Classification Model of English Course e-Learning System for Slow Learners

Thakaa Z. Mohammad, Abeer M. Mahmoud, El-Sayed M. El-Horbart
Mohamed I. Roushdy and Abdel-Badeeh M. Salem

Department of Computer Science, Faculty of Computer and Information Sciences,
Ain Shams University, Cairo, Egypt

thakaa66@me.com  abeer_fl3@yahoo.com  sayedhorbaty@yahoo.com
miroushdy@hotmail.com  abmsalem@yahoo.com

ABSTRACT: Data mining methodology can analyze relevant information results and produce different perspectives to understand more about the students’ activities. When designing an educational environment, applying data mining techniques discovers useful information that can be used in formative evaluation to assist educators establish a pedagogical basis for important decisions. This study presents a proposed model based on classification approach to find an enhanced evaluation method for slow learner students in the English course. This model can determine the relations between academic achievement of students and followed behaviors in the website of e-learning English course. In addition to that, the results of this study provide the teachers with new enhanced methods of evaluation since the slow learners might not have high academic achievements.

Key-Words: E-Learning, Knowledge Discovery in Databases, Data Mining, Web Mining, Slow Learners, English e-learning course.

1 Introduction

E-learning is a technological educational method aims to develop the education by providing facilitated learning methods and approaches based on information, communication and multimedia technologies. During the last five years, a huge of accumulated information is collected from e-Learning courses [1,2]. Furthermore, applying data mining techniques on educational databases offers helpful and constructive recommendations to the academic planners in education institutes to enhance their decision making process, to improve students’ academic performance and trim down failure rate, to better understand students’ behavior, to assist instructors, to improve teaching and many other benefits [3,7,10].

On the other side, classifying those databases and finding out suitable methods to retrieve information from them created the needs for new approaches [6,8,9]. Classification is a process of grouping physical or abstract objects into classes of similar objects. It is a supervised model where it predicts class labels for unseen data. When using a classification for educational system, it allows characterizing the properties of a group of user profiles, similar pages or learning sessions. Recently, the classification is one of the most useful tasks in e-learning since many objectives can be achieved in e-learning environments by utilizing the classification task such as; (a) classifying students into groups according to the similarity in their reactions and characteristics as an educational strategy, (b) identifying students whom need more motivation as a kind of minimizing the rates of students dropping out, and (c) predicting the levels of students’ intelligence for giving them special courses, and many other objectives [3,15].

This paper discusses the application of data mining approach to educational systems, particularly, classification techniques for e-learning. This study aims to find the relation between the students’ behaviors in the websites and their academic achievements. Therefore, a data mining model
based on classification methodology has been built
for this purpose. However, we can define the
relations between students’ behaviors in the e-
learning website and their academic achievements.
The rest of this paper is organized as follow:

Related work is discussed in section 2 and our
problem domain is described in section 3.
Section 4 presents our proposed classification
model for tracking students’ behaviors. In
section 5, the paper concludes with a short
summary and with an outlook on the next steps
to be done in the proposed development system.

2 Related Work

Many studies have been held in order to improve
the implementation of data mining means and
algorithms through e-learning systems [8,9,10,11].
Each study focuses on a special data mining
technique as an application for e-learning. In what
follows, a brief discussion is presented for some
related work achieved in this respect.

AlAjmi et al. [16] held a study about “Using
Instructive Data Mining Methods to Revise the
Impact of Virtual Classroom in E-Learning”. In their
study, they have focused on the use of educational
and instructive data mining approaches in finding out
the impact of virtual classroom in e-learning which is
considered as a kind of virtual learning environment.

Also, they followed using a data mining techniques
to observe the records of students’ behaviors in the
virtual classrooms environment. Actually, they have
classified the performance indicators of students as
variables of the data mining algorithm. After that,
they calculate the weights of those variables (for each
student) based on exams scores and then, classify the
students to conclude their study.

