



A Study on the Application of Data Science in Consumer Finance

Duanduan Gu

Bayi School International Department, No.29 Suzhou Street, Haidian District, Beijing,
100195, China
duanduan.gu@bayims.cn

Abstract. This paper studies the various applications and impacts of data science in the field of consumer finance under the digital age and makes suggestions for the subsequent development of data science. This paper aims to increase the use and understanding of data science in consumer finance organizations. This paper mainly uses case analysis, data analysis and model analysis techniques. Through a series of studies, it is finally concluded that the application of data science can bring good improvements to enterprises, such as the improvement of risk control ability and investment and financing ability.

Key words: Consumer Finance, Risk Management, Data Science, Credit Assessment

1 Introduction

1.1 Background

In the digital age, providing comprehensive funding needs is a very important step for the current development of Chinese consumer finance industry under the requirements of national policies. Under the continuous stimulus of the state, the average consumption of the Chinese people reached 12,739 yuan in the first half of 2023, an increase of 8.4 percent compared with the same period in 22 years. With the steady development of the national economy, the development potential of the consumer finance field has been gradually exploited. Regarding the digital status of the consumer finance industry, the financial industry is a data and information intensive industry, which is the advantage of large model applications, so the industry began to use AI technology for large-scale anti-counterfeiting. In recent years, consumer finance companies have continuously promoted the research and development and innovation of fintech. According to the statistics of the China Banking Association, by the end of 2023, 29 consumer finance companies have applied optical character recognition, 28 applied live detection, 25 applied artificial intelligence, 19 applied knowledge graph, 14 applied robots and other latest technologies, which have greatly improved the quality of service [1].

1.2 Types of Data Analysis

As an important discipline and technology, data analysis covers data science, statistics, computer science and other fields, and is widely used in business, scientific research, social policy and other fields. The rise of data science has driven the development of data analysis. Statistics provides a theoretical basis for data analysis, which uses the ideas and methods of statistics for reference, such as hypothesis testing, regression analysis, analysis of variance, etc., for data modeling and inference. The progress of computer science has promoted the rapid development of data analysis. With the improvement of computer hardware performance and the maturity of software technology, data analysis can deal with large-scale data sets more efficiently and realize the operation and visualization of complex algorithms [2]. About types of data analysis, such as Descriptive analysis: To understand the characteristics of data through observation, measurement and visualization. Correlation analysis: Evaluating the correlation between two or more variables. Factor analysis: Summarizing a set of variables into several factors to understand the internal relationship between them. Cluster analysis: The samples are classified into different sets according to their similarity. This paper's goal is to explain the importance of data analysis in the field of consumer finance.

2 Application in Consumer Finance

2.1 Application in Consumer Finance

This paper will study some cases to explore the application of data analysis in the field of consumer finance. Because of the advent of the digital era, the consumer finance industry has also created some digital products to enhance the vitality of the industry, such as Internet consumer finance securitization products, which are based on the development of Internet consumer finance and carry out financing through asset securitization to ease the financial pressure and obtain higher profits. For example, Jingdong Baitiao accounts receivable debt special asset support program is a typical Internet consumer financial asset securitization product. Scenario-based consumer financial products provide customized financial services products according to consumers' preferences and consumption needs. Such products are usually closely integrated with specific consumption scenarios, such as consumer credit services on e-commerce platforms. Such digital products not only improve the efficiency and security of consumer finance, but also expand the scope and depth of business, making financial services more convenient.

Consumer Credit Model. Under the premise of digitization, there have been no small changes in consumer credit models, which mainly focus on the update of risk assessment models and the improvement of credit scoring systems. The traditional consumer credit model relies too much on historical data and financial information, and the information source is very limited, so it is unable to comprehensively assess the risk. With the deepening of digitalization, a wider range of data can be obtained

through big data, such as users' online behavior and social media activities. For example, by combining convolutional neural networks (CNN) and two-way long short-term memory networks with attention mechanisms, a user's loan default probability can be more accurately assessed [3].

Continuous Risk Assessment and Stock Management. The importance of continuous risk assessment is that it helps organizations remain constantly alert to potential threats so that they can take timely measures to address them. Continuous Monitoring and Risk Scoring (CMRS), for example, is a comprehensive process that supports an organization's risk management decisions by automating feeds and data analysis to maintain continuous awareness of information security, vulnerabilities, and threats. In addition, the development of dynamic risk assessment methods, such as generalized autoregressive conditional density modeling (GARCD model), provides a new tool for the dynamic measurement and management of financial risks.

