International Journal of Research in Advent Technology, Vol.7, No.5S, May 2019
E-ISSN: 2321-9637
Available online at www.ijrat.org

Survey: An Analysis of Student's and Teachers' Performance on Educational Data Mining

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Abstract— Data mining is widely used in educational field to extract useful information. It is the method of obtaining hidden, unknown and probably significant knowledge from huge voluminous amount of data. Educational data mining is one of the emerging discipline that can be applied for analyzing teachers' performance evaluation and students' performance evaluation. It has been found that educational data mining is the most frequently used assessment technique in higher education to know how the courses are taught. In this survey, educational data mining is applied to evaluate teachers' performance and students' performance. And find out the interesting information to credit teachers' appraisal**.**

Keywords—Educational data mining, Performance appraisal, Students' performance, Teachers' performance.

1. INTRODUCTION

Data mining is used to extract the meaningful information from large data using some patterns. It has been used in many applications such as educational data mining, web mining, text mining. It is an emerging discipline, concerned with developing methods for exploring the unique types of data that come from educational settings, and using those methods to better understand students, and the settings which they learn in [1]. Methods are different from standard data mining methods. There are three main goals in educational data mining, [2]

Pedagogical: to help in the design of didactic contents and improvement on the academic performance of the students.

Managerial: to optimize the organization and maintenance of education infrastructures, areas of interest and study researches.

Commercial: to help in students' recruitment in any private education.

Improving the efficiency and equity of schooling depends, in large measure, on ensuring that teachers are highly skilled, well resourced, and motivated to perform at their best. Raising teaching performance is perhaps the policy direction most likely to lead to substantial gains in student learning. In this paper, teachers' performance is measured on the basis of some factors like students' feedback, teaching-learning and evaluation related activities, professional development activities such as research work, attending national and international conferences, arranging workshops, publishing research papers. Teachers' appraisal can be done by analyzing students' evaluation and teachers' evaluation.

In this survey, it has been found that educational data mining applied on teachers' performance evaluation helps in improving education sector.

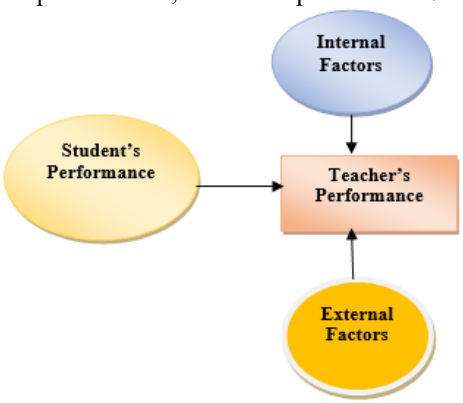

Fig. 1. Affecting factors of teacher's performance

Fig. 2.

2. LITERATURE REVIEW

Literature survey refers to a critical summary. Literature reviews contextualize research about a topic. A literature review is an evaluative report of studies found in the literature related to a selected area. The review should describe, summarize, evaluate and clarify this literature. It should give a theoretical basis for the research and help you determine the nature of our own research. [3] It Reviews that what have already been done in the framework of a topic. Therefore, on the basis of the existing knowledge, everyone can buildup innovative idea and concept for further research purpose [4].

Lawrance, R., *et al.* [5] present a paper on students' performance analysis using educational data mining is one of the emerging discipline which includes the process of analyzing the students' details using different attributes. Attributes such as students' name, roll number, previous semester marks, attendance, assignment, seminar performance, lab work and gender are used to evaluate the students' performance (Pass / Reappear). In this paper, classification techniques are described and used for educational data mining. The classification process is based on C5.0 algorithm with good

classification accuracy. The system is helpful for the learners as well as to the teachers for the academic performance evaluation. It is a warning system for the students' to improve their study performance.

