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Teacher's Performance Evaluation Tool Using Opinion Mining with Sentiment Analysis

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***Abstract* – The research aims to develop a teacher's performance evaluation tool using opinion mining with sentiment analysis. The study may help to identify the strengths and weaknesses of the faculty members based on the positive and negative feedback of the students either in English or in Filipino language. The proposed system provides the sentiment score from the qualitative data and numerical response rating from the quantitative data of teachers evaluation. It will also graphically represent the evaluation result including the percentage of positive and negative feedback of the students.**

Thus, the school administrators and educators will be more aware about the sentiments and concerns of the students. The reports generated from the developed system could be utilized to enhance the performance of the concerned faculty. In addition, the results from the students' evaluation of performance could also be used as a basis for merit, awards, and/or promotion. Furthermore, the said proposal may encourage as well as improve fact-based decision making for university stakeholders.

Keywords – Sentiment Analysis, Naïve Bayes Algorithm, Teacher Performance Rating, Quantitative and Qualitative Ratings.

I. INTRODUCTION

The performance of teachers in a class has been center of attention for most educational researcher. The quality of teaching is not only measured from qualification and knowledge of teacher but also their dedication and commitment in classroom [1]. The dominant view of an effective teacher is the teacher who possesses a broad repertoire of techniques and is able to skillfully use these techniques to meet the changing demands of the classroom [2]. And in order to make improvements to teaching, it is vital to know what students think of the way they are taught. One technique for accessing student voice in the educational process is to allow the opportunity to give feedback on the performance of their teacher which includes their perspective of instruction, organization, classroom environment, and quality of the amount learned. Teacher evaluation is a common method to evaluate the teaching process quality. It is generally accepted that teacher evaluation from the student opinions is an important part of teaching practice. In higher education, it has been the most widely used in most colleges and universities. Additionally, this method continues to be the most frequently used for testing teacher's teaching performance and course [3].

The evaluation questionnaire has been used as instrument for data collection. It consists of quantitative and qualitative questions. The quantitative data was collected by closed-ended questions such multiple choice, while the qualitative data was collected by open-ended questions as comments and suggestions from students opinion in textual form. Faculties often have difficulty making sense of students' written comments on teaching evaluations. Although such open-ended comments are usually quite rich with observations and insights, instructors frequently struggle to draw conclusions from them. Rather, they remark that the students' comments seem contradictory; half of the students say one thing, and the other half says the opposite. Understandably, this can frustrate faculty members and lead them to believe that there is no way to satisfy everyone. As a result, faculty may choose to ignore the important messages that students' written comments provide.

According to Marsh [4], student evaluations are the most studied form of personnel evaluation. Most of the studies look into quantitative measures gathered in the questionnaires and they rely on the fixed rubric rules, and take less into account students' opinion. In this paper it utilizes the textual open-ended responses that are also collected and one of the obstacles is that reading and making sense of all the textual responses can be a daunting task. This aims to combined analysis of the textual and quantitative responses using opinion mining techniques in order to provide a more comprehensive understanding of the teacher's qualitative ratings.

For this reason, a comprehensive and reliable teacher evaluation instrument tool that will give importance on both quantitative and qualitative result that can be able to effectively measure it. And through this it can boost the enthusiasm, initiative and creativity of teachers. Students ask to complete course evaluations as part of the institution-wide assessment process. Students give their feedback in textual free format to express their reviews. The dataset used in this research is educational student feedback that data to extract the frequently commented features along with their opinion.

Sentiment analysis method is use to identify the negative and positive polarity extracted from a textual responses. With the integration of opinion mining it is used to extract intelligent information based on a person's opinion. Opinion mining and sentiment analysis are used to extract such

remarks and analyze them on the basis of its polarity respectively.

This research work focused on developing software that can be used by any University as a tool in evaluating teaching performances. This aims to give specific weight to narrative response of students as part of performance rating scale, and to measure how qualitative rating analysis complements the quantitative rating analysis.

The paper proposes a teacher evaluation method based on opinion mining, which filters the student comment on teachers to form a teacher evaluation repository automatically. The sentiment analysis engine classifies these comments to positive or negative category and points out which is good or not good about teachers work. An overall positive or negative evaluation of a teacher is given out from students' perspective.