2.2 Risk Management

In this part, this paper explores some application of data analysis and take some case as example. Data analysis is widely used in the financial industry for risk management and forecasting. By analyzing a large amount of historical data and market trends, financial institutions can identify and assess potential risk factors and develop appropriate measures to prevent them. Data analysis can help banks and investment companies build credit rating models to better assess the credit risk of borrowers. In addition, using data analysis technology, financial institutions can conduct market risk analysis, liquidity risk analysis and operational risk analysis to better manage the risk exposure of enterprises. The consequences of these historical accidents are very painful, so this paper will list several methods to control operational risk, such as the application of machine learning. By introducing the latest machine learning algorithms, such as XGBoost, neural network and logistic regression algorithm, an early warning mechanism of personal default risk can be built. Effectively forecast and control credit default risk [4]. Moreover, the risk early warning analysis system can be used to dynamically monitor and analyze commercial banks' risk indicators, operation and management activities and comprehensive risk trends by designing and implementing financial data statistics and risk early warning analysis system, and timely discover hidden risks. Take CMB as an example. China Merchants Bank, a leading financial institution in China, has embraced data analytics as a cornerstone of its risk management strategy. Recognizing the importance of staying ahead in a rapidly evolving financial landscape, CMB has invested heavily in advanced technologies to harness the power of big data and predictive analytics, transforming the way it identifies, assesses, and mitigates risks across its diverse business portfolios. One prominent example of CMB's successful implementation of data analytics lies in its credit risk management framework. The bank has developed a comprehensive data ecosystem that integrates information from multiple sources, including customer transactions, financial statements, external credit ratings, and even social media sentiment analysis. This data-rich environment enables CMB to gain a 360-degree view of its borrowers' financial health and creditworthiness.

Utilizing sophisticated machine learning algorithms, CMB's risk management team can now rapidly process vast amounts of data, identifying patterns and anomalies that might indicate potential credit risks. These predictive models not only help to flag high-risk loans early on but also enable the bank to accurately assess the probability of default for each borrower. This, in turn, informs CMB's credit decision-making process, allowing it to adjust lending terms, credit limits, or initiate proactive intervention measures to minimize potential losses. In addition to credit risk, CMB has also leveraged data analytics to streamline its operational risk management. By analyzing historical data on fraud cases, the bank has been able to identify common fraud patterns and develop real-time monitoring systems that flag suspicious transactions. These systems use advanced algorithms to analyze transaction characteristics, such as the amount, frequency, and geographic location, enabling CMB to swiftly detect and prevent fraudulent activities [5]. Data analytics has emerged as a pivotal tool in mitigating operational risks within financial institutions, as evidenced by the contrasting outcomes of two seminal cases: the "Fat Finger" incident involving Everbright Securities and the collapse of Barings Bank. The Everbright episode, characterized by erroneous trades triggered by human error, underscores the significance of real-time data monitoring and anomaly detection systems in preventing such costly mishaps. By leveraging advanced analytics, firms can promptly identify and mitigate operational risks, thereby safeguarding their financial stability and reputation. Conversely, the collapse of Barings Bank, attributed largely to inadequate risk management and the absence of robust data analysis to uncover the massive fraud perpetrated by Nick Leeson, highlights the dire consequences of neglecting these safeguards [6-7]. The contrasting fates of these two institutions serve as a testament to the critical role that data analytics plays in shaping effective operational risk management strategies. Moreover, data analytics has been instrumental in improving the bank's compliance processes. By automating compliance checks and continuously monitoring transactions against regulatory requirements, CMB ensures that it remains compliant with ever-changing regulations, thereby reducing the risk of fines and reputational damage [8]. Data analytics and credit systems will now be linked. Data analytics plays a pivotal role in the credit assessment and management processes within the consumer finance sector, revolutionizing the way lenders evaluate risk and optimize their lending strategies. Its application and value extend far beyond traditional methods, offering a deeper understanding of customer behavior, creditworthiness, and market trends. In the realm of credit lending, data analytics empowers financial institutions to analyze vast amounts of structured and unstructured data from various sources, including credit reports, transaction histories, social media footprints, and even external market indicators. This comprehensive data set enables lenders to construct predictive models that accurately assess an individual's ability and willingness to repay loans. Japan has done a pretty good job of using big data analytics in corporate credit [9]. And by the application of data analysis, bank can better avoid bad credit risk. When traditional algorithms are used to assess bad credit risk with a large amount of data, the impact of bad credit risk factors and the incomplete and incomplete data of each index in the hierarchy of the bad credit risk management performance evaluation system will lead

