

# *Study on Semi Automation in Uniform Faculty Appraisal System*

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**Abstract**—Appraisal system is vital in ensuring the quality of human resources in any organization. Every organization strives for a reliable and efficient appraisal process to ensure timely and productive decisions. In educational institutes, the quality of faculties and teaching process have a direct impact on the performance and ranking of the institute. Traditionally, appraisal process in educational institutes is manual which consumes considerable amount of time and cost. While a fully automated appraisal system can save time and greatly improve the efficiency of the appraisal process, it doesn't provide the discretion to higher authorities for appraisal related decision making. Also, as there is no uniform appraisal process, an in-house automated appraisal system will have a lot of cost involved for development, maintenance and upgradation of the system. Our proposed system is a semi automated uniform appraisal system for educational institutes which works on a combined approach of automation with human intervention.

**Keywords**—*appraisal; student; faculty; educational institute; data mining; sentiment analysis; semi automation.*

## I. INTRODUCTION

Every Educational institute aims to become the hub of quality education or in other words, an institute where students dream of pursuing their academics. This can be achieved by the combined efforts of the higher authorities, faculties and students. While higher authorities take decisions and faculties have the responsibility of providing knowledge to students, students can contribute towards the development of the institute by implementation of knowledge gained and actively suggesting changes and improvements to ensure their all round development. An efficient faculty appraisal system helps the higher authorities in taking important decisions for improvement in the quality and process of teaching and for the betterment of the institute.

Currently, many institutes in India and other developing countries use the traditional pen-paper method for appraisal of faculties where physical self-appraisal forms have to be filled by the faculties. As students are important stakeholders of any educational institute, some institutes also ask students to fill feedback forms regarding classroom teaching as well as other educational and extracurricular activities. These forms are

then manually verified by the HOD or higher authorities and then forwarded to the principal for further action. This method leads to wastage of time, paper and money. Some institutes have started using a custom built in-house software for faculty appraisal which speeds up the process and also saves paper. But there is a considerable cost for development, maintenance and upgradation of the software. A common platform for faculty appraisal along with automation is the need of the hour.

For the success of any product or service, client satisfaction is crucial. How the product or the service is beneficial to the client plays a major role in defining its success or failure. In case of a faculty appraisal system, the clients are the management and higher authorities of the institute. An automated faculty appraisal system might not be acceptable to them as it might reduce or deprive them of their discretion in the appraisal process. Therefore, a combination of automation and human intervention in a uniform faculty appraisal system might serve the purpose.

## II. LITERATURE REVIEW

In literature[1], the authors explain the importance of student-teacher interaction and student engagement and its impact on the overall performance and development of the students. Teachers are encouraged to design a plan for teaching, observe the outcomes and make changes accordingly. They also promote continuous evaluation rather than semester-end evaluation and focus on solving real world problems. A sample of 86 students was taken for comparison between traditional teaching and evaluation method and continuous evaluation method using project based learning. It was found that results were favourable for continuous evaluation method using project based learning.

In literature[2], the authors describe the design and development of a web based appraisal system for performance evaluation of faculties using Data Analytics. They also focus on Data Visualization to make data more presentable for ease in appraisal based decision making. Microsoft Azure has been used as a Cloud platform to make data processing and storage

safe and hassle-free. Traditional appraisal methods like Rating system, Grading system are studied and compared with modern appraisal methods like Management by Objectives, 360 degree feedback. Microsoft Stack is used for web development. A web based appraisal system will be useful for accessibility from any device having browsing capabilities compared to platform specific software.

In literature[3], the authors attempt to study and detect the subjectivity faced by teachers in appraisal system due to managers' or higher authorities' bias, prejudice, mood swings or other reasons irrelevant to the actual job. This subjectivity might lead to biased or improper decision making in turn affecting the institute, students as well as individual teachers. Text mining was conducted on dataset of answers to classify clues of subjectivity into categories like irrelevant to domain, duplicate answers and insignificant related to the questions. This process is useful in portraying unbiased analysis to the higher authorities to enable them take key appraisal based decisions. Selecting the right text mining algorithm is essential for the success of the mentioned system.

In literature[4], the author describes the implementation of an SaaS (Software-as-a-Service) based Job Performance Appraisal system. The system primarily focuses on automation of the appraisal process from collection of data to final decision making which is a time consuming task when done manually. Collection of data is done through mining of online records or other forms of data involving the work done by the employee. Various parameters like task completion, revenue generation, quality of work are considered while creating performance evaluation models.. Big data analysis is used for performance metrics of related jobs for automation of decision making process.

