Text Mining for Customer Experience Mobile Banking Analysis

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Abstract: Improvements in information and communication technology have resulted in several innovative changes to reach consumers. The use of online financial transactions is increasing due to the convenience and security provided. The changed habit of customer transaction from traditional payment into digital or online payment creating a new need of customers and company new ways to fulfilled new mission of succession, to fulfill it company needs to providing good service that been customize to their customer's needs. In this study, we examined the mobile banking customer experience through customer perception on Google Play Store, and we used BCA Mobile, one of Indonesia's mobile banking services, as our case study. Sentiment analysis methods to assess customer satisfaction and topic modeling methods to extract key customer issues within each sentiment class. This research aims to provide an evaluation and valuable insight into customer experience in mobile banking. As a result of this research, BCA Mobile customers are dissatisfied with the app service. Consumers consider transactions with the most recent version of BCA mobile to be risky because it does not use pins or onetime passwords (OTP). This discovery may help BCA Mobile pay more attention to other app features to better understand the needs of their customers

1 INTRODUCTION

The proliferation of the internet and mobile phone users, as well as the advancement of information and communication technology, have modified service delivery methods. Therefore, companies have utilized a variety of innovative channels to reach consumers (Jebarajakirthy and Shankar, 2021). Likewise, banks offer banking services via technologically oriented platforms such as mobile banking (m-banking) (Mullan et al., 2017). M-banking is primarily utilized by bank customers to interact ubiquitously and instantaneously with the bank through mobile devices such as telephones, smartphones, and tablets (Kwateng et al., 2019)(Veríssimo, 2016). M-banking functionalities provide customers with access to a variety of information, such as bank statement requests, balance checks, and ATM locations. This cutting-edge technology also enables real-time and secure financial transactions such as bill payments and money transfers (Jadil et al., 2021). Global adoption of mobile banking has increased significantly in recent years (Arcand et al., 2017). Currently, 2.4 billion people use m-banking services worldwide in 2020, with the number expected to reach 3.6 billion by 2024 (Research, 2020). In Indonesia, the use of m-banking has also increased dramatically, as indicated by a Bank Indonesia report stating that the volume of m-banking transactions reached 3.2 billion from January to May 2022. This value increased by 67.87% from the same point last year, when it was 1.90 billion transactions. In addition, the research indicated that the value of m-banking transactions between January to May of 2022 reached IDR 3,888.09 trillion, a rise of 43.76% compared to the same period last year (Kontancoid, 2022). BCA Mobile is currently one of the most popular mobile banking services in Indonesia. According to the Populix survey titled "Consumer Preference Towards Banking and e-Wallet Apps," conducted online on 1,000 respondents aged 18-55 in several major cities in Indonesia, BCA Mobile will be the most popular m-banking service among Indonesians in 2022, with a market share of up to 60% (Angelia, 2022).

The implementation of m-banking has also shifted the fulfillment of customer needs, and the important factor to a company's success lies not just in the quality of its products/services, but also in efforts to meet the needs of its customers, followed by

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providing good and friendly service to convert them into loyal customers. To get it all, every company must understand the customer's needs. Customer information can assist a company in making major decisions regarding business reorganization, marketing, service offerings, and other strategies (Alamsyah et al., 2020). Customer information can provide a company with specific information about what a customer wants and needs, or it can provide something are of how customers feel about a particular aspect of the company's business (Anderson and Kerr, 2002). Technological advancements have made it possible for businesses to manage customer relationships and create enhanced customer experiences more effectively (Peppers and Rogers, 2017). In accordance with this, BCA Mobile can analyze by understanding customer perceptions of their service and identifying the issues that satisfy and disappoint their customers. In this study, we analyzed customer experience towards BCA Mobile using customer perception on Google Play Store. However, the large volume and unstructured data cause the process of processing data into more useful information to require special techniques and methods (Khan et al., 2019). To overcome this, we use sentiment analysis and topic modeling methods. The level of customer satisfaction was determined using sentiment analysis, while key customer issues were extracted using topic modeling within each sentiment class.

2 METHODS

The research is divided into five stages: data collection, pre-processing, sentiment analysis, topic modeling, and results and analysis. The steps process of this research is shown in the following figure:

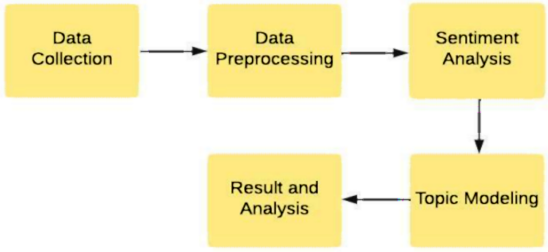

Figure 1: Research Workflow.

a Data Collection
This study scrapped customer perception of BCA mobile on the Google Play Store. The data collection period runs from June 1, 2022, to November 5, 2022, with a total of 2.000 data points collected.

b Data Preprocessing
Data preprocessing is a critical step before data analysis, as it transforms data samples into more meaningful information (Angiani et al., 2016)(Haddi et al., 2013). Data preprocessing starts in several steps. Converting uppercase to lowercase letters (transform case). Cleaning and removing non-alphabetic characters from the dataset, such as numbers, and symbols. Divide the input data format, which exists a long text, into small units known as tokens. In the context of a document, a token could be a word, a number, or punctuation (Tokenize). Eliminate unnecessary words (Stop word removal), convert words in sentences to their root words, and eliminate word additions (Stemming). Table 1 shows examples of each process in the data preprocessing procedure.

