



## Consumer behaviour Using Big Data Analytics

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### ABSTRACT—

In order to gain a larger market share, telecom operators now pay attention to both extremely loyal and churning customers in addition to customer profitability. This is because customer behaviour is becoming increasingly important in the business market. An entirely new generation of customer relationship management (CRM) tactics was brought about by the concepts of big data. Big data analysis assists businesses in identifying sales transactions and creating enduring loyalty relationships by describing customer behaviour, comprehending their habits, and creating relevant marketing strategies. This paper offers telecom companies a methodology to target customers with varying levels of value with relevant offers and services. Syriatel Corporation provided a dataset of roughly 127 million records for training and testing purposes, which was used in the implementation and testing of this methodology.

First, a time-frequency-monetary customer segmentation strategy was implemented. TF (TFM where: Time (T): the total amount of time spent on calls and online during a specific time frame. Frequency (F): make frequent use of services over a predetermined time frame. Monetary (M): The amount of money spent over a specific time frame.) and the degree of allegiance specified for every category or group. Second, the best behavioural traits for consumers and their demographic data, including age, gender, and shared services, were selected using the loyalty level descriptors as categories. Thirdly, in order to create various predictive models that were used to categorise new users according to loyalty, a number of classification algorithms were applied based on the descriptors and selected features. Ultimately, those models were assessed according to a number of parameters, from which the loyalty prediction rules were derived. Subsequently, by scrutinising these regulations, the motivations behind each level of loyalty were identified, enabling us to tailor offers and services to them.

Keywords— Customer behavior, services, analysis.

### I. INTRODUCTION

The dynamic landscape of business operations has witnessed a profound transformation with the advent of big data, marked by substantial investments in infrastructure to harness extensive and varied datasets. This evolution, driven by advancements in communication technology and the ubiquity of social media, has reshaped the terrain of customer behavior analysis and feedback mining. Traditional methodologies, such as speech interviews, have given way to modern platforms like Skype, WhatsApp, and social media discussions, necessitating a deeper understanding and optimization of user engagement and attitudes towards products and services.

As the availability of customer activity and feedback data burgeons, the imperative for intelligent big data analytics becomes evident. However, amid this data abundance, ethical considerations loom large across the entire process—from collection and fusion to analytics and application of findings. This intersection of big data technology and ethics is exemplified through the introduction of the Vibe framework. Unlike conventional sentiment analysis, Vibe tracks correlated emotional trajectories in Skype customer feedback, incorporating both unstructured customer feedback and structured user activity telemetry data. The overarching goal is to augment customer satisfaction and showcase a steadfast commitment to comprehending and addressing customer needs.

Simultaneously, a qualitative study delves into the retail industry in Bangladesh, shedding light on the pivotal role of data analytics in deciphering and responding to customer behavior. This exploration encompasses current practices, challenges, opportunities, and effective strategies employed by retailers. The retail sector in Bangladesh, buoyed by economic development, urbanization, and evolving consumer preferences, has witnessed substantial growth. Integrating data analytics into customer behavior analysis emerges as indispensable for tailoring strategies that align with the dynamic needs and preferences of Bangladeshi consumers. Challenges such as data security concerns and the demand for skilled data analysts are juxtaposed against opportunities, including enhanced customer retention, personalized experiences, and more effective marketing campaigns.

Furthermore, the study underscores the significance of data mining techniques for extracting hidden knowledge from vast datasets, particularly in elevating predictive accuracy and efficiency. The critical role of decision analysis and predictions, pivotal for business success, hinges on robust knowledge bases and forecasting models. The research advocates for a comprehensive investigation and evaluation of forecasting models, employing various data mining techniques to enhance future sales projections.

In essence, the convergence of big data technology, ethics, and customer behavior analysis delineates a dynamic field with tangible applications in augmenting user engagement, satisfaction, and business strategies. Illustrated through examples such as the Vibe framework and a focused study on the retail industry in Bangladesh, this narrative underscores the multifaceted nature of data analytics and its transformative potential across diverse business contexts.