### III. EXISTING SYSTEM

Educational institutes use various methods for evaluating performance. Some of these are:

1. **Rating system:** The appraisal form contains various parameters with option to rate on a scale of pre-defined range like 1 to 5 or Poor to Excellent as seen in [7]. This method is easy to implement for self-appraisal, student feedback as well as confidential rating by higher authorities. A drawback of this method is ratings are not necessarily based on the weightage of individual parameters. For Example, if teacher scores 4/5 for teaching and 2/5 for sports contribution, academic marks (4/5) are given more importance in any educational institute though the average of the two parameters is 3/5.
2. **360 degrees feedback:** 360 degree feedback is a feedback collected from peers, students, Head of Department and all others with whom the faculty interacts during working hours, as described in [7]. This is an annual feedback conducted for appraisal with specific weightage given to each feedback based

on the designation of the person giving the feedback. It evaluates both skills and development opportunities for the faculties. But a negative peer review might result in misunderstandings or personal hatred between employees which have an impact on the teaching environment in the institute. A more efficient and improvised method derived from 360 degrees feedback is 720 degrees feedback [6] which attempts to overcome or reduce the impact of some of the shortcomings of 360 degrees feedback by applying 360 degrees feedback twice in a year. The first 360 feedback's score are used to analyse and make the faculty aware of improvements required. The faculty is given time to implement the same and a Second 360 degrees feedback is conducted. The improvements in score of the second 360 degrees feedback over the first helps in taking appraisal based decisions.

3. **Management By Objectives:** In this method, the performance of the employees, in our case, faculties during completion of short term and long term objectives or goals determine the appraisal score [8]. First the goals are set and the faculties are made aware about the same at the start of the academic year or semester. Timely monitoring the progress and solving any ambiguities related to implementation of the decided objectives and rewarding the faculties at the end is the ideal scenario expected at the end of the process. In practice, the process might be affected by cultural differences, difference of opinion while setting goals and time management synchronisation between faculties and higher authorities.

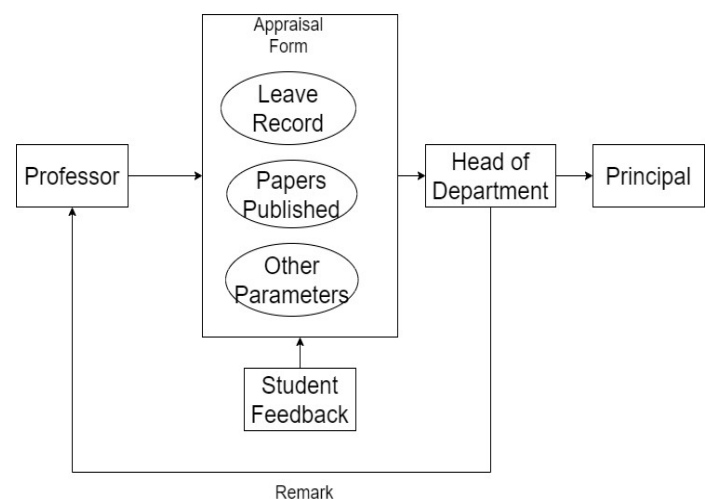


Fig 3.1: Traditional Faculty Appraisal Process

Some institutes have specially built appraisal software which is specific to their appraisal process. With increase in smart devices and improvements in web technology, appraisal systems and their processes including taking feedback from students are becoming web based, as observed in [2] and [5].

But every educational institute has different criteria for appraisal which includes some institute-specific parameters. A customised website might therefore cost a considerable amount. Also, maintenance throughout the year with periodic upgradations involves additional cost which is not worth for a system which would be used just once or maximum twice a year. While some of these websites do generate graphical analysis and reports, the assessment is mostly done manually by the Head of Department (HOD) and later the Principal/Management as seen in Fig 3.1. Automation is not involved here due to exercise of discretion by the HOD and the management in appraisal based decisions. This results in wastage of time despite the active use of web technologies.

#### IV. COMMON FACTORS

To develop a common appraisal platform with semi automation for educational institutes, some common factors which determine or impact the appraisal score have to be analysed. They include the following:

A) Academic Record: Academic Record of students is one of the prime indicators of the success or failure of the classroom and/or lab teaching methodology of individual faculties. This includes the pass percentage, the highest scorers as well as average marks on the entire class. Automation can be obtained by pre-defining the weightage of these factors and using pre-defined conditions like excluding the marks of students having less attendance for calculating average marks for the purpose of appraisal as they haven't attended the minimum number of lectures for the teacher to have an impact on their performance.

B) Leave Record: Faculties are aware of the maximum number of leaves they can avail. Management can pre-feed the threshold and the marks to be auto deducted on violating the threshold. Another customization would be the pre-defining weightage of overtime hours.

