ISSN (e): 2250 – 3005 || Volume, 11 || Issue, 5|| May – 2021 ||
International Journal of Computational Engineering Research (IJCER)

College Feedback System with Sentimental and Psychometric Analysis

Vijay Tembugade [1], Soham Tale[1], Amit Nemade [1] and Dilip Dalgade [2]
1 – Student, 2 - Faculty
Department of Computer Engineering, MCT's Rajiv Gandhi Institute of Technology, Mumbai, Maharashtra, India

ABSTRACT
Many schools and colleges collect feedback from the students on the main aspects, of course, such as preparations, punctual, skills, and learning experience to improve the students learning experience. But, the traditional approach for taking feedback is using manual methods and it focuses mostly on the quantitative way and ratings given by the student. So, the evaluation cannot be made effectively. Also, all the feedbacks are analysed without knowing the sentiments of each student behind his feedback which may be his fake response towards the teacher. In this paper, we propose a college feedback system that applies algorithms and a sentiment analysis approach [1] to provide teachers a genuine, real, and qualitative feedbacks taken from students that will improve the students learning experience to a great extent. We have collected feedback from the students and then made different analysis on different kind of data that was collected during feedback. This proposed system is an efficient approach for providing genuine and qualitative feedback for the teacher and will help to increase the understanding between teacher and students.
KEYWORDS*: Feedback, Natural Language processing, Psychometric Analysis, Sentiment Analysis.*

Date of Submission: 12-05-2021 Date of acceptance: 25-05-2021

I. INTRODUCTION

Feedback System in any organization plays an important role in understanding the loopholes between organizations and employees, similarly as students and educational institutes. The feedback could be in form of multiple options or brief paragraphs. While growing the communication between two ends is important. As we concern about students and the educational institute it is vital to understand each other in student's perspectives as well as teacher's views towards the institute. Here, we are putting forward the system where we will understand the feedback given by students from various perspectives and in various parts.

To change the traditional feedback system approach of collecting feedback through a pen and paper, it is important to move ahead with an online platform, which opens us an opportunity for applying various techniques and algorithms to analyse the feedback given by the students. Here, we put forth an idea of dividing the platform into various parts and subparts. Before asking random questions and analysing them, there is a need for segregation of questions in particular topics and sections [3]. Along with that, there should be a part that demonstrates activities and shows us what is brief and what needs to be answered in a single word.

So, here we need to understand the that feedback system will be having various and parts and sections, and each section do an important role in understanding the student's view toward the institute and towards teachers. Here, we are modelling the feedback system where students give feedback to a particular teacher. We divide the system into three major parts, analytics of questions, sentiments analysis of comments, and psychometric analysis.

In question analysis we divided this system into 5 parts, and each part containing 4 to 5 questions and a comment [1][3]. Every section has a comment which will help us to understand the sentiments behind the comment. Another, psychometric analysis part will the aptitude and metal analysis, which may help us to consider genuine and emphasized feedback for students. We will be approaching questions regarding teaching and other forms along with various psychometric questions to precise reliability of feedback. Natural Language processing [5] is a major part that connects the dots between the system. We need to take the help of various Natural language processing (NLP) Libraries and need to understand thoroughly.

II. LITERATURE SURVEY

In this section, we will be understanding the various fields that evolve around the objectives, that we choose the analyse. We will discuss the various fields of study and natural language processing, and how we come across the data, and the questions.

As we know, the entire analytical and question-answer part is divided into various sections and each section will have one comments section which will help us to understand the basic sentiments of students. The comment could be negative, positive, or neutral, based on student's feedback. For this, we need to understand the working of natural language processing and classification. The question which we have taken are from various feedback forms from various university and Government bodies. Based on their review and their questions, we have finalized our questions. These questions focus on providing qualitative and quantitative feedback to analyse and provide better results and help to analyse teacher's performances.

Sentiment Analysis: Sentimental analysis [1][4][9] is also known for opinion mining, which is part of natural language processing, where we decide the polarity and subjectivity of a comment or any sentence. This technique is used to understand the data whether it is positive, negative, or neutral. With the help of NLP and machine learning algorithm, we can understand the sentiment of the text data. The sentiment Analysis algorithm falls into three parts, Rule-Based, Automatic, Hybrid. Various classification algorithms are also part of this sentiment analysis. Various libraries are also available to work on sentiment analysis, for example, *NLTK and TextBlob using Python.*

Subjectivity: Subjectivity means the sentence which contains explicit sentiments. For example, *the balloon is nice* and *the balloon is pink*. The first sentence is positive and another one is neutral, which shows us that nice is more subjective than red.

