



## eSurMent: An Educational Institution Services Customer Satisfaction Measurement (CSM) Mobile Application Evaluation Tool using Opinion Mining with Sentiment Analysis

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### Abstract

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The sentiment is the action or point of view of a person based on experience. Evaluation for Offices is one way of getting emotions or feedbacks from clients. A person's response serves as an assessment of the quality of higher education standards. For the administrators to gather feedback from the clients/customers regarding their satisfaction or performance inside the offices or department premise, eSurMent was used as a gathering data tool. The study identifies the strengths and weaknesses of Educational Institution Services based on users' positive and negative responses. It provides a sentiment score from the qualitative data and a numerical response rating from the quantitative evaluation data, and a description of the evaluation results from users. Sentiment analysis is one way of surveys and polls to analyze the responses that researchers found to determine positive and negative reactions from students. Therefore, school administrators will be more aware of the shortcomings of users. Reports generated by the system can be used for self-improvement in the institution. In addition, the results of job evaluations can be used as the basis for opportunities, achievements, or marketing strategies.

**Keywords:** Customer satisfaction measurement, eSurMent, Feedbacks, Opinion mining, Sentiment analysis

### Abstrak

Sentimennya adalah tindakan atau sudut pandang seseorang berdasarkan pengalaman. Evaluasi dalam sebuah kantor adalah salah satu cara untuk mendapatkan emosi atau umpan balik dari klien. Respons seseorang berfungsi sebagai penilaian terhadap kualitas standar pendidikan tinggi. Bagi administrator untuk mengumpulkan umpan balik dari klien atau pelanggan mengenai kepuasan atau kinerja mereka di dalam kantor atau premis departemen, eSurMent digunakan sebagai alat data pengumpulan. Studi ini mengidentifikasi kekuatan dan kelemahan Layanan Institusi Pendidikan berdasarkan tanggapan positif dan negatif pengguna. Ini memberikan skor sentimen dari data kualitatif dan peringkat respons numerik dari data evaluasi kuantitatif, dan deskripsi hasil evaluasi dari pengguna. Analisis sentimen adalah salah satu cara survei dan jajak pendapat untuk menganalisis tanggapan yang ditemukan para peneliti untuk menentukan reaksi positif dan negatif dari siswa. Oleh karena itu, pengurus sekolah akan lebih menyadari kekurangan pengguna. Laporan yang dihasilkan oleh sistem dapat digunakan untuk perbaikan diri di institusi. Selain itu, hasil evaluasi pekerjaan dapat digunakan sebagai dasar peluang, prestasi, atau strategi pemasaran.

**Kata-kata kunci:** Pengukuran kepuasan pelanggan, eSurMent, Umpan balik, Opinion mining, Analisis sentimen



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## 1. Introduction

Universities are required to provide a self-assessment to the community [1]. One way is to apply the method of analysis and data collection related to education. Data mining has been used in various industries, but it is still rarely done [2]. Universities have big data, especially data related to education, so they need to research all information and solutions. Big data is a term that describes the rapid growth of data to discover new information while analyzing data. Data mining can help institutions find information to aid decision-making [3].

In this manner, the researcher looks for exciting data a College and University is currently dealing with and focuses on customer satisfaction related data, specifically on customers or clients giving comments or feedbacks to offices, department, or unit performance because feedbacks from students or customers have always played an essential role in the maintenance of quality and standards in higher education [4].

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Customer satisfaction is the suitability of consumers to the product and the performance of the current product. Consumers' expectations for the product are obtained from promotions, family, friends, community, and other product users.

Customer satisfaction is an institution's measure to meet user needs. It is beneficial for the institution to describe the effectiveness of its performance to the institution's management.

In MinSCAT, the only state college in the province of Oriental Mindoro located at Alcatel, Victoria, Oriental Mindoro has a manual process of having a customer satisfaction survey in their departments and programs. Customer response to institutional service is needed because it provides information to the institution and the broader community about the strengths and weaknesses of the institution. Customer testimonials for a product, especially school institutions, have begun to be easily accessible. The ease of access is due to various ages and groups starting to use social media. Thousands can see one negative comment posted on social media of potential customers. Customers who criticize harshly can damage the reputation of the institution.

