



Conference Article

# B2B Customer Engagement: Customer Behaviour Forecast Application

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## Abstract

*The paper presents the "Casper Customer Behavior Forecast Application" a creative project focused on the creation of an advanced decision support software system. The purpose of this system is to closely observe, fully analyze, and precisely predict the behaviors of Casper Business-to-Business (B2B) clients. Our research study implements an innovative methodology by focusing on the enhancement of client interactions through the utilization of RESTful services. Our objective is to reimagine the future of customer relationship management by analyzing and forecasting client behavior in the business-to-business (B2B) setting. The project involves a comprehensive methodology that incorporates extensive study, complex software design, and careful data analysis. In more detail, it involves extensive monitoring of consecutive RESTful interactions carried out by business-to-business consumers across a period of time. By leveraging the capabilities of modern machine learning and deep learning algorithms, our objective is to develop prediction models that establish novel benchmarks within the industry. The methodology employed in this study includes the development of labeled behavioral datasets and the utilization of a supervised machine learning framework. The evaluation of model performance will be performed systematically using a range of metrics, such as F-Score and Accuracy, in order to establish the model's robustness and reliability in making accurate predictions. The expected*



*outcomes of this project have the potential to bring about significant changes. Primarily, the integration of machine learning and deep learning algorithms will provide our company with an important amount of knowledge. Our organization will obtain an innovative software solution that possesses the capability to precisely forecast the future actions of B2B customers. This results in enhanced inventory management and a significant reduction in client waiting periods, resulting in increased levels of customer satisfaction. Additionally, this study has the potential to make significant additions to the global academic body of knowledge in the domains of machine learning and deep learning. In simple terms, the project titled "Casper Customer Behavior Forecast Application" embodies an innovative and academic effort aimed at enhancing customer engagement and predicting customer behavior within the context of business-to-business (B2B) interactions. This research project carries considerable importance, both in its potential to reinvent the field of customer relationship management and its ability to contribute to the global academic conversation on machine learning and deep learning.*

**Keywords:** Customer Behavior Forecast, Decision Support Software, B2B Customer Behavior, RESTful Services, Machine Learning, Deep Learning

## 1. Introduction

The modern business atmosphere is characterized by the persistent attempt to understand and fulfill customer needs and preferences. In the domain of Business-to-Business (B2B) commerce, characterized by complex and diverse transactions, having a deep understanding of consumer behavior is of greatest significance. This paper introduces the "Casper Customer Behavior Forecast Application," a creative project with the potential to revolutionize B2B customer engagement and predictive analytics. The aim of this project is to develop a decision support software system that enables enterprises to effectively monitor, model, and anticipate the behavior of business-to-business (B2B) consumers using RESTful services.

In the context of the B2B sector, which is characterized by complex and data-driven interactions, it becomes clear that the capacity to adjust to consumer behavior is an important component of achieving favorable outcomes. Casper, a notable participant in the business-to-business (B2B) sector, acknowledges the significance of this effort and has undertaken this pioneering initiative to explore novel opportunities for achieving outstanding results.



The objective of the Casper Customer Behavior Forecast Application project is to reinvent the basic structure of business-to-business (B2B) customer relationships. The goal is to provide B2B clients with the necessary tools to monitor their interactions with Casper in real-time. In a more profound way, the goal is to provide individuals with the ability to understand, simulate, and predict these interactions. This article offers an analysis of the unique elements, research and development standards, expected results, and potential advantages of the project under consideration.

In addition to its organizational effects, this project has the capacity to significantly contribute to the wider academic and corporate community. The project aims to leverage the capabilities of modern machine learning and deep learning algorithms in order to develop predictive models that establish novel benchmarks within the industry. The research undertaken under the umbrella of this project surpasses simple practical applications, providing valuable insights and solutions that have the potential to advance the area of machine learning.

In the sections that follow, an in-depth analysis is carried out on this ambitious initiative, explaining its approach, expected consequences, and the evaluation criteria applied for assessing its effectiveness. The project known as the Casper Customer Behavior Forecast Application has the potential to reshape customer engagement within the business-to-business (B2B) sector. It provides an insight into the future of predictive modeling and decision-making based on data analysis.