Polarity: In simple words, polarity is understanding the positive and negative parts of the text. It identifies the orientation of sentiments.

Suggestion extractions: The suggestion [1] stands for any advice or criticism, given by the student by the faculty member. Which may be positive and negative, depending upon the viewpoint of students. Suggestions provide actionable feedback. Most of the time, auxiliary words concept come with a solution to find out suggestions. For example, should, would have, must, etc which describe the advice or positive criticism in comments. Most of the parts can be extracted with various machine learning algorithms like the Decision tree classifier or rule-based classifier, but the simple way would be using regular expression. Various programming languages provide various modules to work with regular expression.

Regular expression: A regular expression, also known as regex or regexp, is a special text string for describing a search pattern. It is a generic representation of a string or a collection of strings. Regular expressions are placed inside the pair of matching. A regular expression describes strings of case-sensitive characters. It's a pattern that matches certain strings and doesn't match others.

Pre-processing of Text and its methods:

Tokenization: Tokenization [1][5] is the process by which a large amount of text is divided into smaller parts called tokens. It becomes vital to understand the pattern in the text to achieve the above-stated purpose. In tokenization, special character, conjunctions, etc are removed. These tokens are very useful for finding such patterns as well as are considered as a base step for stemming and lemmatization.

Stopword Removal: Stop word [1][4] removal is one of the most commonly used pre-processing techniques used in NLP. The main idea behind using this is simply removing the words that occur commonly across all the documents in the corpus. In this technique, tokens such as 'the', 'it', 'is', 'an', etc are removed. Typically, articles and pronouns are generally classified as stop words and are removed in this process.

Naïve Baye's Classification: Naïve Bayes [1] is a probabilistic machine learning algorithm based on the Bayes Theorem, which is part of conditional probability. It is a supervised learning model, which gives an idea about the frequency of words in text data and feature extractions**.** For understanding the natural language processing using various classification methods, naïve Baye's classification used count vectorization and term frequency-inverse document frequency. *Python libraries like NLTK and Textblob use this algorithm.*

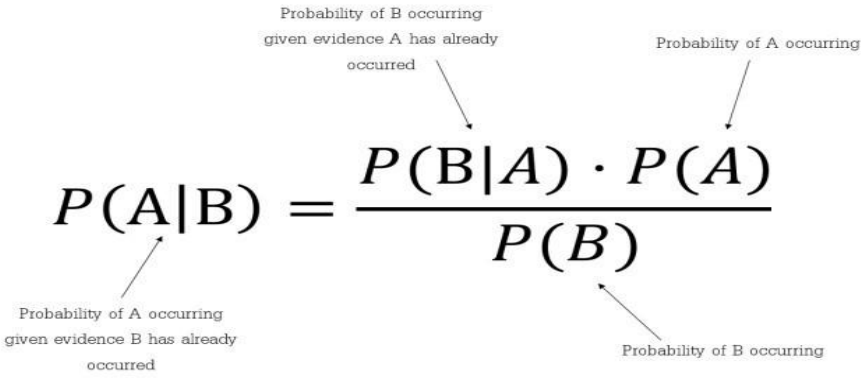

Figure 1 : *Bayes Theorem*

Psychometric Analysis: Psychometric tests [2][6][7] are a standard and scientific method used to measure an individual's mental capabilities and behavioural style. Psychometric is a study of the mental health of a person which helps to understand the psychological condition of the person. It is a field of study concerned with the theory and technique of psychological measurement. One part of the field is concerned with the objective measurements of skills and knowledge, ability, attitudes, personality traits, etc. It is the design and evaluation of tools used for mental measurements. The psychometric analysis [2][8] is used to evaluate the personality of a person, career counselling, and to assess their personality. It helps to know the view of a person on a particular subject by using different methods such as interviews, observation, personality inventories, etc. We are trying to implement the use of Minnesota multiphasic personality inventory in our proposed system. It helps to know whether feedback given by the person is reliable or not. These different kinds of questions are asked to the user and based on answers, we can determine the reliability of the feedback by using different factors.

