

# Mapping Technologies in Top Banks in India and Using Machine Learning Techniques to Assess Mobile Banking Services from App Reviews

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**Abstract:** The banking sector in India is creating crucial changes in banking mechanisms by introducing digital means of accessing monetary and non-financial services. Mobile and internet banking have experienced prolific development with instant payment systems. Top banks in India have established not just instinctive but also very interactive and ingenious applications for mobile banking with features pivoting around customer satisfaction. Using these mobile banking applications, consumers can instantaneously perform monetary transactions, check account balances, and start investments and deposits. Our everyday life has always been impacted by what people think. Views and opinions of others have always affected our thoughts. While the Internet is influential in people's social lives, it contains more and more information concerning their views and sentiments. The distillation of knowledge from this massive amount of unstructured data is known as opinion mining and sentiment analysis. With smartphones' rapid evolution, mobile applications (Mobile Apps) have become essential parts of our lives. However, it is difficult for consumers to understand and keep track of the sphere of banking apps because new apps are entering the market every day. So, sentiment analysis [1] of application reviews on google play store will help the developers keep their particular applications up to date to keep their specific applications in the top lists and help the customers select the most popular application.

**Keywords:** Text Mining, Semantic Analysis, Machine Learning, Banking Technologies, Google Play Store, Natural Language Processing.

## 1. Introduction

Modern financial institutes operate under growing competition and limited resources, requiring a decrease in decision-making time. The knowledge of bank officers is becoming a vital resource that needs to be considered, on a par with other material resources viewing some results of knowledge customization like concept mapping, ontological models, communities of practice, and corporate blogs.

The critical function of any bank is to receive deposits and lend money to indispensable businesses and individuals. Banks are a synonym for trust across the world. In India, when any individual deposits cash in the nationalized banks, it does not matter what the amount is; the individual recognizes that the money will be safe in the bank compared to anywhere else.

Top Banks help put your hard-earned money in a place that will also give you interest on that amount. The bank should also provide various banking services such as loan facilities, fixed deposit schemes, debit & credit card facilities, etc.

One of the key advantages of digital banking solutions is the opportunity to bank whenever and wherever you want.

Top Tier Technologies used in Banking

- To a large extent, machine learning/artificial intelligence is used to detect fraudulent activities and process transactions in ATMs or banks.
- Robotic Processing/Automation is used to automatically process excel/word documents sent by partners, customers, or brokers.
- Blockchain: The latest trustworthy initiative to look into instant payments or real-time settlements on an online ledger. [2]
- *Chatbots/Voice Assistant:* for first customer interaction on websites and social networks to provide services such as ask account balance or simulating loan and customer support. Chatbots are also a special kind dedicated to investment service for customer help.
- Real-time analytics: this is to have to report on banking apps and website activities.
- API: provide a programmatic interface to access Account Information and payment initiation and open banking
- Algorithmic trading: this uses some advanced self-corrective algorithm for trading assets automatically.
- Container: more and more banks use immutable builds to guarantee integrity in delivery. For example, Docker or Open-shift.
- Cloud Infrastructure: to gain speed in releasing new features, Banks use the Cloud more and more with specific requirements to meet the regulatory framework.
- NLP & OCR: to recognize the content of scanned documents and automate data acquisition as quickly as possible.

Understanding the possibility of bringing new technology, how can banking be improved?

Organizing and structuring the data with intelligent algorithms could help customers prepare their financial portfolios or get a more reasonable picture of their spending.

## 2. Dependency on Mobile Banking Technologies

Mobile banking in India is primarily smartphone-based, which requires the bank's application on their device/mobile phones. People from all social classes, from low-income individuals to the better-off, can enjoy increments in financial inclusion through mobile banking.

In India, customers increasingly access banking services by downloading mobile-banking apps on their smartphones [3]. These include bills, fund transfers, credit card payments, account and loan statements, requests for checkbooks, complaint filing, and management of insurance policies or portfolios, among others.