Agaoglu, M., [6] used four different classification techniques, decision tree algorithms, support vector machines, artificial neural networks, and discriminant analysis to build classifier models. Their performances are compared over a data set composed of responses of students' questionnaire using accuracy, precision, recall, and specificity performance metrics. The main aim is to improve the instructor performance. In this paper C5.0 algorithm was used to predict and improve the instructor performance. This paper will help the firstly, effectiveness and expressiveness of data mining techniques, specifically decision tree algorithms, boosting, SVM, ANN, and DA in higher educational mining are presented over a dataset from the daily life. Secondly, using the findings of the variable importance analysis for the classifiers, it is shown that there are many possible improvement areas in the design of the measurement instruments used in instructors' performance evaluation.

Samian, Y., *et al.* [7] present a standard instrument for gathering data from students about their response to teaching and learning. Besides rating, written comments provide further explanation such as on standards, quality, teacher preparation and personality. This paper reports on the comments made by students to the 5 % top rated and 5 % bottom rated lecturers in Semester 2, Session 2010/2011 regarding their teaching performance. This study concluded with two important findings; first, the students comments did correlate with their overall assessment on lecturer's performance and secondly to be an excellent lecturer (or otherwise), ability to deliver lecture effectively play significant role compared to other performance criteria.

Kamath, S. R., *et al.* [8] represent a data mining technique that can be used for the analysis of teaching staff performance appraisal evaluation based on realistic data. The Performance based appraisal system is a systematic process that assesses teachers' academic performance and productivity in connection to certain pre-established criteria. The performance appraisal process helps in achieving high quality education. Data mining technology is widely used in educational field to retrieve useful information. It is the method of obtaining hidden, unknown and probably significant knowledge from huge amount of data. This proposed model intents in the evaluation of teaching staffs performance and can be used for judgmental purposes in order to make good administrative decisions. The high potential of data mining applications for teachers' performance management can be revealed. Regardless of origin, data mining techniques show automated discovery of new associations and dependencies of attributes in the observed data.

Pal, K. A., *et al.* [9] propose a data mining technique to evaluate teacher's performance on the basis of different factors. They consider some of the most relevant factors, and develop rules using data mining techniques. They perform an analysis considering number of parameters for the derivation of performance prediction indicator's needed for teachers' performance assessment, monitoring and evaluation. The aim is to predict the quality, productivity and potential of faculty across various disciplines which will enable higher level authorities to take decisions and understand certain patterns of teacher's motivation, satisfaction, growth and decline. The analysis depends on many factors, encompassing student's feedback, organizational feedback, institutional support in terms of finance, administration, research activity etc. As a conclusion, they have met an objective which is to evaluate and investigate teacher's performance by the four selected classification algorithms based on weka tool.

Asanbe, O. M., *et al.* [10] present an efficient system model for evaluation and prediction of teachers' performance in higher institutions of learning using data mining technologies. The results show that, among the six attributes used, working experience, and rank are rated the best two attributes that contributed mostly to the performance of teachers in this study. Also, considering the time taken to build the models and performance accuracy level, C4.5 decision tree outperformed the other two algorithms (ID3 and MLP) with good performance of 83.5% accuracy level and acceptable kappa statistics of 0.743. It does mean that C4.5 decision tree is best algorithm suitable for predicting teachers' performance in relation to the other two algorithms in this work.

Pavani, S., *et al.* [11] proposed fuzzy logic concept to evaluate teacher's performance on the basis of different factors, applying into fuzzy inference system (FIS), FIS is the process of formulating the mapping from a given input to an output. They consider some of the most relevant factors, and developed rules will be fuzzified. As input fuzzy variable performance will be fuzzified with suitable fuzzy linguistic variable and ultimately FIS will be developed. This paper explains the comparison of two different membership function and getting more or less similar, So as to achieve the shape of membership function, which is not playing much role to evaluate the performance in positive or negative direction.

Mardikyan, S., *et al.* [12] present a paper on Student evaluations to measure the teaching effectiveness of instructor's are very frequently applied in higher education for many years. This study investigates the factors associated with the assessment of instructors teaching performance using two different data mining techniques; stepwise regression and decision trees. The results show that, a factor summarizing the instructor related questions in the evaluation form, the employment status of the instructor, the workload of the course, the attendance of the students, and the percentage of the students filling the form are significant dimensions of instructor's teaching performance**.**

Ughade, P., *et al.* [13] present a paper on faculty performance that has calculated on the basis of two parameters (i.e.) Student's feedback and the result of student in that subject. In existing system they define two approaches one is multiple classifier approach and the other is a single classifier approach and comparing them, for relative evaluation of faculty performance using data mining Techniques. In multiple classifier approach K-nearest neighbor (KNN) is used in first step and Rule based classification is used in the second step of classification while in single classifier approach only KNN is used in both steps of classification.