Many techniques are invented to study the different aspects of human psychology. It helps to know the perspective of the person on a particular subject. Tools that are used are short quizzes, questionnaires, interviews, and test analysis. It helps psychologists to know whether the person is reliable or not, whether the person is telling the truth or he/she wants to avoid the questions. We can analyse the person with the help of psychometrics. To get the honest opinion of a person we can use psychometric analysis.

In our proposed system we are giving several questions to users and we will take input from them to analyse and study their answers so that we can conclude their feedback. These questions are formed using different survey feedback forms and psychometric questions are formed using the MMPI-2 [7] technique in which the user answers the form of Yes/No, Agree/Disagree, True/False type questions. We are also trying to implement repetitive nature in our question sets like after a particular set of questions we are repeating the question with the same sense but differently for example, about saying 'No' we can ask two questions 'Are u good at saying "No"?' and another one is 'How often do you say "No"?'. We are providing 5 options to each question and giving them points to study them in our system.

III. DATASET

Our dataset is a response submitted by students recorded as feedback for a particular teacher. The feedback form contains 5 sections [3][4][5] i.e., punctuality, behaviour and discipline, subject command, teaching methodology, and student interaction. Each of these sections contains 4-5 questions whose answers are recorded as a numeric value between 1-5 where 1 means strongly disagree and 5 means strongly agree. Also, each section has one field for comment. So, students' responses were recorded in this format and are used for qualitative and training purposes. Those options being normalized as part of data extractions.

Questions are divided into five sections which are as:

- Punctuality,
- Behaviour and discipline,
- Subject Command
- Teaching methodology
- Student Interactions

Question and Options:

Each section plays an important role to understand the overall best and worst performances. Punctuality defines the timing and overall attendance of a teacher. Questions are framed to understand Punctuality. Behaviour and Discipline are for understanding the importance of overall personality and class presentations. Subject Command explains to us how much teachers know about the subject and the ability to make it

understandable to students. Teaching methodology gives us an idea about various platforms used by teachers and Student Interaction is bidirectional communication between the teacher and students [10,11,12].

For each section we have decided some factors on which questions are being framed.

Punctuality	Time and peace in classroom, Syllabus completions, Time Managements
Behaviour and discipline	Cheating and Shortcut ways for syllabus completions, Favouritism in class, Discipline and language, Helpfulness behaviours
Subject Command	Depth of subject, organisation of syllabus before teaching, availability of notes, Stimulation of interest in subject, Extra Topics beyond syllabus,
Teaching Methodology	New and modern way of teaching, online/offline platforms understandability, PTTs/ Backboard use
Students Interactions	Problems in Language of communication, Enthusiastic behaviours, group discussion and doubt solving, Accessibility outside of class

Table 1: *Section Name and questions in each section.*

For these questions, each will be having options that will have a particular value which will be counted to understand the positive and negative points of the teacher. Options will be like Strongly agree, Agree, Neutral, Disagree, and Strongly disagree. The agreement gives a positive view towards the question and disagreement will give a negative view towards the questions. Though it is important to understand the overview of the question in general it will between agreement and disagreement.

Comment Section:

Comments [1] are one of the important factors to analyse the sentiment factor of a particular student. Students have to give comments for each section. Those comments will be helpful to understand the sentiments and extracting out the suggestions for the system. The suggestion will be displayed separately as explicit suggestions and show directly to the teacher.

Psychometric Questions:

Near about 22 to 24 psychometric [2][7] questions will be asked to students to analysis the factor of reliability. Those questions will also have 5 options which will be analysed to get the most important mentality of students. The question may contain repetitive question which will be asked in a contradictory way to get a basic idea of student's mentality. We will assign one threshold value for the score of psychometric tests and on basis of that score will be deciding which feedback to choose and which to not. Student which will not able to clear the threshold of psychometric test , the feedback give by them will get less value as compare to other those who got sufficient score.

Report and Output:

Overall report will be generated by combining the whole analysis factors like sentiment and suggestions. Also, graphical representation of best-case scenario and worst-case scenario of teacher will be show on on report. Exact report generation is based on various factors which are as described in proposed system and psychometric study.

