

Analysis of Student Feedback by Using Data Mining Techniques

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Abstract

Feedback is very important factor for any organization. It helps in self-analysis and also outlines scope for improvement if any. In educational institutions feedback helps to identify gaps and can also be used for performance analysis. This paper aims to dig deeper into the feedback data of an institution. Currently the feedback data is used to report only the performance of teacher. The paper proposes methods to analyze the feedback data using data mining techniques for better understanding of the faculty, course and student. The format of feedback varies from institution to institution, so there cannot be a general technique that will fit for all. The feedback data from the students will be analyzed by using different Data Mining techniques. The feedback data will be used for analyzing all the parameters considered for feedback which would help management in making policy decisions in teaching learning process. This Paper surveys all Data Mining technique that have been applied for analyzing feedback data.

Keywords: Educational Data Mining, Classification Clustering, Teaching Evaluation.

Introduction

Educational data mining is a field of Data Mining that focuses on the unique data that comes from educational setting and use it to better understand students and the setting which they have. Educational Data Mining can be used by educators, Learners, Management for decision making. The requirement of knowledge Analysis and Mining in educational activity is to mine college and student's data from varied stakeholder's perspective. Feedback not solely is a backbone for any successful system however additionally it provides a response for the users of the system [1]. To improve the standard of education, except for strengthening the teaching administration, the Institute should introduce the required means that of inspecting the standard of education, that is evaluating the standard of teaching.

Data Mining is a method of analyzing knowledge from totally different views and summarizing the result as helpful information. The system should first spot the matter from Business perspective then understanding the knowledge that is within the type of student feedback after that we are Going to analyze knowledge by using parameters like Lecture preparation, organization and course material, Blackboard writing and organization,

audio-visual aids used, educator dependent on teaching, Difficult topics were taught with adequate attention and ease, Instructor enthusiastic about teaching, and various theory and practical Parameters. When knowledge is completely analyzed, tools for hidden patterns and associations are used and Prediction of results is carried out for improving teaching learning process by using WEKA tool .Data collection is the 1st stage of mining method. In our work knowledge is obtained from college domain concerning the mentioned parameters from the Engineering faculty. The data is then cleansed for errors and missing values etc. In this era, various data processing tools are available within the market and every tool has its own merits and demerits. [12][13] For the analysis of information of engineering faculty, we've focused on student's feedback knowledge using various Data Mining techniques.

In our college feedback System, the student gives feedback on the basis of 14 Theory factors and 11 Practical Factors. Student should give marks on likerts scale. A minimum mark is 0 and a maximum mark is 4. The marks are given to all the factors by students and then calculated and percentage is calculated with respect to total marks for respective teacher. Overall Impression is given on the basis of minimum to maximum marks such as N, O, V, G, and E.

N-Not Satisfactory

O-Outstanding

V-Very good

G-Good

E-Excellent

Hence, we are trying to analyze the feedback data by doing comparative study of techniques and results from various years, so that we can predict the faculties who have good teaching skills, knowledge about subject, Assessment, Self and student motivation, Punctuality and practical knowledge and after that we will compare the feedback with academic results of the students.

Tools and Techniques

Tools-

Weka tool i has been used for conducting the feedback analysis. Along with feedback data, students' performance in the courses were also taken into consideration. WEKA tools is a tool used for data mining.

Techniques-

A. Data Preparation

The dataset which is used is obtained from G.H.Raisoni College of Engineering, Nagpur, Maharashtra, India .which is given by the students of college in the form of feedback for the faculties of college of the year between 2012-2016.The Students give feedback on the basis of 14 theory factors and 11 Practical factors like Lecture preparation, organization and course material, Blackboard writing and organization, audio-visual aids used, educator dependent on teaching, Difficult topics were taught with adequate attention and ease, Instructor enthusiastic about teaching, and various theory and practical factors. These factors are categorized into six categories like KAS(Knowledge about Subject),TS(Teaching Skills),A(Assessment),SASM(Self and student Motivation),P(Punctuality) and PK(Practical Knowledge):

Theory factors-

TF1- Lecture preparation,organisation and course material(structure)
 TF2-Blackboard writing and organization.
 TF3-Audio-visual aids used.
 TF4-Lecture delivered with emphasis on fundamental concepts and with illustrative examples and faculty has command over the subject.
 TF5-Difficult topics were taught with adequate attention and ease.
 TF6-Instructor enthusiastic about teaching.
 TF7-The teacher able to deliver lecture withadequate attention and ease.
 TF8-Encouraged to ask questions to make lecture interactive and lively.
 TF9-The TAE Parameters and tests were challenging (with new and novel problem solving apperoch).
 TF10-TAE & CAE marks were displayed regularly.
 TF11-CAE question paper was discussed in the class after exam and answer sheets were shown.
 TF12-The evaluations were fair and impartial and it help to improve students .
 TF13-Teacher gives additional technical/non-technical inputs by using Multimedia /NPTEL/Learning resources/Organising Guest Lecture/Organising workshop .
 TF14-The teacher was always accessible to the students for counseling, guidance and solving queries off the classroom hours .