Muzenda, A., *et al.* [14] analyze the effect of lecturers' competences on students' academic performance among higher education and training students. A sample of 115 students was selected and used for the study using simple random sampling procedure. A structured questionnaire was used to gather data on students' level of agreement on the extent to which distinct variables measuring lecturers' determine their academic performance. Four hypotheses were tested using Stepwise regression approach. Results indicate that subject knowledge, teaching skills, lecturer attendance and lecturer attitude have significant positive influence on students' academic performance.

Baradwaj, et al. [15] implemented an ID3 decision tree learning algorithm with the help of the previous example which included the training set. In their study, they described the reasons for using decision tree algorithms. They calculated the entropy values for each attribute in the data set and then calculated information gain for each attribute. Then they selected the root node as an attribute which has the highest information gain and found which attribute was the next decision node until they ran out of attributes. Finally, their ID3 classification algorithm has generated the decision tree for weather data set.

Adhatrao, et al. [16] implemented an ID3 and C4.5 Decision tree technique on educational data mining. First-year students' data was collected. Their system was used to predict the result of same students in second year. The accuracy of the ID3 algorithm is 75.145% and that of C4.5 is 75.145%. They concluded study can be used to predict the students' result based on previous semester marks.

Z. J. Kovacic *et al.* [17] presented a case study on educational data mining to identify up to what extent enrollment data can be used to predict students' success. They used CART and CHAID decision trees and the accuracy of classifiers obtained was 59.4 and 60.5 respectively.

Ramaswamy *et al.* [18] designed a technique on students' data which has 33 features including class label. 6 feature selection techniques were applied on the data set, for selecting the relevant attributes. These attributes have a relevant value to the students result. They used different classification algorithms. Voted perception showed the highest predictive accuracy of 89%.

Acharya *et al.* [19] applied feature selection techniques and data mining algorithms on students' data. The data have been collected from St Xavier's College, Kolkata. Different feature selection techniques were applied on the data for extracting the relevant attributes and discarding irrelevant attributes. They got 79% accuracy.

From, these literature review, it is inferred that teachers' performance and students' perfomacne can be evaluated by applying, data mining techniques, classification, fuzzy logic and overall performance can be evaluated by classification techniques. Based on the literature survey our research work classified as three phases. They are applied for this research work.

Phase I: Preprocessing
- i) Removing Missing Values
- ii) Categorization without MapReduce
- iii) Categorization with MapReduce

Phase II: Feature Selection Methods
- i) Gain Ratio Feature Selection
- ii) Gain Ratio Feature Selection with MapReduce
- iii) Information Gain Feature Selection
- iv) Chi-Square Feature Selection
- v) OneR Feature Selection
- vi) Relief Feature Selection
- vii) Random Forest Feature Selection
- viii) Intact Feature Selection
- ix) Symmetric Uncertainty Feature Selection

Phase III: Classification
- i) C5.0 Classifier without MapReduce
- ii) C5.0 Classifier with MapReduce
- iii) Classification Accuracy

3. PROPOSED METHODOLOGY

Now a days, education data mining plays a major role in the society. In these papers, educational data mining was used to improve the teachers' performance using feature selection and classification techniques. Teachers' performance evaluation for a college has been done, in order to improve teachers' performance by decision tree in classification technique. Big data concept using Apache Hadoop can be applied in educational data to predict the teachers' performance as well as students' performance in return improve academic performance.

4.CONCLUSION

In this survey, teachers' and students' performance on educational data mining has been done using different approaches. Prediction is based on the teacher's performance evaluation and students' performance evaluation. The primary aim of this proposed research is to motivate the teachers to improve their work performance which can be used for judgmental purposes in order to make good administrative decisions. Data mining techniques show automated discovery of new associations and dependencies of attributes in the observed data. The main objective of educational data mining is to improve the teacher's and students' performance. This paper examines various techniques of data mining in Education Section.