II. Review of Related Literature

Universities are increasingly interested in using quality measures that provide evidence that can be used for benchmarking and funding decisions. Administrators, head, or personnel used Students Evaluation System for gathering responses of the student to the teacher's performance and identifying information of the student experience of learning. There are a range of methods and associated studies cited in the literature concerned with the Sentiment Analysis in Teacher's Performance rating. Reviews of the literature of student evaluations of teaching show the massive amount of evidence collected using these standard instruments [5, 6]. Teacher's evaluation still controversial especially faculty have normally no formal training in teaching, so those mechanisms that are used for assessing teaching effectiveness are threatening. (Sunghwan Mac Kim and Rafael A. Calvo).

Sentiment analysis [7] attempts to automatically identify and recognize opinions and emotions in text. It purpose is to identify whether a text is objective or subjective, or represents a positive or negative opinion. This been used in many areas especially in business, like movies review, user experience of the product, politics, and other. Survey has shown that such opinion also affect the people reading those opinions [8, 9]. People used to express opinion and comments, so it give impact related to a product or issue are to be analyzed by the associated organization so that they can improve based upon the remarks of people. Opinion mining and sentiment analysis are used to extract such remarks and analyze them on the basis of its polarity respectively. Opinion mining and sentiment analysis not only finds an application in online remark sites but they also can be used as sub-component technology in recommendation systems [10]. In which a data structure similar to applying to research education such Teacher's evaluation system can combined analysis of the textual and quantitative responses using novel data mining techniques in order to provide a more comprehensive understanding of the student experience.

There are some studies applied algorithm wherein it can be useful in integrating to student evaluation a variety of topic extraction methods, mainly divided into automatic extraction method such as Kyu, Liang and Chen [11] proposed algorithm for opinion extraction, opinion summarization and tracking the opinion which may be used for multiple languages. The opinion extraction algorithm takes value of opinion holder into consideration whereas in this paper the value of opinion holder is taken to be one. Wilson's [12] approach was to identify contextual polarity for a large subset of sentiment expressions. This approach was a phase-level sentiment analysis. Kin and Hovy [13] in their first model selected a topic and analyzed sentiment of remarks using word sentiment classifier with word net. The second model used probability of sentiment words.

III. Research Methodologies

The methodologies of the research can be summed up using the stages shown figure. The students will evaluate their teachers in numerical rating and qualitative scale using Online Teacher's Evaluation Tool. The system will handle the process through the following procedures. First, the students comment will be sourced from the Teachers Evaluation Database; the words will undergo filtering using Opinion Mining which counts the presence of obvious affect words that are extracted from dataset polarity. Second, it will undergo to text classification using Naïve Bayes, it will compare the individual words of the sentence with the database of words, while comparing, the words will find the probability of the labels, and next these words will be compared to the probability of positive and negative label. Additionally, words will find the polarity and go to the classification module to generate the summary and visualization result and lastly it will produce result to the users.

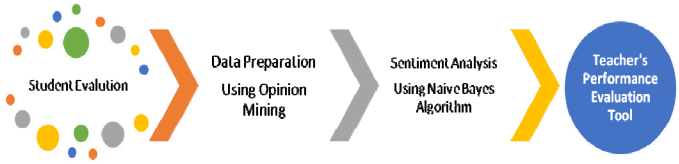

Fig. 1. Research Procedure

IV. System Features

A. System Architecture

The proposed system allows the user to provide quantitative ratings, and feedback in the form of comments/suggestions. The qualitative ratings will be analyzed using opinion mining with sentiment analysis engine. For data preparation, the comments/suggestions of the student will be extracted from the database. We can apply the transformations sequentially of data preprocessing to remove unwanted characters which do not support sentiment value from the students' comments included these following processes such as: 1) Converting to lower case, 2) Removing punctuation, 3) Removing numbers, 4) Stripping white space, 5) Removing common words which do not support sentiment value, and 6) Removing word suffixes [13].

The system uses a set of language resources (Dataset Polarity that we had created) to identify the opinions expressed in a volume of messages written by students, as shown in Figure 2. Learning based techniques is used to create a model by training the classifier with labeled examples. This means that you must first gather a dataset with examples for positive, negative and neutral classes, extract the features/words from the examples and then train the algorithm based on the examples. The Dataset Polarity consists of a list of dictionaries of words manually compiled for our project which includes the Tagalog and English words.

Then the opinions extracted are analyzed to find out the polarity using Naïve Bayes Algorithm. Every sentiment word in the database has been given a value. When a sentiment word is detected in a sentence the value saved in the database is used for evaluating the cumulative opinion value. When a sentence is analyzed, for each sentiment word found in the sentence, its opinion value is fetched from the database. Then the collaborated opinion value of that sentence is estimated. If there is negation in a sentence the value of opinion score is decreased/ increased by a certain amount.