Fig 1.Shows Theory Factors

Practical Factors

PF1 - The Selection of experiment was commensurate with the theory.
 PF2 - The Performance of the experiment - The experiment was leading towards proper conclusion/interpretation.
 PF3 - The Performance of the experiment- the teacher helped students in understanding the experimental observation/outcome and explaining the difficulties raised while performing the experiment.
 PF4 - The Performance of the experiment - The experiment could trigger student for any creative idea.
 PF5 - The Performance of the experiment - The experimental setup was well maintained , fully operational and adequate.
 PF6 - Submission of experiment - The precise updated and self explanatory lab manuals were provided.
 PF7 - Submission of experiment -The Submission of experimental write-up was routine and repetitive.
 PF8 - Submission of experiment - The teacher does assessment of experiment regularly and gives feedback.
 PF9 - The entire lab session was useful in clarifying student knowledge of the theory.
 PF10 - Students are confident with the use of the concepts,instruments and their application in further studies.
 PF11 - Practicals marks were allotted after every experiment.

Fig.2 Shows Practical Factors

KAS	TS	A	SASM	P	PK
TF4	TF1	TF9	PF9	PF6	PF1
TF5	TF2	TF10	PF10	PF7	PF2
TF6	TF3	TF11		PF8	PF3
TF7	TF8	TF12			PF4
	TF13	PF11			PF5
	TF14				

Table 1.Grouping of Theory and Practical Factors.

B. Classification technique used

In this study we have used J48 Classifier.

The C4.5 calculation is utilized for constructing choice trees is actualized in Weka as a classifier called J48. Classifier, similar to channels are sorted out in an order: J48 has the full name weka. classifiers. trees. It is created by Ross Quinlan. The choice trees produced by C4.5 can be utilized for arrangement, and thus, C4.5 is frequently alluded to as a measurable classifier. It turned out to be extremely prominent in the Top 10 Algorithms in Data Mining most outstanding papers distributed by Springer LNCS in 2008.

C. Clustering technique used

In this study, we have used Simple K means Clustering technique. Weka 3.8.1 is a data mining tool used for clustering and prediction of faculties who can further teach the particular subjects.

Simple K means Clustering

Simple K means Clustering is a uncomplicated clustering algorithm It partitions the data tuples into clusters such that every entity in the cluster has its nearest mean. To perform clustering in weka interface, Select cluster tab in the explorer there will be a choose button, click on that and you will find a dropdown list of available valid clustering algorithms. Then select simple K means algorithm from the list. We will use the full training set for clustering and the clusters will be formed so that we can predict the results by seeing the clusters.

Results and Discussion

Sr.No.	Attributes	Class	Distinct Entries	Type of data
1	Session	Session	1	Nominal
2	Student Name	Student Name	1	Nominal
3	Branch	Branch	1	Nominal
4	Semester	Semester	1	Nominal
5	Section	Section	1	Nominal
6	Faculty Name	Faculty Name	1	Nominal
7	Department	Department	1	Nominal
8	Subject Name		1	Nominal
9	Subject Type	Practical Theory	2	Nominal
10	Marks	0,1,2,3,4	5	Numeric
11	Impression	N,O,G,V,E	5	Nominal
12	Factor	TF1-TF14 PF1-PF11	25	Nominal
13	Parameter	KAS,TS,A,SAS M,P,PK	6	Nominal

Table 2. Pre-processing of Data.

Classification

Classification of feedback data using different classifiers in WEKA based on class parameters:

Classifiers used	Correctly classified instances	Incorrectly classified instances	Percentage accuracy of classification	Time taken for execution (in sec)
J48	885	0	100%	0.02
LMT	885	2	97.91%	0.03
Naïve bayes	873	12	98.64%	0.09

Table 3. Showing Three Classifiers

Table 3 shows that three classifiers have been used from which J48 gives 0 incorrectly classified instances with 100% accuracy in 0.02 seconds and LMT and Naïve bayes are bit less. Hence for this we can say that J48 has outperformed other two classifiers.