## 2. Literature Survey

The domain covering the research of customer behavior, predictive modeling, and the creation of sophisticated decision support software is a dynamic fusion of academic study and real-world application. In today's business climate, organizations are passionately trying to understand and predict customer behaviors, emphasizing the pivotal significance of state-of-the-art technology. This literature review provides a complete analysis of the fundamental principles that serve as the basis for the "Casper Customer Behavior Forecast Application" project. We explore various significant areas, such as machine learning, deep learning, RESTful services, predictive modeling within the B2B environment, and the emerging patterns in behavioral data analysis. Furthermore, this study looks into the core principles of supervised learning, the progress made in the design of decision support software, and the potential influence of research and development efforts on academic debates. To delve into the specifics of our literature survey, let's explore each key area in detail.



In the context of Machine Learning in Customer Behavior Analysis The analysis of customer behavior holds significant importance in modern corporate operations. Previous studies have shown the possibility of employing machine learning methods to understand and predict client behavior. Numerous academic investigations have examined a range of machine learning algorithms and approaches, explaining their practical implementations in a wide array of commercial contexts [1][2].

Deep learning, which comes under the broad category of machine learning, has attracted significant attention due to its capacity to show complex patterns within extensive datasets. Previous studies have extensively explored the utilization of deep learning in the field of predictive modeling, showcasing its effectiveness in producing precise predictions [3][4].

In addition The implementation and effectiveness of predictive modeling in business-to-business (B2B) contexts have received comparatively little attention, in contrast to its well-documented application in business-to-consumer (B2C) situations. The current body of research offers valuable insights into the many problems and opportunities associated with predictive modeling in the investigation of B2B consumer behavior [5][6].

In the literature, there exists a number web service-oriented architecture-based systems dedicated to solve problems in differing domains [7, 8, 9, 15]. There exists a study focusing on classification task on web usage mining data [10]. This project differs from such previous work as it is focusing on developing a system which would be analyzing and predicting the user behavior by utilizing the machine learning algorithms and RESTful micro services. There are studies focusing on data representation and embedding strategies to model the datasets [16, 18, 19]. This project is focusing on understanding the user behavior based on the data features calculated from the user navigational behavior. There are studies that focus on analyzing the quality of the software produced during the implementation of the projects [12, 17]. This project leaves out the software quality for future work. There are studies for keeping track of the user's actions [11, 13, 14], however, this study leaves out the analysis of history of events for future work.

This literature survey provides a structured overview of the relevant themes and areas of research that set the stage for the Casper Customer Behavior Forecast Application project. It helps contextualize the project within the broader academic and business landscape.



### 3. Methodology

The project titled "Casper Customer Behavior Forecast Application" employs a carefully developed process that integrates extensive research and technical proficiency. The methodology employed in this approach progresses through various distinct phases, each characterized by a series of precise actions and procedures, with a particular focus on the technical components.

The data collection and preprocessing phase involves the collection of behavioral data from Casper Business-to-Business (B2B) customers. This involves collecting the sequence of RESTful interactions that occur during specified time intervals. These consecutive contacts form the foundation for modeling client behaviors over a period of time. The process of technical data preparation plays a crucial role in this context, as it involves carefully removing outliers and irrelevant data points. This optimization of the dataset is essential for enhancing the effectiveness of subsequent modeling techniques.

The core component of our methodology involves the development of tagged behavioral datasets. During this stage, we allocate labels to the behavior exhibited by each consumer, based on their eventual activity inside a predetermined timeframe. To provide an example, when a customer's series of RESTful requests includes A, B, and C, the final action (C) is assigned the label for that specific sequence. The utilization of labeled datasets is crucial within the framework of supervised learning, as it acts as a fundamental component of our predictive modeling methodology.

The methodology employed in this study incorporates the utilization of the GO programming language for the purpose of feature engineering and dataset optimization. The feature vectors that are obtained from initial behaviors that precede the ultimate actions of customers are systematically organized through the utilization of the GO programming language. The incorporation of the GO technique enhances the efficacy and effectiveness of the feature engineering procedure.

In order to enhance our methodology, we utilize relational databases to effectively store and retrieve the substantial amount of behavioral data. This decision improves the capabilities of data management by providing support for the production and maintenance of structured datasets.

The approach employed in this study utilizes a range of machine learning and deep learning methods, such as Regression methods, Winnow Algorithms, Support Vector Machines (SVM), and Long Short-Term Memory (LSTM) networks. These algorithms are



responsible for generating predictive models based on labeled behavioral information. The dataset has been divided into two sets, namely the training set and the test set. The training set is specifically utilized for training the algorithms, employing the GO programming language. Performance indicators, such as F-Score and Accuracy, serve as the foundation for an accurate evaluation of the models.

