Teaching Learning Process Assessment based on Students Evaluation

S. Vijaya, L. Padmavathy, P. Lavanya and T. Prabha

Abstract--- In the past two decades, teaching in higher education has been risen in status and given much importance especially in improving Teaching Learning Methodology from the evaluation of Teachers done by students. Different parameters of teaching methods of faculties taken into account and evaluated through students to find out best teaching methodology. As feedbacks are given from the consumer's point of view, most importantly students' evaluation reports provide faculties with important feedback.

Keywords--- Teaching Learning, Evaluation, Higher Education, Students.

I. INTRODUCTION

In recent era Education has become one of the important issues regarding the improvement of a Country [1]. The major purpose of higher education institutions is to present excellence education to its students. One way to achieve the higher level of excellence in higher education scheme is by predicting students' academic performance and thereby taking early actions to improve students' performance and also the teaching quality. The relevant knowledge is hidden with the educational dataset and it is extractable during data mining techniques. This paper is planned to validate the capabilities of data mining techniques in the background of higher education by offering a data mining model. In this work, classification task is used to evaluate faculties' performance [2]. Evaluation of faculties performance have to be done based on students feedback. So that the precise area can be recognized. That helps the lecturer to take necessary actions like more attention of the students and also to improve their teaching methods. Finally that improves students' caliber and academic status. The application of data mining in the learning framework work is referred as Educational Data Mining [EDM]. Ferguson presents in [2] two drivers for this to arise: primarily, the volume of data that are composed of educational institutions have seriously improved; Secondary driver is helped to collect data, still brought some clearing issues such as possible lack of motivation and difficulties for the educators to collect direct feedback, level of interest or even the understanding of the students. In this work, Data mining approaches are proposed to predict faculty performance. Prediction is done using Data mining algorithms. Prediction is carried out with academic records along with initial academic information.

Also, student evaluations help administrators and department chairs in validating the effectiveness of instruction. The discussions in this issue represent efforts to address a determined challenge facing in current higher education and how we develop assessments from evaluation from students that are informative, scalable, and can be accepted by the administrators and majority of experts in the field. Recognizing common approaches to valuation has not been met with unbridled enthusiasm and agreement. To compare the teaching methodology used by faculties and give sculpture to good teaching, ten parameters were taken and based on the point mentioned below feedbacks

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received from students.

1. Subject Knowledge
2. Preparation
3. Clarity and understandability
4. Enthusiasm in teaching
5. Finding students' level and learning progress
6. Availability
7. Quality of test and evaluation
8. Motivating students
9. Students Consumerism
10. Competent Teaching

II.   RELATED WORK

Student Evaluation of Teaching (SET) is an important technique of faculties in higher education. All teachers can get knowledge and their course from various institutions, but their level of teaching is evaluated by the student's feedback. The SET (Gregory Ching, 2018) technique mainly consists of following three aspects.

1. Evaluation of Instructor.
2. The Teaching process.
3. Learning outcomes as perceived by the students.

Evaluating the instructor about their knowledge, method delivery and etc. should be updated by the students each and every day, and the content delivery is related to general activity and the teaching approaches. The instructor must satisfy student's expectation. Factors that affect SET ratings are

1. Physical appearance
2. Gender and Age
3. Ethnicity

Most commonly physically attractive teachers get higher ratings, and teachers whose age is less also get higher rates than seniors. If the faculty regularly watch and motivate their students, their levels will be enhanced and those persons can get higher ratings. Examining the teaching activity is more difficult; there is no accurate mechanism available to accurately measure the lecture discussion.

He also suggests that developing SET is very important and necessary for each and every institution. Student evaluation of teacher effectiveness is categorized by the feedback written by them and also the students can and do make important contributions to the professor's in case of guiding. The important factor of student assessment is for growth of faculty and their self-improvement. Additionally it will be considered for teacher's promotion, and salary decisions. The students who are sitting in the first bench can observe more than the students in other desk.