Researcher plan to design and develop a project to look at a possible problem that may experience in the school. Developer search for a possible solution to help the people and the administration desire to have customer satisfaction surveys and program announcements. It can also help the potential end-user to leave comments and suggestions in every office. It will also help the students or employees because they will be informed of any programs.

End-user will use the mobile phone to answer customer satisfaction surveys and to view announcements. With mobile phones, end-users can control. They will have free will to give comments or suggestions in different offices that will directly go to the server located at the MinSCAT Administration Office. It will also benefit the campus administration because there is no need to count manually to get the survey results.

Generally, the study aimed to designed and develop eSurment: An Educational Institution Services Customer Satisfaction Measurement (CSM) Mobile Application Evaluation Tool using Opinion Mining with Sentiment Analysis to provide the customers, clients, students, and employee and the administrator with access to the announcement and help the front-line service provider, to quickly determine the customer satisfaction surveys and reports using a mobile application.

Specifically, the study aimed 1) to develop a mobile application that can allow the customers, clients, and students to rate and give feedback with the services of the departments, offices, and programs of a high education institution, 2) to view by the concerned personnel the customer feedback, complaints, and sentiments, 3) to develop metadata to identify the problem to provide a solution to improve customer satisfaction ratings as determined by customer satisfaction surveys, 4) to make the process of program announcement faster and easier and 5) to provide insights on the performance of every office.

### **Literature Review**

In the study conducted by Gunther Eysenbach, mobile applications for health and well-being promotion have proliferated. Between 2013 and 2014, global smartphone use increased by 406 million, bringing mobile phone users to 1.82 billion devices (up 5% on the year). It resulted in Internet users via mobile devices increasing by 81% in one year. At the beginning of 2013, tens of billions of applications were downloaded, so it is estimated that by the end of 2013, hundreds of billions of applications were downloaded. The portability of smartphones provides access to health information and interventions at any time in any context. The capabilities (e.g., sensors) of smartphones can also enhance the delivery of these health resources. Sifting all information

available in an organization is a challenge. Data mining plays a vital role in converting it into practical knowledge needed for decision-making, thus serving as a reference to improve a specific individual, a process, and the whole organization. Feedbacks from clients are critical, for these will serve as a basis for a particular organization to look into its strengths and weaknesses. With these, sentiment analysis of data mining is critical.

Sentiment Analysis is a growing area of Natural Language Processing, with research ranging from document-level classification [5] to learn the polarity of words and phrases [6]. The critical goal of sentiment analysis is to measure the sentiment polarity of text data [7].

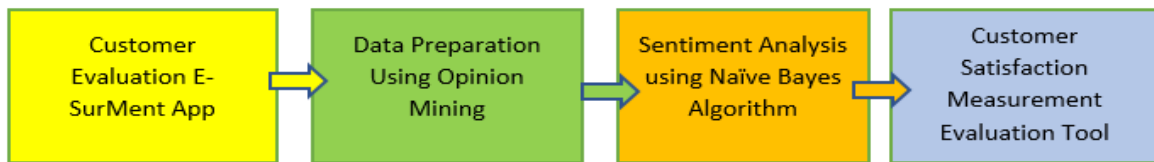
There are various methods used in previous research for data extraction where methods in sentiment analysis have transformed moderately from manual-paper-based surveys to an automatic computer-based system [8]. Computer-based systems such as social networking sites like Facebook, Twitter, blog [9], and online forums play essential roles in our daily lives to communicate and share information with others [10]. These are the platforms mainly used for data gathering. Research conducted related to these is Sentiment Analysis to Prediction in Jakarta Governor in 2017 by Ghulam Buntoro using tweeter to test opinion on the three candidates for governor. The tweet opinion is divided into three sentiments: positive, neutral, and hostile. Buntoro believed that the amount of emotion to the Jakarta governor could be one of the parameters of victory or defeat of a candidate. Another study by Pak and Paroubek in 2010 proved that their proposed technique, sentiment classifier is efficient and performs better than previously proposed methods.

