

# Academic Performance Appraisal for Teachers using Association Rule Mining Technique

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**Abstract** - The main objective of the educational institution is to provide high quality education for producing good results. Producing high quality education and result mainly depends on "Best Teacher". Obviously, Best Teacher produces high quality education like practical oriented lectures with practical examples and good results. Institution has to identify their performance and recognize them as per the criteria. This paper focuses the evaluation of teacher's performance to impart the quality of education in the institution. Data Mining is an interdisciplinary research area that deals with the model development to explore data in the educational institution. Many researchers have taken this issue and evaluate the teacher's performance using some data mining tools. But still it finds some difficulties to determine the accurate result. In this case, decision making technique is used to find and make the meaningful patterns and association rule mining technique is used for producing interesting knowledge too. Association rule is not only for generating the patterns and also for classifying the teachers based on their similarities in academic part. Teachers are classified based on their involvement in teaching, student interaction, practical work, methodology used etc. These criteria's helps to recognize their performance which is extracted from the corresponding educational database. This paper proposed an idea to evaluate the teacher's performance and produce an accurate report for recognizing the Teachers and improve the betterment of the institution.

**Keywords** - Association Rule Mining, Support, Confidence, Rule Prediction, itemset.

## 1. Introduction

Education is a vital role for the betterment of a Country. Nowadays, Institutions are facing an important challenge is to smooth the progress of more accurate educational processes. Educational organizations are placed in a competitive world. Institutions has to beat their competitors by facilitate quality education. So Institutions need in-depth knowledge about analysis, planning and decision making in educational database. The required knowledge is not gained from predefined software's. Expert knowledge is needed to process the database. Data Mining incorporates all the required techniques such as database, Statistics, Visualization etc. Hidden patterns, relationships and duplication can be

easily extracted from database. These techniques helps to make better decisions on their database and extracting interesting patterns like teachers having similar characteristics, their performance, experience and so on. The main objective of this paper is to propose Association Rule Mining techniques for analysing teacher's performance and producing an accurate result. ARM is one of the data mining techniques which is required to generate associations between the items. Minimum Support and Minimum Confidence can be used to compose the relationships and predict the interesting patterns. Support and confidence measures the interesting patterns. The rule composed of two itemsets

- Antecedent
- Consequent

The above attributes represents the relationship between support, confidence and lift. Association rule mining is the process of find all the rules with the condition of support and confidence. Initially, Support and confidence is calculated for all the rules and it is compared with the user specified or predefined threshold values. This paper uses association rules to extract the teacher's performance which will be helpful for educational institution to analyze their performance and improvise the education quality. Teachers are responsible for producing better result and placement of students in the industry. So institution has to identify the best teachers and recognize them to make the education quality in a better way. As a result, this study is conducted to enhance the quality of education by analysing the patterns extracted from educational database by Association rules.

## 2. Related Work

Smita Bhanap et.al [4] discussed how the data mining techniques are useful to extract meaningful knowledge from educational database. The author designed Student-Teacher model for enhancement of higher education. It helps to increase the admission ratios and enhance the student's evaluation and performance. Randa Kh. Hmaid [2] examines the assessment of teacher's

performance and proposed a new model to evaluate the teacher's performance through data mining techniques like decision tree, Naïve Bayesian, Rule Induction. This model helps to improve their performance and thus reflect it on the classrooms.

D.Megdalene Delight Angeline[1] measured the students performance by Apriori algorithm. It extracts the set of rules specific to each class which helps to predict the student's performance. Charanjit Bamrah et.al[3] analyzed the potential use of association rule mining for enhancing the quality of student's performance. This performance report helps to improve their quality and progress. P.Ajith et.al[5] proposed an interactive technique to assist the user throughput. It discovers the likelihood of Student's deviation providing more insight by considering more information.

### 3. Proposed Methodology

Educational Institution considers an important factor for delivering good results which is the quality of managerial decisions. This system expects to improve the quality by analyzing the teacher's performance. In this perspective, existing system maintains all the observed data's and recordings manually. It takes time to maintain and analyse the dataset. So the institutions faced a lot of problems to analyze the records. To overcome this problem, a new method is proposed to analyze the teacher's performance based on the educational database by using association rules.