The subsequent stages of the study include a complete validation of the outcomes produced by the machine learning and deep learning algorithms. Models undergo intense examination, with the attainment of a forecast accuracy level of no less than 95% being regarded as a significant milestone. Deviation from the established norm initiates an optimization procedure. The parameters of the models are adjusted to enhance their performance. The implementation of data preparation techniques is crucial for achieving optimal predictive accuracy, particularly when combined with the utilization of the GO programming language for optimization purposes.

The methodology employed in this study utilizes the GO programming language and relational databases to establish a comprehensive framework for the development, implementation, and verification of the Casper Customer Behavior Forecast Application. The process incorporates technical details throughout each phase, demonstrating the project's aim to reinvent B2B customer engagement and prediction.

#### **4. Expected Outputs and Benefits**

The project titled "Casper Customer Behavior Forecast Application" holds significant potential for yielding actual benefits and impacting consequences. These implications reach beyond our organization and have relevance in both the worldwide academic and corporate sectors.

The main objective of our company is to enhance our competence in the field of machine learning (ML) and deep learning (DL) algorithms. As the project progresses, our team gains extensive knowledge and practical experience in utilizing a wide range of complex algorithms. This dedication places us at the vanguard of utilizing state-of-the-art technology and utilizing it to optimize our operations.

The primary goal of our project is to develop an advanced software system that can effectively forecast the future behaviors of business-to-business (B2B) customers. The ability to make accurate predictions holds significant potential for transforming our business processes. Through the use of efficient inventory management techniques and



the substantial reduction of client wait times, we expect to observe heightened levels of customer satisfaction, thereby establishing our position in the market.

Moreover, our constant commitment to research and development plays a significant role in promoting the advancement of knowledge and proficiency in the fields of machine learning and deep learning on a national scale. The collection of information and experiences through this initiative serves as evidence of our dedication to developing talent and expertise in these crucial domains, hence enhancing the supply of skilled engineers within our nation.

At a worldwide level, our initiative has the potential to make significant contributions to the academic discourse in the fields of machine learning and deep learning. Our plan involves promoting awareness of our research findings through the delivery of papers at prestigious international conferences and publication in well-regarded academic journals. The objective of these academic contributions is to enhance the current body of knowledge, promoting a more profound comprehension of machine learning and deep learning approaches.

In order to evaluate the efficacy and impact of our "Casper Customer Behavior Forecast Application" endeavor, we have created pivotal benchmarks: The robustness of our machine learning and deep learning classifiers is demonstrated by a strict threshold of at least 95% prediction accuracy, thereby certifying their efficacy in making accurate predictions. The maximum response time for basic capabilities of the project output software has been established at 5 seconds, thus offering optimal efficiency and responsiveness in real-world scenarios. We support the employment of a 100% uptime statistic as a means to assess the accessibility and continuous availability of the system, hence ensuring uninterrupted access and utilization of the program.

The projected results and benefits of our research highlight its substantial importance, offering potential breakthroughs within our organization and valuable contributions to the broader academic and business sectors.

## **5. Results and Future Work**

The project titled "Casper Customer Behavior Forecast Application" has produced notable advancements in the field of customer behavior research and prediction. The foundation for monitoring, predicting, and precisely forecasting the behavior of Casper B2B clients has been established through the creation of advanced decision support software.



The utilization of machine learning and deep learning algorithms has demonstrated significant efficacy, resulting in a prediction accuracy rate surpassing 95%. From a practical point of view, this achievement has resulted in a significant decrease in the duration customers spend waiting and a big improvement in the management of inventory. The outcome exhibits a noticeable increase in consumer satisfaction, therefore showing the practical value of our research.

As we consider the next year, our dedication to enhancing prediction models remains strong. The acknowledgement is made regarding the fluidity of client behavior and the progressive advancements in the fields of machine learning and deep learning. The company's continued emphasis on research and development will be motivated by the objective of improving the accuracy and effectiveness of our prediction models.

Furthermore, our efforts transcend the local limits of this project. It is claimed that the knowledge and insights acquired in this study possess the capacity for broader applications, extending beyond the B2B environment to encompass the wider field of customer behavior analysis. We possess a strong desire to disseminate our research outcomes to both academic and industry sectors, thereby cultivating an environment that promotes creativity and cooperation.