IV. PROPOSED SYSTEM

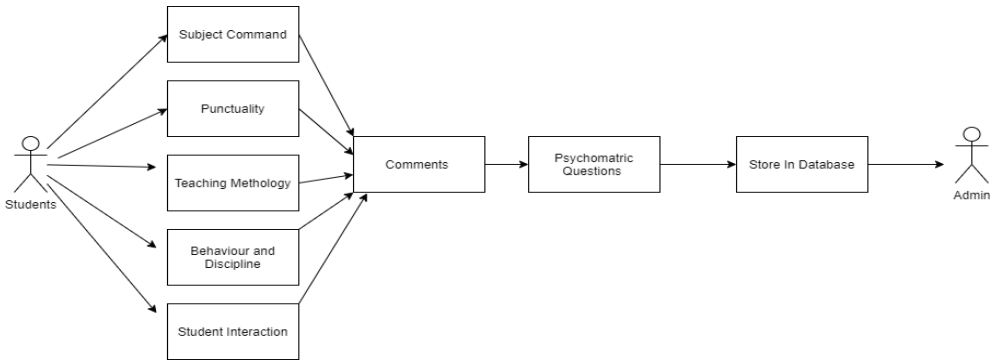

Figure 2 : *Students View of Feedback Form*

Students View:

Each student will receive a unique link through email to fill the feedback form which has 5 sections, each section contains 3 to 5 questions. Each question has 5 options. After completing each section students can give suggestions in the comment box which is provided at the end of every section. Other than this, the form

also contains one psychometric section which has a total of 22 questions. This section has a time limit, each question has 5 to 10 seconds of time to answer. After completing all the sections students can submit their form.

Administrator View:

All the feedback given by the students will be stored in a database with the unique ID for particular feedback with the option selected by students and comments. When the admin asks for the generation of reports of a particular teacher for a particular subject, then data is fetched from the database and given to the analysis module, and analysis is being done. The analysis module contains understanding the best section of the teacher and the worst section of the teacher. As well as, graphs for understanding the feedback will be generated. It also contains the NLP model which helps to extract suggestions and understanding the sentiments of the comments.

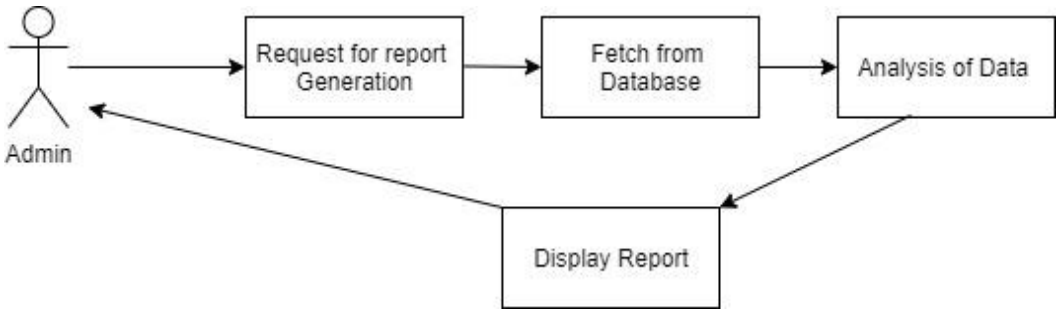

Figure 3: Admin view of feedback form and report generation

Procedures:

Admin needs to create a feedback form by selecting the teacher and his/her subject of teaching. Then the admin needs to select the students who need to fill the form and then emails are sent to those students. Then the student will receive the mail with a unique link which is valid only once. Then the student will open the link and can give feedback. The student will click on that form and will answer all questions and then clicks submit. Once all students give the response, responses are stored in the database, admin needs to click Generate Report button.

When the admin asks for a report or exact output of feedback given by students then all data stored in the database will be fetched to the server. Then that data will be asked to go for the analysis module. The analysis. Module will extract suggestions from comments and will give the teacher a positive suggestion regarding subjects. The analysis module contains various things like Suggestion extraction, the best case of teacher and worst case of a teacher, graph generation, sentimental models. Best Case finds out which point is best in the teacher so that teacher can know where he/she has been improved. Worst case means to find out at which point, the teacher can improve his/her performance. The report will be generated at the front end of admin as per admin request for the particular feedback form.