to the lower accuracy of the bank's assessment of bad credit risk. Under the premise of big data analysis, we can use APH algorithm and BSC theory to build a bad credit risk assessment model to improve the accuracy of risk assessment.

Credit Scoring. By leveraging advanced algorithms, data analytics automates the credit scoring process, instantly evaluating applicants based on their financial profiles. This not only streamlines the lending process but also ensures objectivity and consistency in decision-making.

Risk Mitigation. Through real-time monitoring and analysis of loan portfolios, data analytics identifies early warning signs of potential defaults or fraudulent activities. This proactive approach allows lenders to intervene swiftly, minimizing potential losses.

Personalized Offerings. By analyzing consumer preferences and spending patterns, data analytics enables lenders to tailor credit products and services to individual needs, enhancing customer satisfaction and loyalty.

Market Insights. Aggregated data from multiple sources provides valuable insights into market trends, consumer behavior, and credit demand. These insights guide product development, pricing strategies, and marketing campaigns, ensuring lenders remain competitive and relevant.

2.3 Value of Data science

Data science can bring a lot of value, such as bring efficiency. Data analytics automates manual tasks, reducing processing time and costs while improving accuracy. Reducing risk by identifying high-risk borrowers and fraudulent activities early on, lenders can minimize their exposure to losses. Data analytics models also can enhance customer experience, personalized offerings and seamless lending processes foster positive customer experiences, leading to increased satisfaction and retention. Profitability also can be seen like kind of value, accurate risk assessment and efficient operations contribute to higher loan approval rates and reduced bad debts, ultimately boosting profitability. Huabei, a pioneering digital credit service, harnesses the power of data analysis to revolutionize the credit lending process. By deeply analyzing a myriad of data points including user transaction history, spending patterns, and social media activity, Huabei can create highly personalized credit assessments that are both precise and efficient. This data-driven approach enables Huabei to quickly determine creditworthiness, offer tailored credit limits, and implement robust risk management measures. Furthermore, by continuously monitoring user behavior and updating credit assessments in real-time, Huabei can maintain a dynamic and responsive lending system that keeps pace with the evolving needs of its users [10]. In summary, Huabei's innovative utilization of data analysis in credit lending underscores the critical role technology plays in modern financial

services. The result shows big data analysis can be applied to various aspects of consumer finance, such as building a new credit risk assessment model to improve the accuracy of risk assessment and controlling corresponding risks through data processing corresponding to various risks. More in-depth development of data analysis will improve the overall level of consumer finance industry.

3 Conclusion

Data analysis has a wide range of applications, whether it is risk management or credit system, which plays a very important role in these aspects. This paper analyzes the examples of Huabai lending and China Merchants Bank's credit system, as well as the "Fat finger" and the Barings Bank incident, proving that qualified data analysis applications can avoid unnecessary troubles for enterprises and help them develop. To sum up, the level of data analysis ability determines the development prospect and value of a consumer finance enterprise. Data science can significantly improve risk management capabilities in consumer finance. By building complex data models, financial institutions can assess the credit risk of borrowers more accurately, thereby reducing the non-performing loan ratio. Data science is playing an increasingly important role in precision marketing in consumer finance. By analyzing consumer behavior and preferences, financial institutions can provide more personalized financial products and services, thereby increasing customer satisfaction and loyalty. In addition, data science can help improve the efficiency and quality of consumer financial services. By automating large amounts of customer data, financial institutions can respond quickly to customer needs and provide immediate customer service support. With the continuous advancement of technology and the deepening of applications, data science will play an increasingly important role in the consumer finance industry. Financial institutions need to constantly explore and innovate to fully harness the power of data science to cope with increasing market competition and achieve sustainable development.

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