Assessment (Dylan Wiliam, 2013) is the link between teaching and learning. In learning there are 3 key processes

1. What is the position of the learner?

2. The steps for improving their skills

3. How to meet student expectation

The Formative Assessment mainly depends on learning intentions, eliciting evidence, feedback from students. According to this assessment the students are considered as learning resource for one another. So the classroom situation with instructors and students varies depends on the situation. Assessment may be either formative or summative, students play an important role in teaching-learning process.

The feedback collected from the students which may be in hard copy or soft copy, is very important for instructor in place of their self-development. The feedback also helps the management for taking better decision in case of appraisal. In some institutions the question paper model differs, pass percentage also affect their systems.

To develop Assessments that are informative and scalable (Salazer, 2018) four questions are examined: Why? What? Who? And How?. The detailed descriptions of the questions are

- Why we want assess?

- What are all the things we required to assess?

- Who is responsible for these assessments?

- How to meet these assess?

Classroom situations are increasingly seen as a source of information to guide teacher development and 3 principle ideas are considered such as kind of work that is allotted, language chosen for communication, Time and available resources. To improve the quality of teaching and taking effective decisions (Thuy-van et al, 2015) two methods are suggested such as statistical and machine learning method. Statistical method includes regression analysis and statistical tests for identifying the faculty performance whereas the machine learning includes decision trees for identifying the most important factor. The association rules can be used to calculate the bond between the factors. For good teaching (Feldman, 1998) knowledge of the subject is sufficient. Teaching methodology may differs for every institution and the instructor must give their content very clearly and in understandable manner. Students will judge their instructor based on his/her enthusiasm. Instructors should deliver their points in student level, because in a classroom multiple level of students are gathered. Students expect that their faculties are always available and ready to help them. While evaluating the students, instructors try to avoid partiality because it affects the students personally. On the other hand quality of examinations also affects the grading. If they do not satisfy the student's need, the students and their parents give only low ratings. But there is no perfect model to analyze the teacher's ability.

III. SYSTEM OVERVIEW

For this work dataset collected as a form of feedback from students. Feedback form is prepared with ten parameters

1. Subject Knowledge

2. Preparation

3. Clarity and understandability

4. Enthusiasm in teaching

5. Finding students' level and learning progress

6. Availability

7. Quality of test and evaluation

8. Motivating students

9. Students Consumerism

10. Competent Teaching.

Based on the feedback score for the above mentioned parameters faculty feedback the dataset is framed with faculty name, subject and feedback (Very Good, Good, Neutral, Bad, and Very Bad). 500 feedbacks collected towards 50 faculty members from various departments.

Fig. 1: System Overflow Diagram

IV.   PROPOSED STUDY

- Neural networks is inspired by biological paradigms programs that enables to observe and learn data from computer.

- In neural network the Deep learning techniques is a powerful learning method.

General Methodology (Parts of Our Algorithm)

The Deep Learning method will be followed:

1. Start the model structure (such as number of input features)

2. Initialize parameters and define hyper parameters:

    - number of iterations

    - number of layers L in the neural network

    - size of the hidden layers

    - learning rate α

3. Iterations:

    - Collect the propagation (calculate current loss)

    - Calculate the cost of function

    - Collected propagation (calculate current gradient)

    - Update parameters (parameters, grades)

4. The existing parameter are used to predict the methods.

V.   EXPERIMENTAL RESULTS

In order to see the impact of the individual benefit on the whole system, we conduct varies experiments based on the sample parameters on training data. Using that we selected a final model configuration based on test data.

Dataset

For making the assessment of Teaching Learning process among faculty members especially in higher education, feedback forms are given to students with various parameters discussed in the introduction section and collected. Based on the evaluation of students the scores and feedback given to the faculty members are taken as dataset.