Now, we will perform Classification of academic result data of students to see whether if a faculty has got good feedback and the results are also good. We have used Decision stump classifier to see how many students are passed or failed for the subjects of the particular faculty

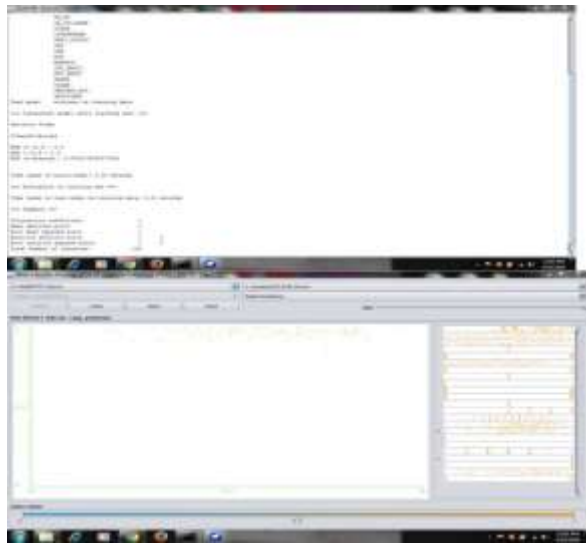


Fig 1. Classification with Decision Stump

It shows all the students out of 140 are passed only 2 students have failed for the particular subjects taught by that particular faculty.



Fig 2. Graphical Representation of the Pass and Fail Students

Clustering

Clustering using simple K means will make the clusters for the particular faculty and analyze that for which parameter which impression is given.

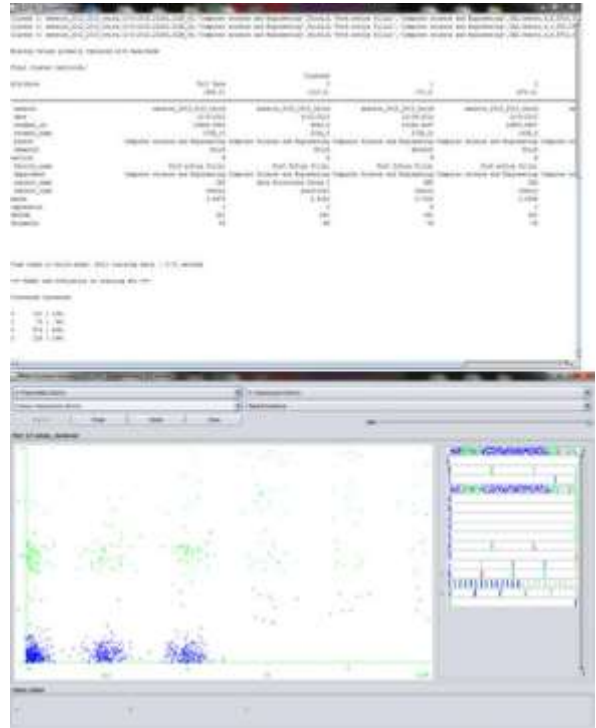


Fig 3. Clustering using Simple K means

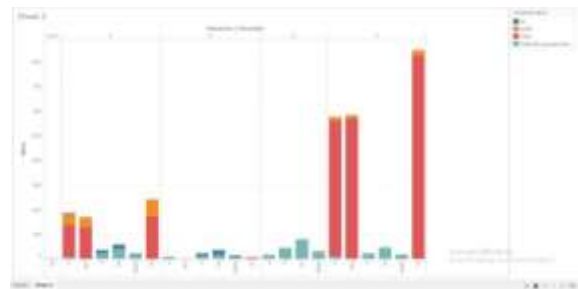


Fig 4. Graphical Representation of Parameters and Impression got for the Different Subject to a Particular Faculty.

Out of the attributes considered we calculated which parameters are useful for the analysis of faculties and then comparing the feedback data with the academic results of the students. It implies that we can find out that the feedback given by the students and their results of that particular subjects are satisfactory. Now table shows that for different sessions that particular faculty has got good impressions by analyzing the feedback.

Faculty	Overall Impression	Output from the Student Result data	Conclusion
A	E	2 Failed out of 140	If Feedback is given good by students then results are also good
B	N	16 failed out of 192	If Feedback given by students is not good then results are also bad

Table 4. Shows Impressions for Particular Faculty

By seeing the results, we can recommend that particular faculty for further years. Technical and non-technical Training recommendations can also be given to teachers based on their feedback analysis.

Conclusion

In this paper, we have performed the analysis in Educational Data Mining applied within the student domain to understand their performance and interest and apply acceptable decision-making ways to boost their performance. After learning last decade papers we tend to observe that there's a scope for improvement in academic data mining. We discussed and planned about the data mining with respect to a college domain to research the performance of faculty by taking various different parameters. We can say that the feedback data from the students will be analyzed by using different Data Mining techniques like classification and clustering. By classification we can classify the correctly classified instances based on parameters and then by performing clustering using simple k means algorithm we can identify that for which parameter which impression is obtained by the particular faculty. The classification is performed on the result data by using Decision stump to classify pass and fail students. The comparison is made between feedback dataset and results of the students taught by that particular faculty and the result shows if the feedback and results are satisfactory or not and future predictions can be made for the particular faculty. The parameters considered for feedback will help management in making policy decisions in teaching learning process. Our analysis goal is to decide that parameter is the additional value for analyzing the faculty performance. This research will be employed in academic organizations for raising teaching-learning standards.

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