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## II. METHODOLOGY

In a comprehensive approach to customer feedback and sentiment analysis, the methodology employs SysSieve, a lexicon-based tool, for topic detection, with the Vibe metric tracking emotion trends over time based on user activity and feedback. Key factors considered include sentiment score, adjusted sentiment factor, and user influence. Data analysis for understanding customer behavior utilizes tools like Weka, Rapid Miner, and Python, adopting a phenomenological approach in the Bangladeshi retail industry. The study involves interviews and multi-source data collection, with a subsequent application of a combination of linear regression and random forest techniques for behavior analysis. A transition to online surveys enhances customer feedback collection, enabling real-time insights and contributing to the proposed STDC marketing model, which adopts a customer-centric See–Think–Do–Care approach for targeted marketing and improved overall customer experience. The system incorporates decision tree mining using the C4.5 algorithm in Hadoop MapReduce, data visualization through D3.js, and integration of big data analytics for online behavior analysis, survey data, and customer segmentation. Further research extends to Phuket and Ratchaburi provinces, employing a mixed-methods approach to study local modern trade stores with a focus on factors influencing both male and female customers. Additionally, a framework for human behavior analysis using AI leverages Dailymotion data, utilizing Apache Spark and HDFS for data processing and storage in a three-layer architecture encompassing data pre-processing, data processing, and decision management.

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## III. ETHICS CONSIDERATIONS IN CUSTOMER FEEDBACK AND BEHAVIOR MINING

Consumer behavior, encompassing the actions individuals take to purchase a product, holds valuable insights for marketing analysts. In the digital age, trillions of data pieces related to consumer buying behavior are generated every second, reflecting the diverse nature of consumers. The complexity of this data makes conventional analysis methods challenging, leading to the adoption of Big Data technology.

Big Data technology proves capable of extracting, processing, and analyzing large and complex datasets. The data sources include social media, surveys, and customer activity telemetry data, which may contain sensitive personally identifiable information (PII). Ethics considerations focus on data privacy and anonymity, especially when dealing with sensitive subjects. Protecting user identity becomes crucial, considering potential risks when exposing such data to new contexts or audiences.

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## III. RESULTS AND FINDINGS

The evaluation of consumer behavior in the Bangladeshi retail industry, with a focus on data analytics, encompasses several key facets. Firstly, an in-depth analysis of clothing items involves mean and standard deviation values for trust, security, and privacy attributes, visually represented through a bar graph. The discussion extends to the identification of trends such as super convenience stores, smart mirrors, and mobile store cars, emphasizing the role of big data, machine learning, and AI in predicting customer preferences.

The integration of data analytics in Bangladeshi retail is explored, highlighting its growth alongside advanced analytics, diverse data sources, and technologies like facial recognition. A comprehensive overview of challenges and opportunities in this landscape covers aspects such as data security, skilled analysts, integration issues, privacy regulations, data quality, scalability, ROI measurement, real-time insights, personalized marketing, competitive analysis, and enhanced customer experiences.

Best practices and strategies are outlined, encompassing staff training, fostering a data-driven culture, collaboration, data quality assessments, and agile projects. Recommendations stress the importance of clear objectives aligned with strategic vision, robust data security, and external expertise.

Consumer behavior analysis is undertaken based on various parameters including location, purchase reasons, product types, prime time/location, transaction amounts, and visit frequency. The design of predictive models is discussed, with recommendations for testing and affirmation to enhance their effectiveness. Project implementation involving data from Dailymotion and YouTube encompasses data extraction, storage in Hadoop HDFS, and analysis using Apache Spark 3.0 with MLlib and graphX libraries.

In a telecom context, loyalty prediction using machine learning employs Multilayer Perceptron, Decision Tree, Random Forest, and Gradient-Boosted Tree models, with Random Forest identified as the best-performing. The conclusion emphasizes the classification of users by loyalty for targeted marketing and the derivation of insights into behavioral features influencing loyalty, highlighting the benefits of classification algorithms in accurate predictive models for new user classification. This comprehensive analysis underscores the multifaceted nature of consumer behavior evaluation in the evolving landscape of the Bangladeshi retail industry.

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#### IV. CONCLUSION

Setting loyalty levels and TFM segmentation were used. After applying the classification algorithms based on the chosen attributes and loyalty levels as classification categories, comparing the outcomes, the optimal classification model in terms of accuracy was chosen. This model, which expressed the correlation between behavioural features and classification categories and thus known the causes of loyalty in each segment, was the basis for ten loyalty prediction rules. The right offers and services were optimised for the target audience. Using the classification algorithms also allowed for the development of a precise predictive model that categorised new users according to their level of loyalty.

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