Problem Characterization – Classification
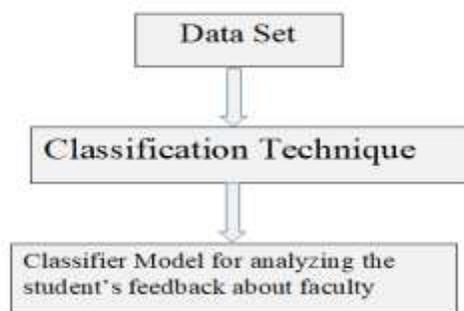
Framework

Flow Chart
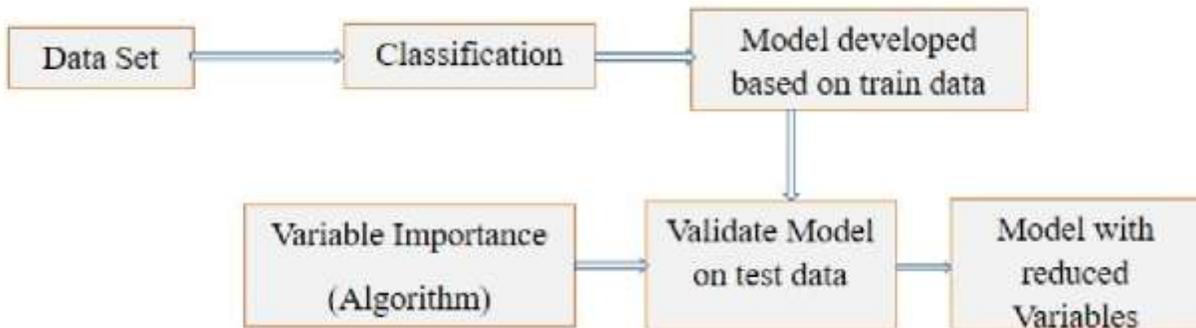
Solution Conceptualization

- Identify that if data is clean.
- Check for missing values.

Identifying variables influencing feedback and look for possible relationship between variables. Such as Correlation, Box plots, Scatter Plots, Chi_square test, etc.

Construct a model with reduced number of variables to classify the student's feedback to the faculties' performance.

Exploratory Data Analysis

```python
1 import os
2 #•   To Work with data frames:
3 import pandas as pd
4 #•   To perform numerical operations:
5 import numpy as np
6 #•   To visualize the data:
7 import seaborn as sns
8 #•   To partition the data: from sklearn.model_selection
9 from sklearn.model_selection import train_test_split
10 #•   To import the library for logistic regression:
11 from sklearn.linear_model import LogisticRegression
12 #To import the performance matrices - Accuracy Score and Confusion matrix:
13 from sklearn.metrics import accuracy_score,confusion_matrix
14 #•   To import the data:
15 feedback=pd.read_csv('f1.csv')
16 #•   Create the copy of original data:
17 data=feedback.copy()
18 #   1.    Getting Know the Data:
19 # Print(data.info()) is used to find out  the data types of variables used in the data set.
20 # Such as SNO, ROLL NO, FACULTYNAME, SUBJECT, FEEDBACK and etc.
21 print(data.info())
22 #   2.    Data preprocessing (Missing values)
23 # Data.isnull() is used to find out the missing values
24 data.isnull()
25 #   3.    Cross tables and visualization
```

Print ('Feedback Columns with Null values:\n',data.isnull().sum())

('Feedback Columns with Null values:\n',

SNO	0
ROLL NO	0
FACULTYNAME	0
SUBJECT	0
FEEDBACK..etc	0

- Summary of numerical variables:

    summary_num=data.describe()

    print(summary_num)

- Summary of categorical variables:

    summary_cate=data.describe(include="O")

    print(summary_cate)

|	ROLL NO	FACULTYNAME	SUBJECT	FEEDBACK	Etc.
Count	2160	2160	2160	2160	....
Unique	540	4	4	5	
Top	17ADA0001	FACULTY 4	Software Testing	good	....
Freq	4	180	60	1560	....