Chellatamilan and Suresh [17] utilized the data
mining tools in recording and classifying the
behaviors of e-learning students in order to find the
impacts of the e-learning systems on the students.
Chen et al. [12] apply decision tree (C5.0 algorithm)
and data cube technology from web log portfolios for
managing classroom processes. The induction
analysis discovers potential student groups that have
similar characteristics and reaction to a particular
pedagogical strategy. Minaei- Bidgoli and Punch
[13] classify students based on features extracted
from the logged data in order to predict their final
grades. They use genetic algorithms to optimize a
combination of multiple classifiers by weighing
feature vectors. Tang et al. [5] use data clustering for
web learning to promote group-based collaborative
learning and to provide incremental learner
diagnosis. They find clusters of students with similar
learning characteristics based on the sequence and
the contents of the pages they visited. Hamalainen et
al. [4] introduce a hybrid model, which combines
both data mining and machine learning techniques in
constructing a Bayesian network to describe the
student’s learning process.
3 Problem Domain

By focusing on slow learners’ students, there are many courses that available for those students who suffer from some problems that make them learn in a slow manner comparing with their equals in normal classes. Through this study, a new English e-learning course for slow learners will be designed. Actually, this course will be designed to contain twelve different units divided into two semesters where unit-1 to unit-6 forms the first semester and unit-7 to unit-12 forms the second semester. Each unit will have five parts; reading, listening, grammar, speaking, and writing. Each part will contain two levels; material level that explains the idea of the part, and the quiz level that assesses the understanding level of the student for the required skills. A total score is calculated for each unit in the semester, and also a total score is calculated for each semester. Finally, the two semesters’ scores are used to calculate the average score of English e-learning course for each student as it appears in Fig 1.

The English course is just an example about the courses that can be offered for slow learners for different levels. It appears that the academic achievement of each student will be noticed by the teacher based on the total score of the unit, semester, and the course. Containing five parts in each unit (Reading, Listening, Grammar, Speaking, and Writing) makes several choices for each student to follow different patterns in selecting the pattern that they prefer in the e-learning course. This e-learning course will not force a specific order of parts to follow by the students of slow learners in English e-learning classes. Some students start with the Reading part, other students start with the Listening part, and so on.
These behaviors form different patterns that followed by the students in the same class. Actually, following the behaviors of the students within the course in order to compare those behaviors with their academic achievement cannot be done simply.

4 The Proposed classification model for tracking students’ behaviors.

The solution of this problem can be achieved by the use of classification approach as shown in Fig 2. According to the figure, two types of data are required to find the relation between the patterns and the academic achievement of the students; data of navigating students’ behaviors and data of recording students’ academic levels.

(a) The first kind of data will be classified into patterns since each pattern will have an ID as it is shown in Fig 3. Those patterns can be obtained simply by tracking students’ behaviors in the e-learning environment. The number of these patterns will be equal to $5\times4\times3\times2\times1$ (5!) which equal 120 based on the probability rule; the tree in Fig 4 can explain this relation in more details.
(b) The second type of data can be collected from the records in the databases for the involved students. Each student has a file that contains the academic scores in each part and each unit in addition to the records of accessing and exiting date and time. This database is used by the teachers to keep track with their students’ achievement. The collected data can be linked together in order to find the relations between patterns of students’ behaviors and their academic achievement by using classification techniques of data mining. The collected data will be compared in a table form, where each pattern is linked with the total achievement of the students that follows this pattern.

(c) The final step which is in obtaining the relations between the linked data can be in statements form as it appears in Fig 5.

However, the English e-learning course will be designed by HTML programming language in order to make it available on a website. Some GUI functions and methods will be used in order to design a user friendly interface. The HTML programming
provides each page with a unique link and so it is easy to track students. Then, the obtained data from web mining techniques can be classified by simple relationships based on the previously defined patterns.

5 Conclusions

This study presents a proposed model based on classification approach to find an enhanced evaluation method for slow learners’ students in the English course. This model can determine the relations between academic achievement of students and followed behaviors in the website of e-learning English course. In addition, the results of this study provide the teachers with a new enhanced methods of evaluation since the slow learners might not having high academic achievements; therefore, evaluating students with new methods can be more effective than traditional methods.

References