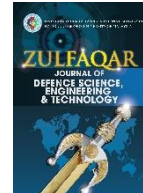




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### A REVIEW ON TECHNIQUES AND CHALLENGES IN SENTIMENT ANALYSIS OF STUDENT'S COMMENTS

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#### ABSTRACT

*Assessment of instructors by students is needed for assessing the teaching quality of a lecturer towards achieving the objectives of a course. This paper aims to examine the techniques used in sentiment analysis for assessing the effectiveness of a lecturer's or a teacher's teaching style in the learning process at a university or school. In addition, the effectiveness of sentiment analysis techniques in assisting the teaching evaluation process is also discussed. The challenges for assessing the quality of teaching of National Defence University of Malaysia (UPNM) lecturers are also discussed in this paper. The sentiment analysis technology is capable of analysing views or opinions on a matter, regardless of whether they are positive or negative. Data from the sentiment analysis can be used by specific parties or anyone else to rectify any weakness or to improve any aspect that the user commented on. The purpose of this study is not to find the weakness of the lecturer, but rather the results of this assessment process can be useful to the management for rectifying weaknesses and for improving the teaching process.*

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#### Introduction

Sentiment analysis is a technology that can be categorised opinions expressed by users on social media in the form of positive or negative texts. Sentiment analysis is mainly used in business areas, such as product reviews, hotel reviews, and movie reviews. Apart from businesses, sentiment analysis can also be used in various fields, such as politics, education, and tourism. Similarly, the process of teaching and learning at the University applies a variety of formal methods to gather feedbacks from students regarding the teaching and learning quality. The process of assessing teaching and learning at the UPNM is conducted online. Students are required to fill in the assessment information at the end of the semester. Students at the UPNM are required to fill in two sections of the assessment. The first is the qualitative section that contains questions related to teaching, content, and learning. Each question is rated on a scale of 1 to 5. The second

section is the comments section, where the students must fill in comments related to learning, teaching, and content of a course. This paper aims to determine whether the sentiment analysis approach can improve the quality of the various teaching and learning styles. This survey will also help the Centre for Academic Development to improve the overall teaching patterns, students' learning environment, course content, and assessment methods conducted. All feedbacks from students must be analysed and interpreted to allay all shortcomings wisely and prudently. Effective delivery while teaching a lesson will influence the learning process and subsequently produce outstanding and innovative students. This paper will discuss the challenges that need to be faced in conducting sentiment analysis on students' assessment of lecturers' teaching methods. The challenges discussed will only reflect on the situation at the National Defense University of Malaysia.

### **Techniques Used in Sentiment Analysis for Evaluation Students' Comment**

We have reviewed several studies to prove that the sentiment analysis approach can be used to analyse students' feedbacks or comments on the teaching and learning process at universities, schools, or even colleges.

A database was built to store a list of sentiment words (in English) that contains the polarity value of each word. This database is a lexicon approach [1] for measuring and assessing the levels of learning performance. Sentiment scores have values between -3 to +3. Score values between 1 and 3 are considered positive and score values between -1 and -3 are negative. However, a sentiment scores that equals to zero is considered as neutral. The heuristic method was used to automatically calculate the semantic orientation score for each word found in a student's comments. This system displays the outputs in the form of "moderately positive", "very positive", "moderately negative", "very negative", and neutral based on the average polarity score for all comments towards the lecturer. In a study by [2], a student feedback mining system (SFMS) was developed using text data and the sentiment analysis approach to analyse feedbacks in a detailed qualitative form. They collected comments from students and pre-processed the text data. During the processing phase, the features (topics) were identified and extracted from the documents and categorised into one topic group. Pattern matching was used to compare each topic group with the documents containing students' feedbacks. This phase was followed by the process of classifying comment groups into positive or negative groups. Finally, visualisation in chart form was used to compare topics based on the displayed numbers of positive and negative feedbacks.

In [3], a mining system for students' feedbacks was developed using text analytics and opinion mining approaches. This system prepares a quantitative analysis based on comments from the students, as well as determines the effectiveness of the implemented teaching practices. This system consists of four main phases, and the first phase is the data cleaning phase, whereby stop words are identified and removed from the comments and document matrix. The second phase involves topic extraction, which is to identify the topic that the student has commented on. For example, in a comment, 'The course database is very difficult', the topic of this comment is "database". Once the topic is identified, the next process is to break down the topic into specific subtopics, such as learning, and teaching content. The researchers implemented clustering algorithms and specific clustering functions for the process of topic clustering. The third phase is the extraction of sentiments from students' comments. For example, for the comment 'The course database is very difficult', the word 'difficult' is a sentiment word in the negative sentiment category. They used LingPipe Language Identification Classifier to classify comments into the negative sentiment or positive sentiment categories. The summarisation phase is the final phase of which the output is visualised. Examples of such outputs include column charts that illustrate the sentiment scores for each of the topics that are mentioned in comments, such as faculty interaction, faculty feedback, faculty preparation, project, assignment, teaching delivery, skills, learning experience, and understanding concepts.