REFERENCES

[1] Bakar, R.S., and Yacef, K, "The state of educational data mining in
2009: A review and future visions." JEDM-Journal of Educational Data
Mining 1.1 (2009):3-17
[2] Barracosa, J.I.M.S.2011. Mining Behaviors from Educational Data
[3] http://library.queensu.ca/webedu/grad/Purpose_of_the_Literature_ Review.pdf
[4] http://ar.cetl.hku.hk/am_literature_reviews.htm
[5] Lawrance, R., Shanmugarajeshwari, V., "Analysis of Students' Performance Evaluation using Classification Techniques." IEEE International Conference on Computing Technologies and Intelligent Data Engineering(ICCTIDE'16), 10.1109/ICCTIDE.2016.7725375, 16426971
[6] Agaoglu, M., IEEE Translation and Content Mining, "Predicting Instructor Performance Using Data Mining Techniques in Higher Education." Department of Computer Engineering, Marmara University, Istanbul 334722, Turkey. Volume.4, 2016, pp:2379-2387
[7] Samian, Y., and Noor, N.M., ELSEVIER Sci Verse Science Direct, "Students' performance on Good Lecture Based on Lecture performance Assessment." International Conference on Teaching and Learning in Higher Education (ICTLHE -2012) in Conjunction with RCEE and RHED 2012, Volume. 56, pp:783-790
[8] Kamath, S.R., "Data Mining Approach for the Analysis of Performance Based Appraisal System of Selected Teachers in Kolhapur city." International Journal of Multifaceted and Multilingual Studies. Volume. III, Issue. IV, April 2016, pp: 1-6
[9] Pal, K.A., and Pal, S., "Evaluation of Teachers Performance: A Data Mining Approach." International Journal of Computer Science and Mobile Computing (IJCSMC), Volume. 2, Issue. 12, December 2013, pp: 359-369
[10] Asanbe, O.M., Osofisan, O.A., and William, F.W., "Teachers' Performance Evaluation in Higher Educational Institution Using Data Mining Technique." International Journals of Applied Information System (IJAIS) Volume. 10, No. 7, March 2016, pp:10-15
[11] Pavani, S., Gangadhar, S.S.V.P., Gulhare, K.K., and Raman, V.C., "Evaluation of Teacher Performance Using Fuzzy Login Techniques." International Journal of Computer Trends and Technology - Volume. 31, Issue. 2 – 2012, pp: 200-205
[12] Mardikyan, S., Badur, B., "Analyzing Teacher performance of Instructors Using Data Mining Techniques." Informatics in Education, 2011 Volume. 10, No.2, pp: 245-257
[13] Ughade, P., Mohod, W.S., "A Survey on Analysis of Faculty Performance Using Data and Opinion Mining." International Journal of Innovation Research in Computer and Communication Engineering (IJIRCCE), Volume. 4, Issue. I, January 2016, pp: 87-91
[14] Muzenda, A., "Lecturers' Competences and Students Academic Performance." International Journal of Humanities and Social Science Invention, Volume. 3, Issue. I, January 2013, pp: 06-13
[15] Baradwaj, B. K., and Pal, S. 2012. Mining educational data to analyze students' performance. arXiv preprint arXiv:1201.3417.
[16] Adhatrao, K., Gaykar, A., Dhawan, A., Jha, R., and Honrao, V, "Predicting Students' Performance Using ID3 and C4.5 Classification Algorithms." arXiv preprint arXiv, Vol.3, No.5, September 2013, pp.39-52
[17] Kovacic, Z. "Early prediction of student success: Mining students' enrolment data."
[18] Ramaswami, M., and Bhaskaran, R. 2009. A study on feature selection techniques in educational data mining. arXiv preprint arXiv:0912.3924.
[19] Acharya, A., & Mukherjee, S. "Modeling Value Chain Analysis of Distance Education using UML." International Conference on Modeling, Optimization, and Computing. Vol.1298. No. 1. AIP Publishing, 2012.