- Checking for unique values:

  print(np.unique(data['FACULTYNAME']))

  ['FACULTY1' ''FACULTY 2' ''FACULTY 3' ''FACULTY 4',….'FACULTY 14']

- Relationship between independent variables:

  Correlation=data2.corr()

  print(fb_abt_faculty)

	FACULTY NAME			
FEEDBACK	FACULTY1	FACULTY2	FACULTY3	FACULTY4
Very Good	0	0.333333	0.62963	0.037037
Good	0.033333	0.3	0.3	0.366667
Neutral	0.36	0.28	0.1	0.26
Bad	0.772727	0	0.045455	0.181818
Very Bad	0.8	0	0	0.2

1. Based On Subject Knowledge:

2.   Based On Preparation:
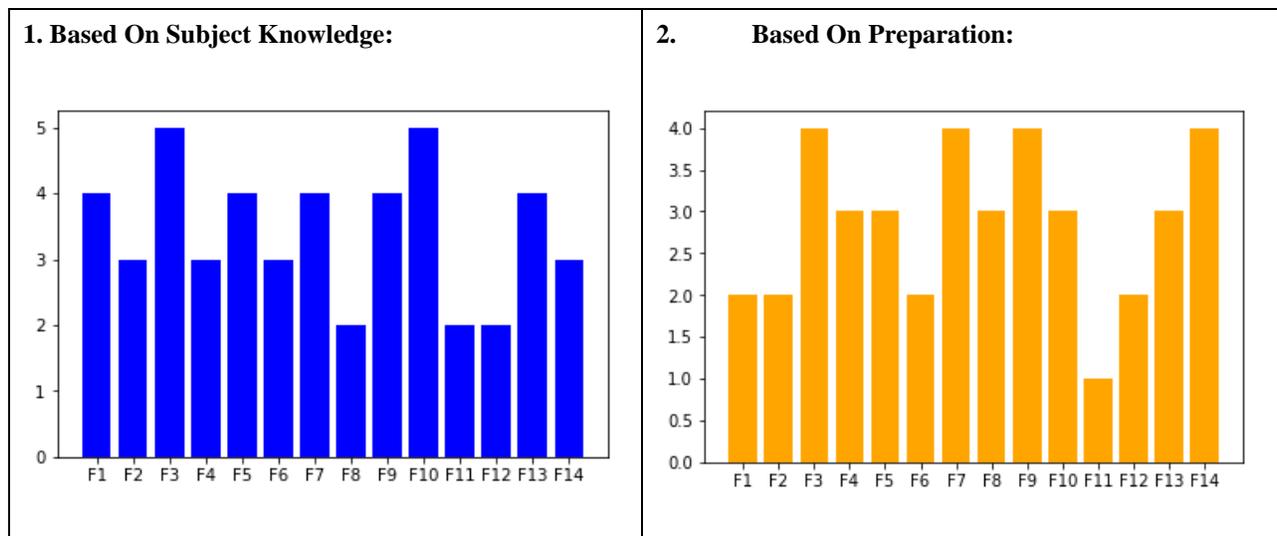
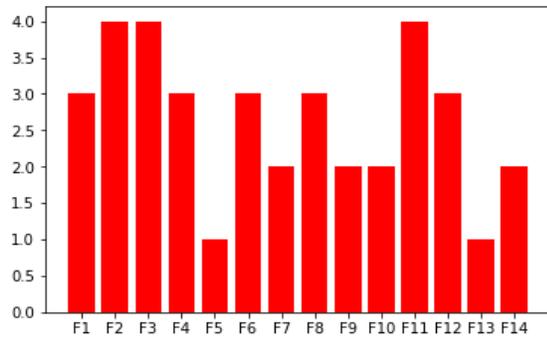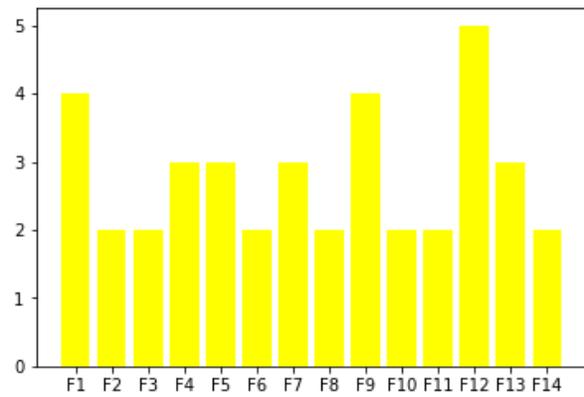**3. Based On Clarity And Understandability:**
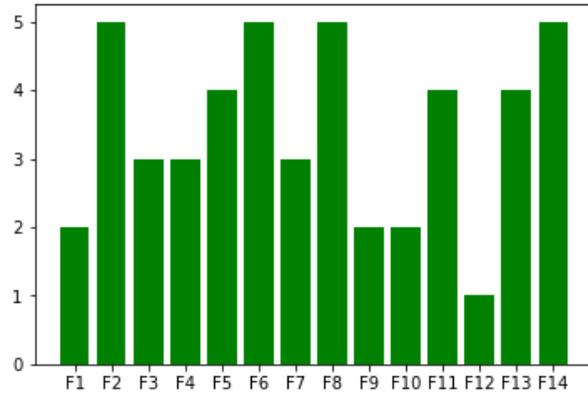
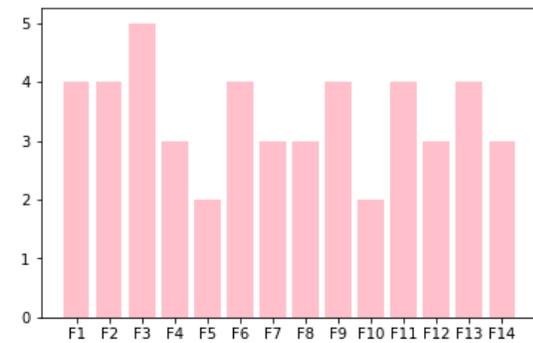**4.Feedback Based On Enthusiasm In Teaching:**
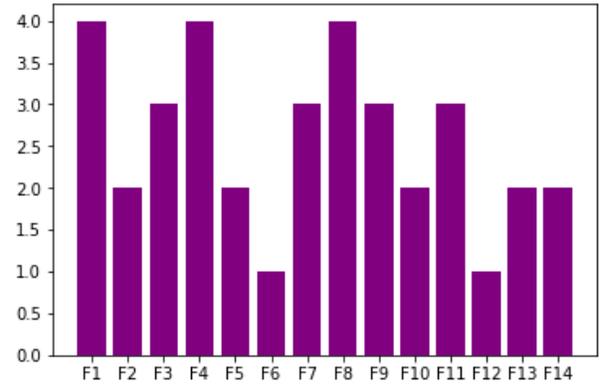
5. Feedback Based on Finding Student's Level and Learning Progress:
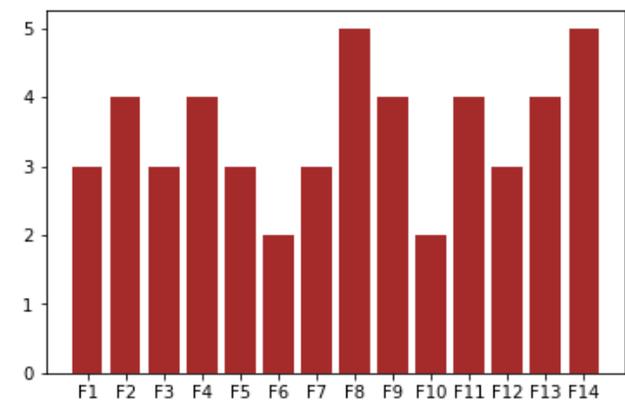