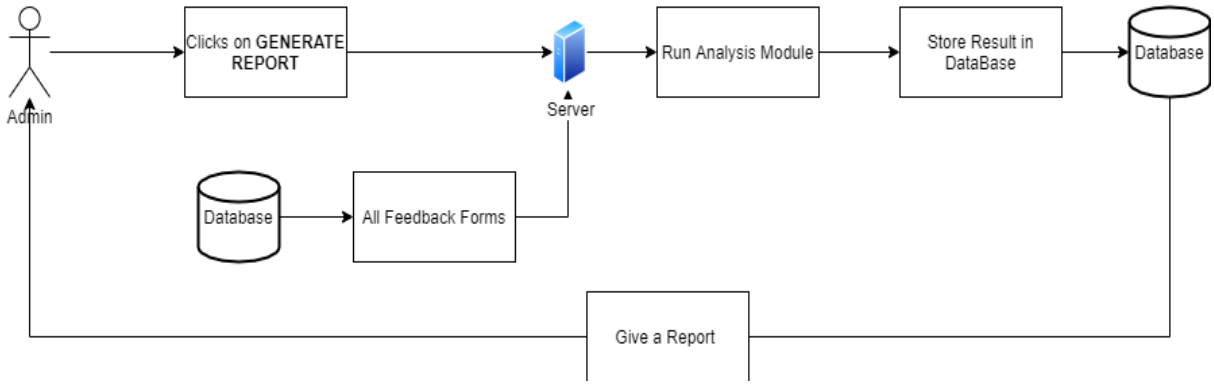

Figure 4: Overall flow of how report will be generated

V. RESULT

The result will contain various parts which will be used to create the report. Those parts will have various conclusions. The feedback that is in the database will be stored are fetched in an analytical model and which will have various factors and parts to work on.

1. Sentimental Analysis Part:

Polarity, subjectivity, positivity, negativity, and neutrality [1] of comments will be generated, which are given by the students. And these will help us to analyse which comment we required and which does not.

	comments	neg	neu	pos	compound	polarity	subejectivity
1	There should be improvements on overall perfor...	0.0	0.723	0.277	0.3182	0.00	0.00
7	His knowledge was vast but teaching method cou...	0.0	0.722	0.278	0.5927	0.25	0.75
21	Pratical explanation would be much better and ...	0.0	0.854	0.146	0.4404	0.25	0.75
23	Good teacher, need more like him	0.0	0.413	0.587	0.6901	0.60	0.55
37	He understands the way students need to be tau...	0.0	1.000	0.000	0.0000	0.00	0.00

Figure 5: Sentiments Analysis of Comments

2. Graphs for analysing the questions.

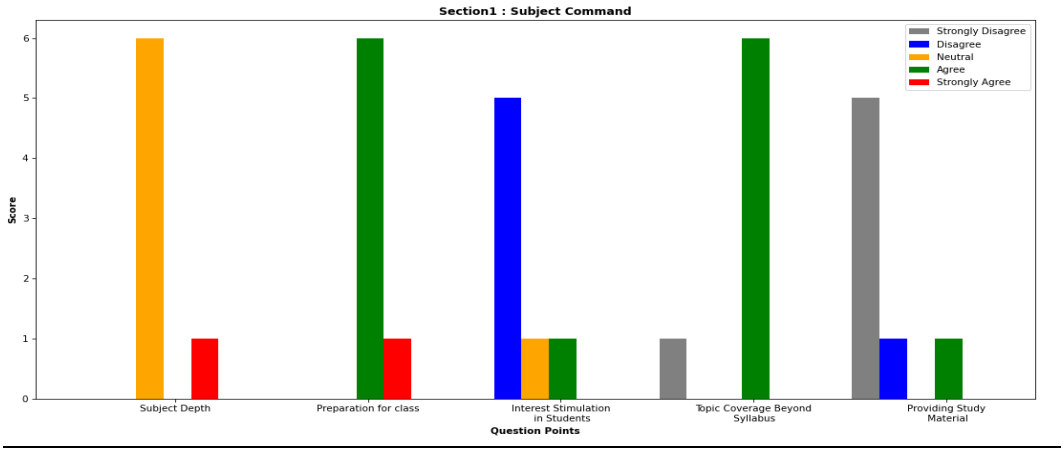

Figure 6: Graphical analysis of 'Subject Command' Section on basis of feedback given by Students