## References

- [1] Khodabandehlou, S., Mahmoud Z. R.. "Comparison of supervised machine learning techniques for customer churn prediction based on analysis of customer behavior." *Journal of Systems and Information Technology* 19.1/2 (2017): 65-93.
- [2] Li, Jing, Shuxiao Pan, and Lei Huang. "A machine learning based method for customer behavior prediction." *Tehnički vjesnik* 26.6 (2019): 1670-1676.
- [3] Moein, M. M., et al. "Predictive models for concrete properties using machine learning and deep learning approaches: A review." *Journal of Building Engineering* 63 (2023): 105444.
- [4] Emmert-Streib, F. et al. "An introductory review of deep learning for prediction models with big data." *Frontiers in Artificial Intelligence* 3 (2020): 4.
- [5] Nashaat, M., et al. "M-Learn: An end-to-end development framework for predictive models in B2B scenarios." *Information and Software Technology* 113 (2019): 131-145.
- [6] Rezazadeh, A. "A generalized flow for B2B sales predictive modeling: An azure machine-learning approach." *Forecasting* 2.3 (2020): 267-283.
- [7] Aktas, M.S., et al. "Information services for dynamically assembled semantic grids", The First International Conference on Semantics Knowledge and Grid (SKG 2005) Beijing China, 2005.



- [8] Aktas, M.S. et al., "Information services for grid/web service oriented architecture (soa) based geospatial applications", The First International Conference on Semantics Knowledge and Grid (SKG 2005) Beijing China, 2005
- [9] Aktas, M.S., Fox, G.C., Pierce, M., Managing dynamic metadata as context, The 2005 Istanbul International Computational Science and Engineering Conference (ICCSE2005), Istanbul, Turkey, 2005.
- [10] Baloglu, A., Aktas, M. S., BlogMiner: Web blog mining application for classification of movie reviews, 2010 Fifth International Conference on Internet and Web Applications and Services, 2010.
- [11] A. Tufek, A. Gurbuz, O. F. Ekuklu and M. S. Aktas, "Provenance Collection Platform for the Weather Research and Forecasting Model," 2018 14th International Conference on Semantics, Knowledge and Grids (SKG), Guangzhou, China, 2018, pp. 17-24, doi: 10.1109/SKG.2018.00009.
- [12] Sahinoglu, M. et al., Mobile Application Verification: A Systematic Mapping Study. In , et al. Computational Science and Its Applications – ICCSA 2015. ICCSA 2015. Lecture Notes in Computer Science(), vol 9159. Springer, Cham. [https://doi.org/10.1007/978-3-319-21413-9\\_11](https://doi.org/10.1007/978-3-319-21413-9_11).
- [13] Dundar, B. et al., A Big Data Processing Framework for Self-Healing Internet of Things Applications," 2016 12th International Conference on Semantics, Knowledge and Grids (SKG), Beijing, China, 2016, pp. 62-68, doi: 10.1109/SKG.2016.017.
- [14] Baeth, M. J. et al., Detecting Misinformation in Social Networks Using Provenance Data, 2017 13th International Conference on Semantics, Knowledge and Grids (SKG), Beijing, China, 2017, pp. 85-89, doi: 10.1109/SKG.2017.00022.
- [15] Aktas, M.S., et al., Implementing geographical information system grid services to support computational geophysics in a service-oriented environment. NASA Earth-Sun System Technology Conference, University of Maryland, Adelphi, Maryland, 2005.
- [16] Uygun, Y., et al., On the Large-scale Graph Data Processing for User Interface Testing in Big Data Science Projects, 2020 IEEE International Conference on Big Data (Big Data), Atlanta, GA, USA, 2020, pp. 2049-2056, doi: 10.1109/BigData50022.2020.9378153.
- [17] Kapdan, M. et al., On the Structural Code Clone Detection Problem: A Survey and Software Metric Based Approach. In , et al. Computational Science and Its Applications – ICCSA 2014. ICCSA 2014. Lecture Notes in Computer Science, vol 8583. Springer, Cham. [https://doi.org/10.1007/978-3-319-09156-3\\_35](https://doi.org/10.1007/978-3-319-09156-3_35).
- [18] Olmezogullari, E.; Aktas, M. S., Pattern2Vec: Representation of clickstream data sequences for learning user navigational behavior. *Concurrency and Computation: Practice and Experience* 34 (9), 2022.
- [19] Olmezogullari, E.; Aktas, M. S., Representation of Click-Stream Data Sequences for Learning User Navigational Behavior by Using Embeddings. 2020 IEEE International Conference on Big Data (Big Data), 3173-3179, 2020.