonstrate the motivation analysis decision tree for e-teacher to evaluate the login on time strategy for online lectures.



(Fig. 4) depicts the Students Motivation for login on time to attend the online lectures

3. RESULTS AND DISCUSSION

The proposed motivational model for e-teacher (Intelligent Agent) is evaluated using Moodle by installing local plugins. These plugins notify the students by emails, alert pop ups etc. The model is evaluated in a public university of Pakistan's BSCS e-learning module. (Fig. 5) is used to show the screen shot of Moodle installed a local Plug-in extension to examine the proposed e-teacher concept.

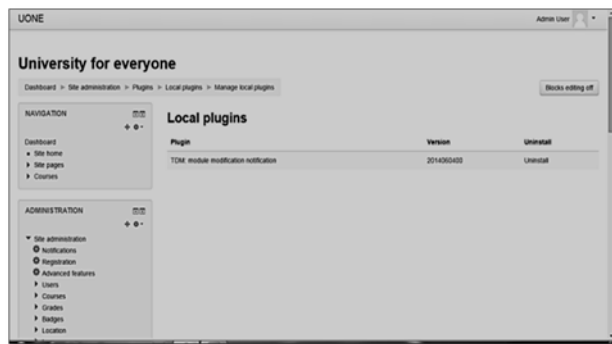


Fig. 5. The e-teacher has implemented different strategies for different situations to motivate the unmotivated students.

Table. 3 is used to demonstrate the frequencies for login on time before and after.

Student	LOT-F Before	LOT-F After
1.	9	10
2.	9	9
3.	6	15
4.	21	20
5.	11	16

The entropy of students' data is the foundation factor of the Induction process. The impurity (Entropy) of different learning styles' classes were used by Induction process to discover the classification rules by examples recorded in data.

4. CONCLUSION

The decision tree software learnt decision tree from the data providing the different patterns about each learning style and also suggested teaching strategy extracted from documented experiences of experts. After implementing the e-teacher's decisions, the clear change in students' login behavior was discovered.

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