A Business Intelligence Model- Enhancement of Quality Education System Using Data Mining Techniques

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Abstract— The objective of research paper is to provide the basic idea in the quality education systems to understand which factors might test the quality of the students. The necessity of having institutional achievement in further enhancement of value added education systems to give good quality students and career, one way to do this is by using valid database management and processing of the students information. A data mining methods represent a valid approach for the extraction of precious information throughout their years of study from existing student's data base to manage relations with other students. This may indicate at an early stage which type of students will potentially be success and what percentage result will be and what areas to concentrate upon in education systems for improvement. For this purpose a data mining framework is used for mining related to academic data from existing student, and the rule generation process is based on the classification method. The generated rules are studied and evaluated using different evaluation methods and the main attributes that may affect the student's quality have been highlighted. Software that facilitates the use of the generated rules is built which allows the quality education systems to predict the student's quality in respect of degrees awarded.

Index Terms— Business Intelligence, *Quality education*, *Data mining*, *Classification*, *Association rules*, *Clustering*, *Degree.*

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1 INTRODUCTION

Business Intelligence is a broad category of applications and technologies for gathering, providing access to, and analyzing data for the purpose of helping enterprise users make better business decisions. The term implies having a comprehensive knowledge of all of the factors that affect your business. It is imperative that you have an in depth knowledge about factors such as your customers, competitors, business partners, economic environment, and internal operations to make effective and good quality business decisions. Business intelligence enables you to make these kinds of decisions. The quality education system is of great concern of the educational institutions. Several factors may affect the student assessement process in a particular Institute. One of the biggest challenges that quality education faces today is predicting the good quality students. Institutions would like to know, for example, which students and how many will success in their institute. This research paper is an attempt to use the data mining processes, particularly predictive classification to enhance the quality of the educational system to deccrease numbers of students (dropout students) to evaluate student data to study the main attributes that may affect the student enrollment factors. From knowing how many students will be success, the encashment value of their degree and to make a big effort to concentrate on all factors that play main role in motivating the new student to enrolls in a particular institute. The rapid growing demand of educational systems and there is a great importance of the sustaining educational business. Today the latest technology introduced in educational organizations for developing and enhancing the educational system and also trying to increasing their capability to help the decision makers obtain the right knowledge from the given sets of data, and to make the best decisions by using the new techniques as data mining methods and techniques.

2. DATA MINING FOR QUALITY EDUCATION

Data mining in educational system is an important research field and this area of research is gaining popularity because of its potentials to educational institutes which are offering quality education.

[1] **Software Modernization**: A new technology define case study of using educational data mining in module course management system. They have described how different data mining techniques can be used in order to improve the course and the students' learning. All these techniques can be applied separately in a same system or together in a hybrid system in intelligence framework.

[2] **Mining Big Data**: Conduct a survey on educational data mining between 2013 and 2014. They have compared the Traditional Classroom teaching with the Web based Educational System. Also they have discussed the use of Web mining techniques in education systems.

[3] **Algorithm:** Discussed how to use of k-means clustering algorithm to predict student's learning activities and through analysis of academic score. The information generated after the implementation of data mining technique may be helpful for instructor as well as for students.

[4] **Academic/learning purposes:** Business Intelligence and analytics helps optimize the entire education sector from the perspective of every stakeholder - the student, the institution, the faculty, the government and the industry. The use of data mining techniques to predict the strongly related subject in course curricula. This information can further be used to improve the syllabi of any course in any educational institute.

[5] **Intelligence Tools:** The integrated business intelligence tools in order to gain enterprise-wide overviews and management dashboards. The increasing uptake of business intelligence within basic and higher

education has been attributed to a parallel demand for accountability. The achievement of the departments and faculties in Business Intelligence systems and initiatives provides a greater return on investment and helps managers to develop new strategies.

3. RESEARCH OBJECT

Business Intelligence (BI) can be used across the lifecycle of tl academic assessments in educational institutions. The scope for BI ai analytics in each of the academic segments are important. The ma interesting use cases include determining which students should g admitted for which best stream, areas of special tutoring, improving application/admission rates, reducing student attrition/drop-offs, evaluating faculty, improving curriculum, helping students prepare study plans, helping students analyze academic and career options, deciding where to open the next school/university, what courses are people able to study best in an e-learning environment, learning recommendations etc. The object of the present study is to identify tl potential areas in which data mining techniques can be applied in the fie of Quality education system in India and to identify which data minii technique is suited for what kind of application to improve the quality of the student.