C) Student Feedback: Students are important stakeholders of any educational institute as their performance determines the success of faculties as well the reputation and ranking of the institute. So many institutes consider students' feedback to be of utmost importance. Rating system along with remarks option is generally used for students' feedback. Unfortunately student feedback is not free from bias. Pre-defining eligibility criteria for student feedback and deciding weightage of student feedback compared to other parameters used for appraisal before automatic evaluation of score.

D) Research work and publication: Research work matter a lot in institutes for higher education like Undergraduate, Postgraduate, PhD, etc. While defining fixed 'x' marks for each publication, higher authorities can set pre-defined bonus 'y' marks for publication through reputed conferences and journals like IEEE, Springer, ACM, etc.

Along with above common factors, the hierarchy of the institute has to be studied. The hierarchy is generally common depending on the type of institute. For example, the hierarchy of an engineering college as shown in Fig 4.1 generally

consists of Principal, Vice Principal, Head of Department, Professor and Assistant Professor. Similarly, the hierarchies of schools, Commerce colleges, Medical Colleges and others are uniform with some exceptions. This uniform hierarchy makes it easier to develop a uniform appraisal system for multiple types of institutes. The privileges can be set according to the role and position in the hierarchy.

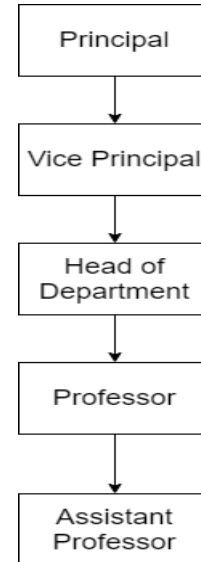


Fig 4.1: Engineering Colleges Hierarchy

#### V. DATA MINING AND SENTIMENT ANALYSIS

Data mining is the process of sorting through elements in large dataset, analysing frequent patterns, and establishing relations between them using data analysis tools as mentioned in [9]. The term 'mining' in real world refers to extracting the useful part (metal) from the rest of the heap (ore). In the same way, data mining is used to filter out essential and useful data from a heap of data. Types of Data Mining Algorithms are as follows:

1. **Classification:** Classification algorithms determine which category or sub-category the data belongs to. It is a type of Supervised learning where the condition for dividing into classes is well-defined. Real world examples of classification are Spam Mail Checker, Attendance defaulters list Generator, etc. Some Classification algorithms are Decision Tree, Naive Bayes and Support Vector Machines.
2. **Clustering:** Clustering algorithms are a type of unsupervised learning where conditions for grouping are not defined and the grouping is done based on similarity, distance and other attributes. Real world examples where Clustering can be used is determining fake news, advertising according to user behaviour, document analysis, etc. Some Clustering

algorithms are K means Clustering, K medoids Clustering, Hierarchical Clustering, etc.

Sentiment analysis is the process of computationally identifying the writer's opinion about something mentioned from text as positive, negative or neutral. It is widely used in Social media monitoring, feedback analysis, Competitor monitoring, etc. Usage of sentimental analysis in determining the nature of feedback for evaluation and analysis in education sector as shown in [10] and [11] is increasing day by day in other sectors as well. Reputation management is also dependant on Sentiment analysis.

## VI. PROPOSED SYSTEM

Our proposed system will be a web application which will automate the appraisal process for faculties while allowing discretion to the higher authorities. In order to develop a semi automated uniform appraisal system, data mining and sentiment analysis will be used to evaluate performance and calculate appraisal score based on the pre-defined conditions set by the higher authorities. Which parameter or set of parameters would have weightage pre-determined by the management by evaluating final appraisal score.

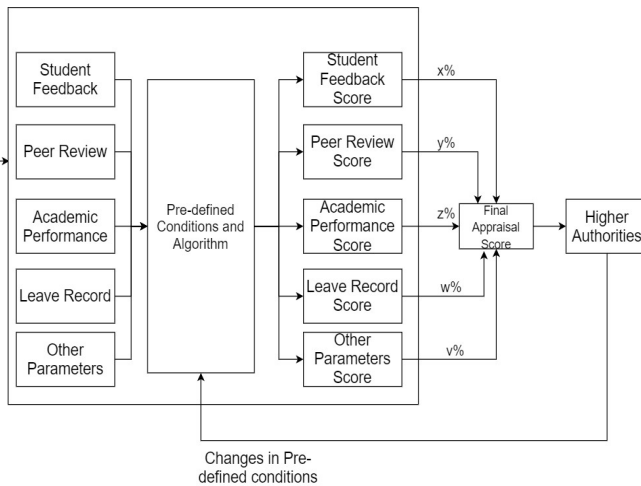


Fig 6.1: Faculty Appraisal with semi automation

For example: if S is Student review, P is Peer Review, L is Leave Record, A is Academic Performance and R is Research work, the formula for final appraisal score would be:

$$\text{Marks} = xA + yL + zS + wP + vR$$

Where x, y, z, w, v are the percentages or weightage of the respective parameters. Along with this weightage, pre-defined conditions set within the considered parameters are also applied automatically, as shown in Fig 6.1. The management or the head of the department should have the liberty to set parameters. Since this is a common platform for educational appraisal system, the parameters can be changed according to

the type of institute like school, commerce college, business school, etc. The score can also be modified by the higher authorities if they have any ambiguities with the process. Sentimental analysis can be used to determine whether a feedback is positive, negative or neutral and award marks accordingly. The numeric data and labelled data can be handled by classification algorithms to generate a combined score based on the results in the previous step after considering pre-defined weightage. Hence a standard and customized process is established in a common appraisal platform for faculties.

## VII. CONCLUSION

The main motive behind our work is to study the feasibility of semi automation in uniform appraisal system in real world scenarios in education domain. Appraisal system is crucial in ensuring and maintaining the quality of faculties in any educational institute. While educational institutes are transitioning from the traditional pen-paper based systems to computerised system for appraisal, the lack of a uniform appraisal system results in spending hefty amounts for in-house appraisal system. With advancements in the fields of Artificial Intelligence, Deep Learning and Data Mining, it is very much possible to build a fully automated faculty appraisal system but it won't satisfy the institute's demand of discretion. Semi automation, that is automation in combination with human (higher authorities) intervention may yield benefits in the form of proper outcomes which may speed up and improve the appraisal based decision making process of the institute. Compatibility with multiple types of educational institutes along with ease of customizations in the appraisal criteria and algorithms will make the system useful to a large number of educational institutes and thereby save a considerable amount of time and money. As the usage of this common platform increases, more data would gradually lead to improvements in the accuracy of the data mining algorithms greatly increasing the accuracy of the calculated score.

## References

- [1] Anagha Vaidya, Rajashree Jain and Prafulla Bafna, "Influence of Staff Student Interaction on Student Engagement," IEEE International Conference on Power, Control, Signals and Instrumentation Engineering (ICPCSI-2017).
- [2] Pratik Borse, Aishwarya Chinchpure, Rajat Singh Deepak and Dr. Swati Shinde, "Comprehensive Faculty Appraisal and Development System Using Data Analytics and Data Visualization," 2018 Fourth International Conference on Computing Communication Control and Automation (ICCUBE).
- [3] Amani A. Abed and Alaa M. El-Halees, "Detecting Subjectivity in Staff Performance Appraisals by Using Text Mining," 2017 Palestinian International Conference on Information and Communication Technology.

- [4] I-Ling Yen, Farokh Bastani, Yongtao Huang, Yuqun Zhang, Xin Yao, "SaaS for Automated Job Performance Appraisals using Service Technologies and Big Data Analytics", 2017 IEEE 24th International Conference on Web Services.
- [5] Rajvee Patel, Omkar Agrawal, Yash Gangani, Ashish Vishwakarma, College Feedback System ,” International Research Journal of Engineering and Technology (IRJET), Volume 5, Issue 01, Jan 2018.
- [6] J. George, “720 Degree performance appraisals: An effective tool to efficiency of modern employees”, International Conference on Electrical, Electronics, and Optimization Techniques (ICEEOT), 2016.
- [7] Prashanth Prabakaran, Indika Perera, “Tool Support for Effective Employee Performance Appraisal in Software Engineering Industry”, 2017 Moratuwa Engineering Research Conference (MERCon).
- [8] Hoffmann-Burdzińska, Kinga & Flak, Olaf. (2016), “MANAGEMENT BY OBJECTIVES AS A METHOD OF MEASURING TEAMS' EFFECTIVENESS,” Journal of Positive Management. 6. 67. 10.12775/JPM.2015.016.
- [9] Margaret Rouse, Adam Hughes, “Data Mining”, Guide to Big Data analysis tools, trends and best practices, Techtarget
- [10] A. Kumar and R. Jain, "Sentiment analysis and Feedback Evaluation," 2015 IEEE 3rd International Conference on MOOCs, Innovation and Technology in Education (MITE), Amritsar, 2015, pp. 433-436.
- [11] C. Pong-Inwong and K. Kaewmak, "Improved sentiment analysis for teaching evaluation using feature selection and voting ensemble learning integration," 2016 2nd IEEE International Conference on Computer and Communications (ICCC), Chengdu, 2016, pp. 1222-1225.