Du et al. in 2015 suggested that customer satisfaction analysis is a promising alternative to surveys and polls, therefore, recommends this technique to be applied in other areas [11]. It is supported by the research of Zamani et al. that sentiment analysis is used to find out how much customer satisfaction with service and overcome various problems [6]. Sentiment analysis was applied to analyze product reviews from Steam, the digital distribution platform by Zou. Sentiment analysis is also carried out through social media.

These studies made the researchers\ decide to apply the concept of sentiment analysis to aid the gap of the present system on feedback gathering, processing, utilization, and analysis of students' comments or sentiments towards the University policies. Thus, the researcher found this method helpful in classifying student's and customers' positive, negative, and neutral feedback.

## 2. Method

This research method is depicted in **Figure 1**. Consumers will rate the institution's work on a numerical and qualitative scale using the E-SurMent Mobile Application. The procedure of this application is as follows. First, the consumer must have an account in this application. Consumers must choose the institution or work unit to be assessed. Consumers also send comments to the system server. The comments will be filtered using Opinion Mining which counts the evident influence extracted from the dataset. Second, it will undergo text classification using Naïve Bayes, compare individual words from the sentence with a database of words while comparing, the terms will find the probability label. Then the comments will be compared with the positive and negative ones label. In addition, the words will find the polarity and enter into the classification module to generate summary and visualization results, and lastly, it will create works for the user.

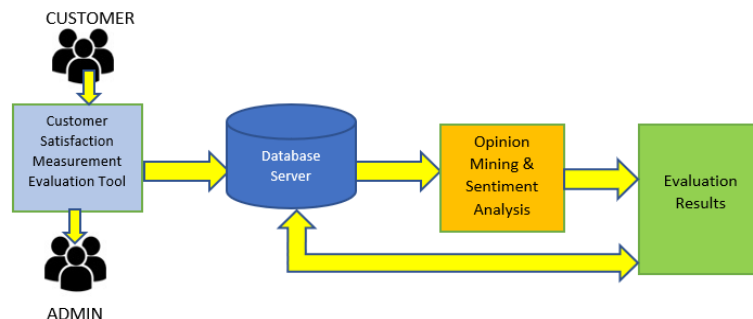


**Figure 1.** Research Procedure

## 3. Results and Discussion

### a. System Architecture

The proposed system allows the customer to provide quantitative ratings, emoticons, and feedback comments/suggestions. It will analyze using opinion mining with a sentiment analysis engine and ask the customer about their sentiments in the respective office or unit and generate the unit results. The system architecture is shown in **Figure 2**.



**Figure 2.** System Architecture

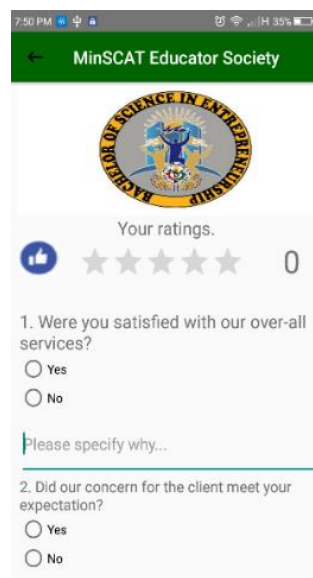
The system can filter the negative and positive comments of the customers either in Tagalog or English words.

The extracted comments were analyzed to determine their polarity using the Naïve Bayes Algorithm. Each response in the database has been assigned a value. When a negative word is detected in a sentence, the value stored in the database is used to evaluate the cumulative opinion value. When a sentence is analyzed, the opinion value is retrieved from the database for each negative word found in the sentence. Then the value of the opinion which is collaborated from the sentence is estimated. If there is negation in a sentence, the opinion score is reduced/added by a certain amount.