4. BUSINESS INTELLIGENCE TOOLS

A greater emphasis needs to be placed on the conversion of data to business intelligence. The potential tools use for BI in the education sector has dramatic effect in educational business since last decade. In fact, despite education being one of the fastest growing sectors in the industry the usage of data for taking better decision is very limited or nearly absent. As the maturity is very low, the potential for growth given the undoubted business benefits is very high. The among potential customers, the transactional software, campus management software and knowledge management software and predictive analytics are being built into mainstream applications for everyday decision making by all types of students, especially in various departmental improvement. And also using traditional commercial ETL and average tools to custom build their data warehouse and average systems. The increasing usage of packaged DWH solutions within LMS and SIS systems. Finally, there is a lot of buzz around the education marketplace on using DWH and average solutions on the cloud.

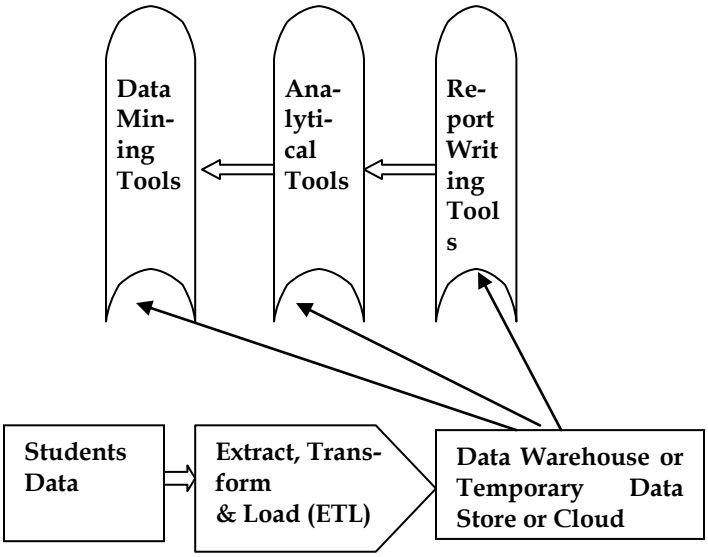

FIGURE 1 :DATA MINING & BUSINESS INTELLIGENCE MODEL

5. DATA MINING TECHNIQUES

The usability of data mining, the extractionhidden predictive information from large databases which is useful for business need, it also used to operate on large volumes of data to discover hidden patterns and relationships helpful in critical decision making. The sequences of steps identified in extracting knowledge from students' data are: shown in Figure 2.

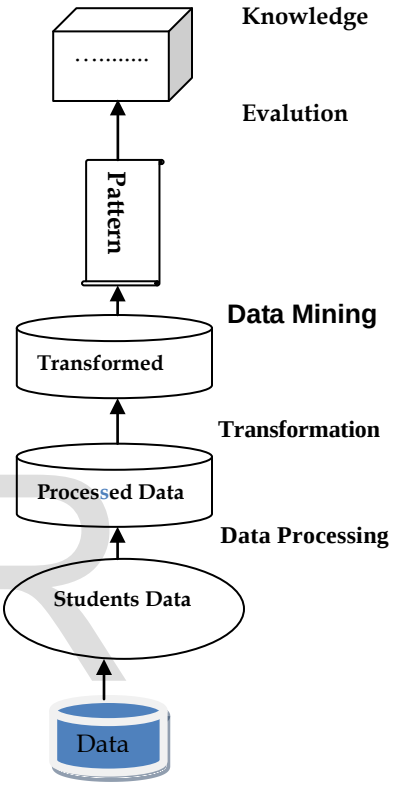

Figure 2.

5.1 CLUSTERING TECHNIQUES

Clustering relevant data in different cluster can be easy to analyze. If management wants to know the best result's data among the students of any department in PG level, clustering data in each course like MBA, MCA, MIT, MFT as a separate cluster and analyze the data can be faster. A performance evaluation result is one of the bases to monitor the progression of student performance in institution. Base on this difficult issue, grouping of students into different cluster according to their performance has become a complicated task. With traditional grouping of students based on their average scores, it is difficult to obtain a comprehensive view of the state of the students' performance and simultaneously discover important details from their time to time performance. In data mining k-means clustering algorithm simple and efficient tool to monitor the progression of students' performance in PG course based institution.

5.2 ASSOCIATION RULE

Association rule can be applied for extracting common factor in an educational institution. An association rule is an expression of the form $X \Rightarrow Y$, where X and Y are sets of items and have no items in common. This rule means that given a database of transactions D *where* each transaction $T \in D$ is a set of items. $X \Rightarrow Y$ denotes that whenever a transaction T contains X then there is a probability that it contains Y too. The rule $X \Rightarrow Y$ holds in the transactions set T with confidence c if c% of transactions in T that contain X also contain Y . The rule has support s in T if s% of the transactions in T contains both X and Y . Association rule mining is finding all association rules that are greater than or equal a user-specified minimum support (*minsup*), and minimum confidence (*minconf*).In general, the process of extracting interesting association rules consists of two major steps. The first step is finding all itemsets that satisfy *minsup* (known as *Frequent-Itemset* generation). The second step is generating all association rules.