Since Smartphone-based mobile-banking transactions are on the elevation in India, this shift can be upheld by recognizing the strengths that either drove it or may have vandalized it. Earnings and education, which can facilitate both digital and financial literacy, determine not only the extent of smartphone-based mobile banking adoption but also impact the affordability of smartphones, the monetary viability of and financial inducements associated with dynamic bank-account usage, and the capability to learn the technology and operate convoluted financial products.

### Improvements in Mobile Banking:

1. Scrape reviews on the play store for all banking apps.
2. Performing Sentiment Analysis and in a comparative manner, adding it to the system.

To retain the competitive advantage and evaluate the needs of the quality app in the mobile application market. The user's feedback on these applications is essential in the mobile application development industry. The rapid growth of mobile banking technology lets people interact and voice their reviews, rate, and convey their feedback about applications. Several user reviews and application rates from the Google Play Store from different categories of banks and built with data were scrapped in this document. The outputs calculated the information using different definitive machine learning algorithms such as the Logistic Regression, Multinomial Naïve Bayes, and Random Forest Classifiers. Various parameters, including accuracy, precision, and recall, were employed to evaluate the statistical outcome of these algorithms for comparison. Each algorithm's one-on-one analysis is performed, and the result is assessed. The logistic regression algorithm's accuracy for analyzing other studies is based on the three classes, in essence, positive, negative, and neutral reviews, and is known to be the better among other algorithms.

### Method:

Classifying documents and strings into different classifications is considered a vital task in Natural Language Processing. For organizing, online information text classification has attained a crucial role nowadays. Initially, text classification of an email as spam was in use for detecting users'

sentiments of comments or tweets. Nevertheless, text classification makes it challenging to automatically label customer queries, sort blogs into different categories, and deal with a small training dataset. Hence, more specifically, the text classification is highly challenging to generalize in NLP.

For mobile devices, within a few clicks, the Google Play Store or application distribution platform allows users to buy, search and deploy their software applications. These platforms enable users to share their ratings and reviews about the application. For instance, they can describe their satisfaction or request for a specific new feature for the application in which they might be facing difficulty. These reviews on the application can be presented as the Voice of the Users that can be more beneficial for the development effort and improve future release applications. Also, this information about the application in reviews, such as feature reports, or bug reports of user experiences about a particular application of features, is more beneficial for the better analysis and application developer.

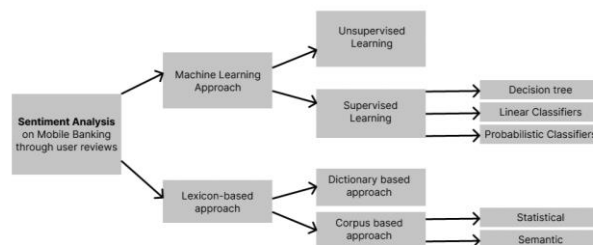


Fig. 1. Application of text classification and clustering of user review data on mobile banking

To inspect, analyze and study a significant number of consumer reviews, the application of sentiment analysis seems even more crucial. This analysis is often used to evaluate a product's rating and the public's preference. Consequently, research and techniques accompanying such study became more prevalent and mature.

In recent years, sentiment analysis for gathering opinions has been abundantly used in documents to find out the subjective views of the public and understand how they feel and think. For the subjectivity and sentiment analysis, we have to categorize if the reviews' orientation is positive or negative but not neutral because the neutral category represents only the neutrality of opinions and statements of fact.

Recently, as the usage rate of social media has increased, the consumer can easily and quickly acquire product reviews. However, there is no uncertainty that the consumer will take much time to obtain helpful information from such abundant data.

Additional constraints deter the development group and analysts from using the information in the reviews:

1. The measure of the reviews differs considerably from practical ideas and advanced introspections to denigrating reviews.
2. Considerable effort is required to analyze many reviews. A review generally includes a diverse sentiment concerning different app components,

making it formidable, e.g., to screen positive and negative reviews or retrieve detailed reviews for distinct features.

Here, different machine learning algorithms were used for banking applications that have their apps on Google Play, and classifications of text mining were used for android application reviews. The usefulness of these ratings from the reviews is most likely to integrate both positive and negative evaluations of the unique features of the banking system.