The researchers in [4] developed a teacher's performance evaluation system using sentiment analysis technology. This system was developed to identify the strengths and advantages offered by teachers based on comments in English or in Filipino (the standardised national language of the Philippines) that have positive or negative elements. This system could also provide analysis results, such as sentiment score values obtained from qualitative data, as well as numerical response ratings from quantitative data related to assessments on teachers. The results were also graphically described, including percentages of the feedbacks from students. According to [4], this system requires several improvements to become more efficient and valuable. Among the proposed improvements were grammar and spell

checkers to check each comment. The other proposal was to increase the number of words in a dataset dictionary to aid in the process of classification analysis. Universities were also encouraged to support such a system to increase the effectiveness and efficiency of courses by providing feedbacks on the developed system.

Sentiment analysis was used to evaluate students' feedbacks [5] at the end of a course. This study used a sentiment dictionary that contained a list of positive and negative words that were used to check the polarity of the words found in students' comments. The KNIME flowchart was used to describe the five components involved in the sentiment analysis process, namely, reading sentiment dictionary read files of students' feedbacks, sentiment tagging, pre-processing, and sentiment analysis. The words collected from students' comments were depicted in the form of a word cloud. The word cloud was used to visualise the positive and negative words that the students used in their comments about their teachers. Word cloud visualisation could also help administrators better understand students' comments about their teachers. In addition, word cloud could help administrators to understand trends and patterns that would be difficult to identify from reading students' comments and help them monitor teachers' performances. The effectiveness of the sentiment analysis approach was validated based on precision value, recall, F-measure, and accuracy. The results showed that the sentiment analysis approach was great at assisting school administrators to analyse students' comments.

The study by [6] discussed the challenges that need to be addressed to evaluate learning performances. Among them are counterfeit comments from students, procedures for collecting data, the applied assessment technology, and statistics. This study had also conducted a comparison of previous studies in terms of techniques or methods used to assess the teaching and learning performances. The authors in [7] argued that the teacher assessment system is essential for improving the quality of learning in an institution. A sentiment analysis model was developed to identify a student's sentiments from a written text. They applied statistical analysis, the Long Short-Term Memory Model (LSTM), to analyse the sentiments found in a student's text feedback. Word cloud visualisation was used to depict students' positive and negative feedbacks. The proposed model was found to be effective in a sentiment analysis process to assess teachers. This study has helped improve the quality of teaching in the education system.

This literature review has proven that the sentiment analysis approach can be and has been used to analyse students' comments regarding the learning and teaching process at universities, schools, and other learning institutions. Sentiment analysis can help universities, schools, or colleges to analyse students' feedbacks more effectively and efficiently.

### **Challenges in Implementing the Teaching and Learning Assessment System using Sentiment Analysis in UPNM**

This study has reviewed the student's lecturer assessment form at UPNM and found several issues that can be considered as the main challenges for conducting sentiment analysis, as follows:

- a. Students wrote their comments in Malay.  
It is difficult to assess comments written in Malay due to technical or application constraints when applying sentiment analysis. Most of the existing applications in the market or in a research field are developed using the English language.
- b. Short-form words.  
Some comments were written using mostly short-form words, such as *sb* (*sebab*: translation - because) and *yg* (*yang*: translation - which or that). This usage made it difficult to interpret what the students were trying to convey regarding the lecturers teaching methods. This will consequently affect the assessment process. To overcome this problem, interview sessions can be held with the students to determine the short-form words that they often use when writing. In addition, language specialists can be invited to assist in addressing this problem.
- c. Fabricated comment or assessment  
There could be fabricated assessments or comments from students who are asked to assess a lecturer's teaching. Fabricated assessments could mislead readers into giving negative or positive opinions regarding something that is not related to teaching. This situation could

affect the assessment process and the reputation of the lecturer. According to [6], information in the form of spams would render comments that contain sentiments worthless and this is a social problem that needs to be addressed in this study.

d. Assessment Method

The application of sentiment analysis technology is useful for some parts of the lecturer assessment process. However, the management might also need to apply other assessment methods, such as communication skills, lecturer's experience, and etc. as part of the lecturer assessment process.

e. Data Collection Process

During the assessment process, the authorities/responsible party must be present with the students to offer them guidance and consultation while filling in the teaching assessment feedback form. This is an important aspect to consider that could help students write intentional comments and not to be influenced by environmental factors, such as their peers and others. Quantitative questions were presented to the students in UPNM, with a Likert scale that was aimed at determining the importance of each element of teaching and learning, as well as to understand students' perception.

f. Mixed Language

There is a mix of Malay and English languages used by students to write comments. This practice is known as 'Bahasa Rojak' [9], which makes it difficult to pre-process the data.

g. Standard POS Tagger in Malay

The study of sentiment analysis for the Malay language is still not as extensive as the study for the more mature English language of today. The advantage for English is that the Stanford Parser software [9] is available, which is a programme that works out the grammatical structure of sentences. There is still no standard software to use in a research for the Malay language. However, some research have been conducted on the process of tagging in Malay [10]–[15].

## Discussion and Conclusion

The assessment of the lecturers' teaching and learning methods is an important aspect in determining their effectiveness. The lecturer teaching and learning assessment system must be developed to analyse the effectiveness of lecturers teaching methods at UPNM. The use of sentiment analysis technology in analysing comments from students has been proven to help organisations or the top management to identify any insufficiencies in the teaching and learning environment. The aim is not to find the lecturer's weaknesses, but rather to help identify any shortcomings, which can be used to improve the quality of teaching and learning at UPNM. Sentiment analysis can help school administrators, universities, or colleges identify topics or features that are relevant to teaching and learning. This approach could also help them identify any weaknesses or advantages in teaching and learning that can be utilised to improve the level of education.

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