Particular question and section [3][4][5] will have proper output and numerical value and those will get us from the question we asked students. Along with those, those will have a best-case scenario and a worst-case scenario. We get how much students agree and disagree about the particular point of the teacher. For example,

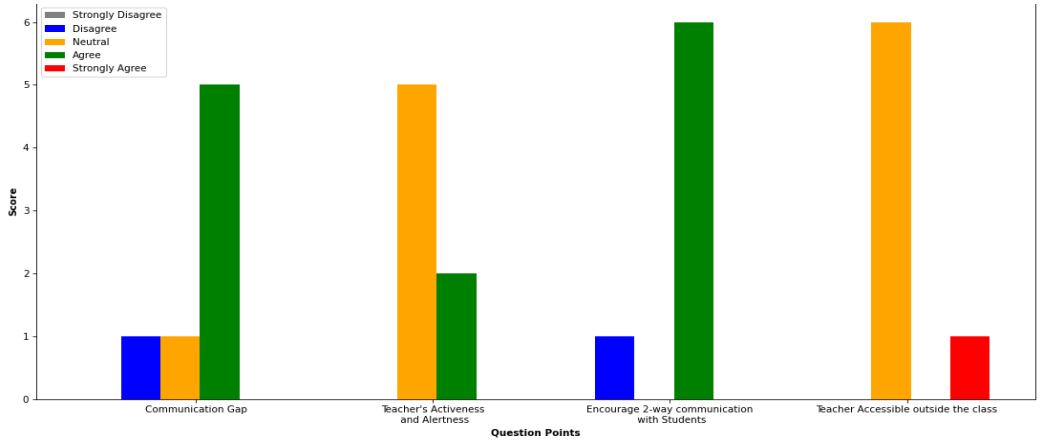

Figure 8: Graphical analysis of 'Student interaction' Section on basis of feedback given by Students

in the above graphs of the Subject Command section, most of the students are neutral about the subject depth of the teacher and most of the are disagree about interest simulation of the subject in the student's behaviour of the teacher.

3. Best- and Worst-Case Scenario:

Best Case gives us idea about in section or in which part the teacher is good. This thing is entirely depending upon feedback given by students. Worst Case will show us the weak point of teacher and this indicates where teacher need to improve. This is kind of Quantitative analysis on which best case and worst(weak) case is extracted. *Subject* column shows us a section on which teacher will get report about. *Best* column show which part of question has good understanding. And *Worst* shows us in which part teacher need to improve his performance.

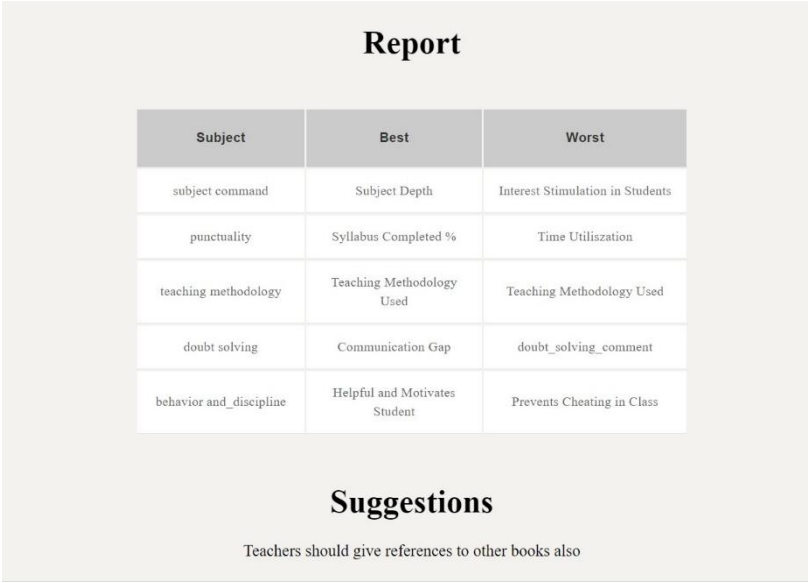

Figure 7: Best Case and Worst-Case scenario & Suggestions

4. Psychomatric Analysis Part:

By analyzing the psychometric section of feedback forms we got different kinds of results. Some students blindly gave the answers by selecting the same option for all the questions. As we are asking the same question in a contradictory manner we got the reasoning ability of students, from this we got to know most of the students gave the psychometric test decently. The answers to the original and the contradict questions were nearly the same. Only a few students about 5 to 7% were not able to clear psychometric tests as they were not giving the feedback decently. There is a threshold value based on which we decide whether to discard the form or not. With the help of threshold value, we are considering only genuine feedback without wasting time on analyzing false feedback forms. From those genuine responses that we get, It will help teachers to believe in the report generated by the system and improve their weak points.