The process through which high-quality information from text is derived is also known as text data mining [4]. High-quality information is statistical pattern learning derived from the patterns and trends through different means. In text-mining, the input text structuring method commonly uses sequential parsing, counting definite linguistic elements already derived and inserted into a database before the output is evaluated and interpreted. Therefore, high-quality text mining usually represents the interest, relevance, and novelty combination. Typically, studies in text mining enclose entity relation modeling, which means comprehending the relationship with sentiment analysis, document summarization, named entities, or text clustering.

### 3. Literature Review

Operating mobile applications by millions of individuals around the globe has grown these days rapidly because of the widespread contemporary use of stores like Apple and Google Play which allows users to access applications in one place easily. Segmentation pertinent to mobile application platforms exemplifies a captivating peril in advancing mobile applications. Newly in recent times, businesses and a growing network of programmers advocated the development of hybrid apps as a potent solution to address this problem in the industry. Assessment of user review is an essential aspect of open mobile applications such as the Google Play Store. How can it automatically combine countless user reviews and produce a definite sense from them? Nevertheless, unfortunately, few analytical means can furnish user reviews above uncomplicated synopses like histograms of user ratings. The system can:

1. Find inconsistencies in reviews.
2. Proposing critical understandings of the entire banking application market.
3. Discerning why users dislike or like specific features in the banking app and providing a more correlative and dependent perspective of users' reviews.

This proposition involves other banking apps identifying users' meaningful choices, concerns, and crises.

Mobile banking applications are constantly growing, with the latest renditions speedily altering the previous versions. Multiple app stores now employ an Amazon-style review/user rating strategy, aggregating every rating administered within that banking app. Many application rating methods are challenging to vary when these applications have amassed a substantial number of users. This study extrapolates that the existing approaches running in the market cannot examine the user satisfaction levels that can prevent mobile banking from enhancing the application's quality. It also includes methods for

optimizing the description of reading user reviews to distinct types of educational user prerequisites along with uninformative suggestions. Resolved by the rudimentary characteristics of studies regularly producing high-dimensional variations, it raises the classifier's intricacy and might cause overfitting issues.

### 4. Conclusion

Banking apps are in widespread use to ease the banking process and are downloaded by users on a platform like Google Play Store. Users utilize these applications for their specific pursuits, and they have their personal experiences. Users can download and use these applications and express the application's experience in the form of statements, remarks, comments or reviews and give the applications a rating from 0-5 depending upon the user's experience with the app. User Reviews from different banking categories of Google Play Store applications were prospected in this research work to analyze the class of the reviews that may be positive, negative, or neutral. Upon reviewing the application semantics with different algorithms of machine learning, three machine learning algorithms were used: Logistic Regression Algorithm, Random Forest, and Multinomial Naive Bayes with various parameters such as precision, accuracy, and analogizing the statistical results of these algorithms. In contrast, the Logistic regression algorithm has been evaluated, which came out to be the most active algorithm with a high precision score that can be used to assess the user reviews for easing the process of banking on mobile.

The number of categories of applications and the number of reviews can be increased hereafter so that we can also compare the accuracy of the logistic regression algorithm with additional algorithms to render the clusters and inspect the relationship between the application reviews and ratings to help scrutinize each banking application more accurately.

#### *Practical implications:*

From a practical standpoint, Banks' Technology managers should bear more attention to the service quality dimensions of practicality. In addition, the results mean that the app design and aesthetics with the most negative reviews should be reviewed from the user's perspective rather than from the company's point of view. Second, they can establish a systematic complaint management system that can prevent service failure in advance by detecting customer complaints early. Lastly, a quick decision regarding service quality with the help of real-time customer response through dashboard construction to provide at-a-glance views of KPIs and give operational management much more time to analyze numbers and perform profitability and technology analysis.

This study is confined to the geographical representation, i.e., Indian customers of its subjects'. Ethnic inclusiveness, multi-cultured background, and demographic diversity will help analyze banking customers from different countries and may help better establish the results.

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