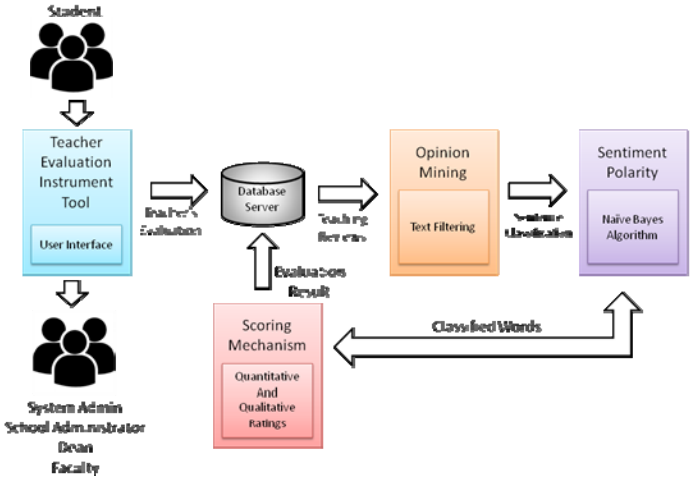

Fig. 2. System Architecture

B. *Features*

The proposed system has features which can be useful for identifying responses of the students' feedback. The proposed system has four major modules: 1) Account Management Module, 2) Students Evaluation Modules, 3) Report Modules, and 4) Teachers Evaluation Instrument Module.

In the Account Management Module, the proposed system has different users, first is the system administrator who will grant the right to access the system to the school administrator, deans, and faculty they can explore the log-in of registered users, manage account user, monitor and view result. The school administrator includes the President, VP's and HR personnel but basically HR is in-charge in the faculty performance, in this account it can view the result of all colleges and produce summary report. Deans has an access to his faculty under his college to view the student comments and result. Lastly the faculty who can only view his narrative evaluation result.

In the Student Evaluation Module, the students will rate the teacher based on the evaluation procedures and associated instruments provide the framework for assessing teacher performance as it relates to the adopted performance criteria as the quantitative data and also students will put written comments on the given space provided as the qualitative data.

The comments will be filtered to find the polarity in identifying comments, if it is positive or negative and it will generate visual representation of result through pie chart to show the polarity percentage. Once the polarity has been done it can view the entire positive or negative comments for each teacher. The system will only accept either English or Tagalog words. Report can easily generated and produce pdf file for filling purposes. It is also generic system where might be adopted by other Universities, header name can be change and modified.

In Teachers Evaluation Instrument Module, it will let the admin set the Scoring Mechanism. It will focus on the distribution of percentage for quantitative and qualitative evaluation and to modify the Teaching Evaluation Framework instrument.

V. CONCLUSION AND FUTURE WORKS

It is notices based on the given literature that there is a need to develop the proposed system because teacher's evaluation is tedious work for the administrator to identify and validate the concerns of the students to their teachers. One of the obstacles is that reading and making sense of all the textual responses can be a daunting task. Most of the current teacher evaluation research is considering how to construct an evaluation index system, evaluating teachers from the index system with different sub scores, achieving the general evaluation from the total scores. The shortcomings of those researches are that the evaluation is confined to some fixed evaluating indexes. Many algorithms have been proposed in order to understand and implement opinion mining and sentiment analysis. In which there are various tools available now for opinion extraction, sentiment analysis and opinion summarization in which integrate in the said system to be more efficient. This teacher evaluation instrument tool will enable the administrators to compile results, produce statistics, and generate reports on a course evaluation form and the comments written by students as freeform natural language, or unstructured data that help in studying the performance of individual teachers to identify their strength, potential and weaknesses. Additionally, it is important factor of assessing and evaluating faculty performance because it reflects valuable aspects of the student experience that can complement other forms of feedback from students to academics and institutions.

In the proposed system it still need to improve more to valuable resources to make very good system, so for future work some researcher can add a grammar and spelling checker to validate the right and valid words in giving feedback. It also

needed to have more data in the dataset dictionary to enhance the classification analysis. Universities are encourage facilitating this kind of system to validate the effectiveness and efficiency of the study and can provide feedback for more enhancement of the system. Moreover, additional algorithms such as Multinomial Naïve Bayes that can be integrate to system when multiple occurrences of word matter in text classification problems to increase the percentage of accuracy in evaluating the performance of the system.

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