5.3 CLSSIFICATION RULE

Classification technique is master technique in data mining, based on machine learning. In this technique it is used to classify each item in a set of data into one of predefined set of classes or groups**.** And a Rule-based classification extracts a set of rules that show relationships between attributes of the data set and the class label. It used a set of IF-THEN rules for classification.

FINAL_GRADE=INTERNAL_MARKS+TERM_END_EXAM

IF STUDENT_ATTENDANCE ≥ 75% AND FINAL_GRADE ≥ 50% ,

THEN C GRADE,

IF STUDENT_ATTENDANCE ≥ 85% AND FINAL_GRADE ≥ 80% ,

THEN B GRADE,

IF STUDENT_ATTENDANCE ≥ 95% AND FINAL_GRADE ≥ 90%,

THEN A GRADE,

IF GRADE ≥ C AND SEMESTER_PERFORMANCE ≥ AVERAGE,

THEN AVERAGE_STUDENT,

IF GRADE ≥ C AND SEMESTER_PERFORMANCE ≥ AVERAGE,

THEN AVERAGE_STUDENT,

IF GRADE ≥ B AND SEMESTER_PERFORMANCE ≥ GOOD, THEN

GOOD_STUDENT,

IF GRADE ≥ A AND SEMESTER_PERFORMANCE ≥ EXCELLENT,

THEN EXCELLENT_STUDENT,

Classification rule can be applied in accessing student's data, like each course can be treated as transaction data. If institution want to know the quality of education delivered in the department of commerce, so one can analyze the performance level of students of commerce department to measure the quality of the students.

6. CONCLUSION

This article presents an idea on the adoption of business intelligence (BI) and attempts to show how important it is as a tool in enhancing the management of information that is needed in strategic decision-making processes at the educational institution. In the present study, we found that education institutions have data but they need insights on the data to improve. The use of BI and analytics, application/admission rates can be improved thereby generating more revenue, quality of faculty can be monitored and evaluated, students can be helped by preparing their study plans, teachers can be provided with immediate data driven feedback on student performance, student attrition can be reduced, etc. BI can help the education sector to adapt and thrive during times of uncertainty by providing accurate, timely and understandable information. Since the application of BI brings a lot of advantages in quality for learning in institution, it is recommended to apply these techniques in the areas like optimization of resources to improve quality education. Hopefully these areas of application will be discussed in.

REFERENCES

[1] Academy Connection – Training Resources In html,[online]December 28th, 2005 Available from: cisco.com http://www.cisco.com/web/learning/netacad/index, December 28th, 2005.[Accessed:02/02/2016].

[2] C. Romero, S. Ventura, E. Garcia,(2008), "Data mining in course management systems: Moodle case study and tutorial", Computers & Education,Vol. 51, No. 1, pp. 368-384, 2008.

[3] C. Romero, S. Ventura, (2007), "Educational data Mining: A Survey from 1995 to 2005", Expert Systems with Applications (33), pp. 135-146, 2007.

[4] Han Jiawei, Micheline Kamber, (2000),Data Mining: Concepts and Technique. Morgan Kaufmann Publishers, 2000.

[5] Nayak et al ,(2013), A Mining Approach for Web Engineering In Respect of Business Intelligence Application, International Journal of Modern Engineering Research , Vol.3, Issue.2, pp-721-724, 2013.

[6] P.Veeramuthu, Dr.R.Periasamy, (2014),Application of Higher Education System for Predicting Student Using Data mining. Techniques, Volume 1 Issue 5, p.36-38.2014.

[7] Shaeela Ayesha, Tasleem Mustafa, Ahsan Raza Sattar, M. Inayat Khan, (2010), "Data Mining Model for Higher Education System", Europen Journal of Scientific Research,Vol.43, No.1, pp.24-29, 2010

[8] Sri Lanka Institute of Information Technology, [online] 28/02/2011 Available from: slit.lk http://www.sliit.lk/, [Accessed on 03/02/2016].

[9] Sun Hongjie, (2010), Research on Student Learning Result System based on Data Mining", IJCSNS International Journal of Computer Science and Network Security, Vol.10, No. 4, April 2010.

[10] Wayne Smith, (2005), Applying Data Mining to Scheduling Courses at a University", Communications of the Association for information Systems, Vol. 16, Article 23, 2005.

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