## b. Features

The proposed system has features that can be useful for identifying responses to the customer's feedback. The proposed system has two subsystems: 1) Customer's System and 2) Administrator System.

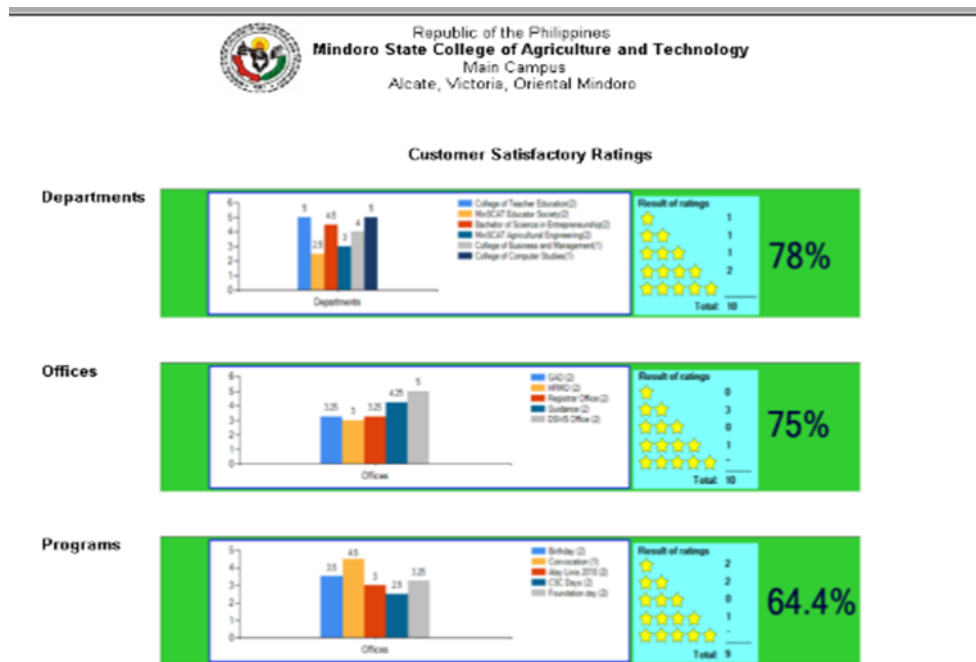
In the mobile application of the E-SurMent, the customer must be log in and connected to the internet to send the ratings to the E-SurMent Server. The customer must choose the unit or department and rate it by selecting the emoticon and numerical rating. After that, the customer must answer the questions, give comments, and be sent to the database server. Below is the interface for a customer to giving rates and feedbacks to particular offices, departments, or units.



**Figure 3.** eSurMent Interface for Customer

**Figure 3** eSurMent interface for the customer. In the Administrator System, it must be managed by the authorized user. The administrator will in charge of printing the results of the evaluation in the different offices and departments. The Admin can also monitor and view the real-time ratings of the customers. The administrator must be the school administrator includes the President, VP's, and HR personnel. This account can view all colleges, offices, and

departments and produce a summary report. Only the Admin can add departments, offices, and also announcements. **Figure 4** is the actual output of the offices.



**Figure 4.** Evaluation Report

#### 4. Conclusion

Sentiment Analysis plays a significant role in data mining aspects, specifically in analyzing feedback, opinions, or sentiments from people, and SurMent's Computer-Based and Mobile Based system is a powerful tool to generate evaluation results of each office. The results imply using sentiment analysis. The overall feedback from customers to the university's offices was easily analyzed in general as the frequency of positive and negative comments were classified and generate reports. The system conveniently gets the ratings of services in the departments, offices, and programs. The system receives customer satisfaction, feedback, and suggestion. The system has been found reliable for the monthly survey of the educational institution services. The future researcher must enhance the mobile application that can be used even there is no internet connection.

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