5. Suggestion Extraction Part :

Suggestions are extracted from comment. First we analyse the sentiments of the comments and then after analysing the sentiments we extract the suggestion of possitive commnets which are useful to teacher for their growth. Most of sugesstion are straigth forward which are directly in form auxilary words. Some of then are possitive comment, which can be understand by sentiments of the comments. Figure 7 shows how suggestion can be extracted at the report.

6. Overall Briefing :

Overall report will be genretaed, which contain all the above points we discussed, which are directly related to the teacher. So that teacher can analyse on which point he/she need to develop him/her self. This entire report will be based on student feedback who cleared the psychomatric test. Some important point we got are like by this method student cannot give random feedback as comment are being asked and also psychomatric test is being taken. Also, if student give the feedback in similar patter like chosing only one option in entire feedback, those student will be neglected from the analysis process.

V. CONCLUSION

In this project, we put forth the idea and implementation of the different views of the feedback system. By using this feedback system, we can take the feedback from students which we want. Also with that, we can not only judge the teacher but also student awareness has been checked by psychometric test. So that, the student which is worthy to give feedback and have a better understanding of the subject can put their value efforts to give suggestions to teachers. The student who is not well performed in the psychometric test can either be neglected or reasked to give feedback properly. The overall report of the teacher will be generated that contains the positive suggestions given by students, and also the graphical view of each section. Using the feedback system model, we can prevent some of the non descent feedbacks from the students and only analyze the proper feedback from genuine students.

REFERENCES

[1]. Swapna Gottipati , Venky Shankararaman , Jeff Rongsheng Lin, et al. : Text analytics approach to extract course improvement suggestions from students' feedback, Research and Practice in Technology Enhanced Learning (June 2018)
[2]. Geraldine Gray, Colm McGuinness, Philip Owende, Aiden Carthy et al. : A Review, of Psychometric Data Analysis and Applications in Modelling of Academic Achievement in Tertiary Education, Institute of Technology Blanchardstown, Ireland(2014)
[3]. Rosni Abu Kassim, Juliana Johari, Muhammad Izzat Rahim and Norlida Buniyamin, et al. : Lecturers' Perspective of Student Online Feedback System: a Case Study , 2017 IEEE 9th International Conference on Engineering Education (ICEED), (November 2017)
[4]. R.Menaha, R.Dhanaranjani, T.Rajalakshmi, R.Yogarubini, et al.: Student Feedback Mining System Using Sentiment Analysis, International Journal of Computer Applications Technology and Research Volume 6, (2017)
[5]. Kousalya. L, Subhashini. R, et al. :Sentimental Analysis for Students' Feedback using Machine Learning Approach, International Research Journal of Engineering and Technology (IRJET), (April 2019)
[6]. Personality Profile and Assesment, http://www.nicheconsulting.co.nz/psychometric_assessment/assessment_tools/personality_assessments.htm
[7]. Minnesota Multiphasic Personality Inventory (MMPI), https://psychcentral.com/lib/minnesota-multiphasic-personality-inventory-mmpi
[8]. WANG Wei-ling, MIAO Dan-min, et. Al.: Research review of college students' psychological quality, Mar. 2007, Volume 4, US-China Education Review, USA
[9]. Daneena Deeksha Dsouza, Deepika, Divya P Nayak, Elveera Jenisha Machado, Adesh N. D. , et al.: Sentimental Analysis of Student Feedback using Machine Learning Techniques, International Journal of Recent Technology and Engineering (IJRTE), (June 2019)
[10]. Feedback Form of North-Eastern Hill University, Shilong.
[11]. Feedback form of Webster University.
[12]. National Assessment and Accreditation Council (NAAC) , Published Feedback form.

Vijay Tembugade, et. al. "College Feedback System with Sentimental and Psychometric Analysis." *International Journal of Computational Engineering Research (IJCER*), vol. 11, no.5, 2021, pp 01-08.