#### 3.1 System Flow Diagram

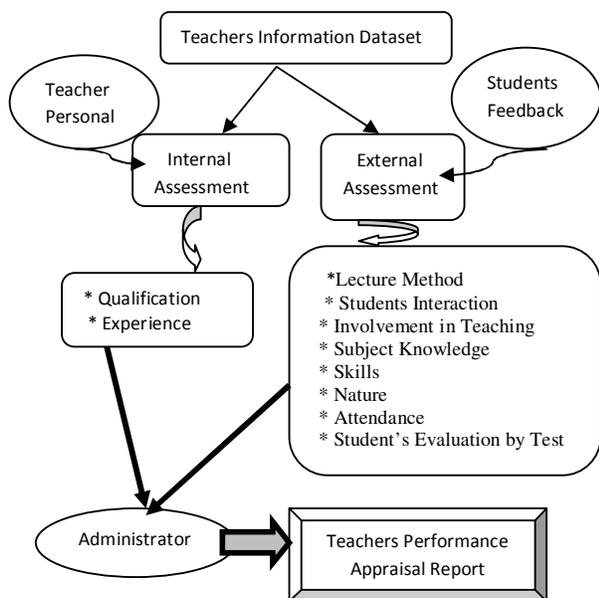


Figure 1 Overall Performance Appraisal Model Flow

In the educational dataset, overall teacher's performances are determined by internal and external assessment. Internal assessment is made bases of a Qualification, Experience which is collected from the teachers and verified by the administrators as shown in Figure 1. External Assessment is based on the teacher's attendance to classes, involvement in teaching, lecture method, skills etc. The proposed method helps to identify the teacher's performance based on the criterias Good, Average and Excellent.

#### 3.2 Data Mining Process

The steps of data mining process are as follows

##### 3.2.1 Data Selection

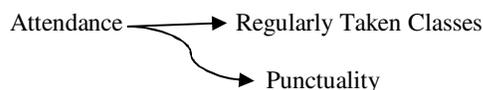
The database used in this paper contains teachers information collected from women's college. This dataset consist of 8500 records and 27 attributes .The following table1 presents the attributes and descriptions that exist in the educational database.

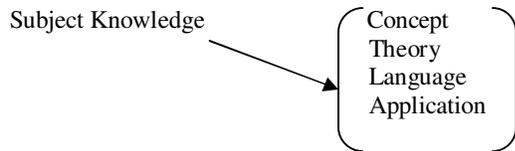
Table 1 Teacher's Performance Database

Teachers Personal	Teacher ID Teacher Name Department Qualification Experience
Attendance to Classes	Classes Taken regularly or not Punctuality ie Timings
Subject Knowledge	Concept Theory Language Application
Skills	Fluency Body Language Demonstration
Relation Nature	Student's- Teachers Relation Biased or Unbiased Manner
Lecture Method	Technology used Seminars Practicals Remedial Classes
Interaction	Students interaction
Students Evaluation	Internal Test Model Practical Test Seminar
Involvement	Teacher's Involvement
Rating	Overall Rating

##### 3.2.2 Data Pre-processing & Transformation

Some of the attributes are having large number of values. So it has to be transformed ie Data's can be divided into several categories such as





After performing Pre-processing task, the extracted data's has to be transformed such as either String values are converted into numeric values (or) Numeric values are converted into String values. The following rules are used to transform the attributes into string value.

If Regular Classes="91-100%" and  
     Punctuality="91-100%" then  
     Set Attendance = "Excellent"  
 If Regular Classes="81-90%" and  
     Punctuality="81-90%" then  
     Set Attendance = "Good"  
 If Regular Classes="71-80%" and  
     Punctuality="71-80%" then  
     Set Attendance = "Average"

Likewise, all the attributes are transformed into string value for our convenience. In this model, Criteria's can be considered as "Excellent, Good and Average".

Excellent – 10 [ 91-100 % ----- Excellent]  
 Good – 8 [ 81-91 % -----Good]  
 Average – 5 [ 71-80 % ----- Average]

The overall rating is calculated by the following rules.

If overall rating is 91-100% then  
     Set Percentage = "Excellent"  
 If overall rating is 81-90% then  
     Set Percentage = "Good"  
 If overall rating is 71-80% then  
     Set Percentage = "Average"

### 3.2.3 Rule Prediction

Finally, Association Rule Mining technique is used to find frequent items for educational dataset. Rules are generated based on the above criteria. Sample datasets are

[Excellent ^ Good ^ Good] → Good  
 [Good ^ Good ^ Average] → Good  
 [Average ^ Good ^ Average] → Average

By analysing the performance report of the Teachers, More Concentration and Training can be given to the average Teachers in order to improve their performance level. Good Teachers can be motivated to attend more training programmes and conferences. At the same time, Institution has to recognize an Excellent Teachers by giving incentives.

## 4. Conclusion

This paper examines the use of Association Rule Mining to enhance the quality of Teachers. The predicted rule helps to identify and categorize the teachers such as Excellent, Good and Average. The overall performance report helps to improve the teacher's performance and makes betterment of the institution too. It helps to identify the teachers based on the similar characteristic which helps to provide more training and concentration. Furthermore, in future this idea will be implemented in Weka Tools and analyse the teacher's performance using data mining techniques such as Clustering, Association Rule Mining and Classification.

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