Table 1: Preprocessing Procedure.

Procedure	Data Text
Raw data	Pelayanan super bak dan sempurna. Sukses terus buat BCA mobile dan semua jajaran nya.
Transform Case	pelayanan super baik dan sempurna. sukses terus buat bca mobile dan semua jajarannya
Cleaning	pelayanan super baik dan sempurna sukses terus buat bca mobile dan semua jajarannya
Tokenize	‖*pelayanan*‖‖*super*‖‖*baik*‖‖*dan*‖‖*sempurna*‖‖*sukses*‖‖*terus*‖‖*buat*‖‖*bca*‖‖*mobile*‖‖*dan*‖‖*semua*‖‖*jajarannya*‖
Stopword Removal	Pelayanan super baik sempurna sukses bca mobile semua jajarannya
Stemming	Pelayanan super baik sempurna sukses bca mobile semua jajaran

c Sentiment Analysis
To classify text in the sentiment dimension, we implement the machine learning principle and the Naive Bayes algorithm. We classify the data as 70 percent training data and 30 percent testing data. For the training data, the text should be labeled with a sentiment class.

d Topic Modeling
To model the topic, we split the results of sentiment analysis into two files (positive and negative) to represent the entire topic in the dataset.

3 RESULTS AND DISCUSSION

Figure 2 illustrates the results of the sentiment analysis on BCA mobile, with 65.75 percent of customers expressing a negative sentiment or equal to 1315 data, and the remaining 34.25 percent expressing a positive sentiment or as many as 685 data

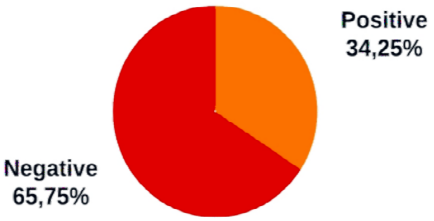

Figure 2: Sentiment Analysis Result.

The sentiment analysis result is divided into two files for modeling the topic in the dataset (positive and negative). Figure 3 illustrates two distinct colors, the red color represents the estimated term frequency within the document's selected topic, while the light blue color indicates the overall term frequency. As shown in Figures 3 and 4, each word has a red and light blue color, indicating that each word appears in more than one topic.

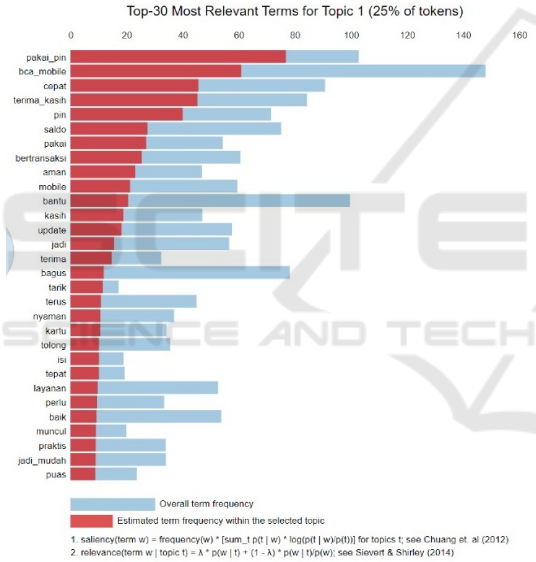

Figure 3: The positive Topic of BCA Mobile.

As shown in Figure 3, the highest frequency topic in the positive sentiment document is the customer talking regarding BCA Mobile app features such as the fast and comfortable service they felt when making transactions at BCA Mobile.

For the negative sentiment as shown in Figure 4, the highest frequency topic is the customer complaint that the latest version of BCA Mobile is less secure because it no longer uses pins to access applications or OTP codes for transactions. They prefer the previous version because pins and OTP codes make transactions safer

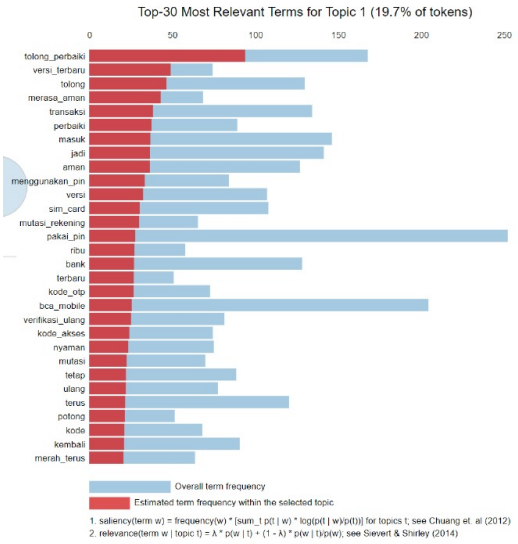

Figure 4: The Negative Topic of BCA Mobile.

4 CONCLUSION

The text mining method was successfully used in this study to classify and conclude two thousand customer reviews about BCA Mobile in the Google Play Store platform to analyze the customer experience in the BCA Mobile Apps. The Naïve Bayes algorithm utilized in this study classifies the sentiment dimension excellently. According to the results, most BCA Mobile customers are dissatisfied with BCA Mobile's service because most customer complaint that the latest version of BCA Mobile is less secure because it no longer uses pins to access applications or OTP codes for transactions. They prefer the previous version because pins and OTP codes make transactions safer. Therefore, BCA Mobile must be more attentive to consumer perception to provide a satisfying customer experience. So that it can generate future consumer loyalty

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