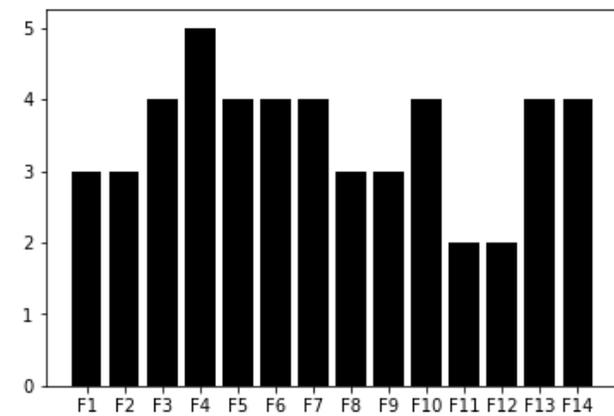**6. Feedback Based on Availability:**

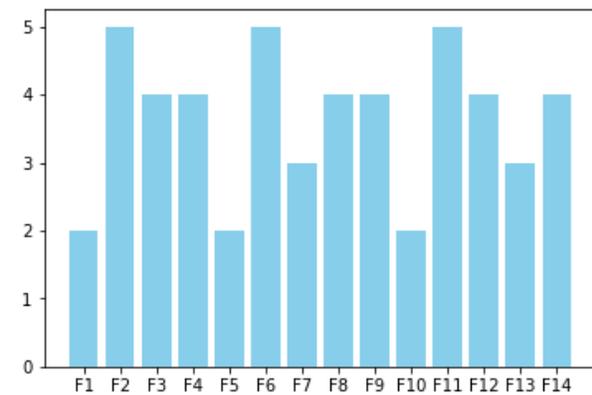**7. Feedback Based on Students Consumerism:**

8. Feedback Based on Competent Teaching:

9. Feedback Based on Quality of Test and Evaluation:

10. Feedback Based on Motivating Students:

X-Axis: Faculty Name: F1=Faculty 1, F2=Faculty 2, F3=Faculty 3, F4=Faculty 4 and so on.

Y-Axis: Feedback about Subject Knowledge – Very Good=5, Good=4, Neutral=3, Bad=2, Very Bad=1

The ten feedback parameters Subject Knowledge, Preparation, Clarity and understandability, Enthusiasm in teaching, Finding students' level and learning progress, Availability, Quality of test and evaluation, Motivating students, Students Consumerism and Competent Teaching are analyzed for teaching learning process assessment based on students evaluation.

In this above table, we have shown the result of relationship between all the feedback parameters for the first four faculties. But we experimented this classification for all the faculties of one department.

Students' feedback value add an important component to the feedback set for the evaluation of effective teaching. Students' evaluation as:

- Multidimensional
- Reliable
- Relatively acceptable against different indicators of effective teaching.

- Useful in improving teaching effectiveness.

Each student gave the feedback through the feedback parameters such as Subject Knowledge, Preparation, Clarity and understandability, Enthusiasm in teaching, Finding students' level and learning progress, Availability, Quality of test and evaluation, Motivating students, Students Consumerism and Competent Teaching. Using classification method in python, we processed the data set. Based on the students' feedback, the following visualization graphs are obtained for each parameters taken for evaluation. At the end of these graph representation, we noticed that faculty3 got the good response from the students. Similarly, we found that the essential improvement expected by student from the faculty. So, this experiment can help the faculty for their effective teaching. By these visualization of variety of feedback parameters, they can find out that student expectation from the faculty. Surely, this will lead to the best growth in the education method.

VI. CONCLUSION

The assessment of student accomplishment, or understanding the quality education methods is the basic to effective teaching. It attentions on students' feedback to strengthen the teaching and learning progress. Several deep learning techniques are used to analyses the collected students' feedback dataset. The student feedback dataset fragmented into two parts. Such as 30% for testing and 70% for training. Moreover accuracy is evaluated through confusion matrix using python language. Illustration of graphs and tables clearly shows that the students' observations on teaching methodology. Based on these graphs, the educational institutions can improve their effective learning environment.

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