

The Impact of Artificial Intelligence in the Big Data Era on the Development of Commercial Banks

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Abstract. Commercial banks must constantly explore and use new technologies such as artificial intelligence to innovate with the rise and development of cloud computing, mobile internet, big data mining and other technologies. However, while commercial banks are innovating, security issues should not be ignored. Commercial banks need to use big data technology to control security in innovation. Firstly, this paper summarizes how commercial banks use artificial intelligence to innovate and make progress in four aspects: risk management and control of commercial banks, customer relationship management and customer demand analysis, improvement of service quality of commercial banks and cost control of commercial banks. Then it introduces how commercial banks control security issues while innovating and how supervisory departments implement effective supervision. Finally, it puts forward suggestions and prospects from the aspects of commercial banks' increasing database construction and large data algorithm.

Introduction

The innovative ability of commercial banks has been severely tested with the advent of the big data era. There are considerable limitations that we rely on traditional corporate financial bankruptcy risk model or traditional measurement methods to predict risk for risk control. The way to serve customers is also limited by the lack of personalized customized services, the lack of personal judgment ability and experience of financial managers based on the subjective judgment of financial managers. The traditional commercial banks' means of retaining customer relationship are at a loss as well because it is difficult to judge which customers will lose. Commercial banks have been unable to carry out efficient cost control before, and resulting in the reduction of profits has become a difficult problem for commercial banks to solve. The emergence of Internet finance has also brought great impact on commercial banks, especially for the continuous squeeze of deposit-taking business of commercial banks, which has led to a huge decline in profits of commercial banks. The development of Internet finance has a significant negative impact on the performance of commercial banks.

However, the Internet era of big data is not only a huge impact on commercial banks, but also an opportunity for commercial banks. The data processing ability has been continuously improved with the increase of information and data, the rapid improvement of computer computing ability and the increase of scientific research investment. It also provides business innovation environment for commercial banks to make use of artificial intelligence, big data mining and cloud computing. At the same time, commercial banks can obtain a large number of comprehensive data which other profit-making organizations cannot obtain, such as a large number of customer income, age, and credit characteristics, which can provide support for commercial banks to use data mining methods for credit risk management. Whether commercial banks can make good use of new technologies, such as artificial intelligence and machine learning to carry out more effective risk control, more accurate customer relationship management, provide more personalized services, and reduce control costs, which determines the success or failure of commercial banks in the era of big data on the Internet. This paper discusses how commercial banks can improve business innovation, cost control, risk control and security issues by using Internet data and artificial intelligence.

Application of Internet Big Data and Artificial Intelligence in Development of Commercial Banks

Risk Management and Control of Commercial Banks. In the era of Internet Big Data and Artificial Intelligence, commercial banks can first expand the data sources of traditional commercial banks' risk management through Internet Big Data Technology, and process semi-structured and unstructured data. Customers of commercial banks, whether enterprise customers or individual customers, want to obtain security protection while obtaining services from commercial banks. For example, customers handle credit or debit card business in commercial banks. If the card is lost and the card information is stolen, the transaction of thieves will bring huge losses to customers. Therefore, it is very important for commercial banks to identify most false transactions or call off large amounts of false transactions in time. The outlier analysis technology in big data mining can help commercial banks solve the problem of false transactions. The outline of singular value analysis is as follows: according to the formation of a training set of large data from a customer, if the credit card is stolen at this time, this consumer behavior will be very different from the customer's previous behavior, there may be a day of continuous large purchases and other abnormal circumstances, when commercial banks receive feedback from large data mining and call off these transactions. Risk control can be more precise if we combined with large data forecasting and analysis. In addition, singular value analysis can be used not only in the security areas such as calling off false transactions to enhance the use of credit cards by customers, but also in the transactions of commercial banks themselves, such as avoiding the operational risks of traders in foreign exchange management.

Bankruptcy risk, credit risk assessment and prediction of commercial banks have a significant impact on the loan decision-making of commercial banks. They also play a important role in the profits and competition of commercial banks, and determine the safety of commercial banks' operating policies.

In the era of artificial intelligence and big data, commercial banks seem to be able to acquire better and more accurate models with the rise of machine learning and neural networks. Through the application of artificial intelligence methods such as support vector machine, BP neural network and multi-layer perception machine, the accuracy of bankruptcy risk prediction can be improved obviously. The application of artificial intelligence method can effectively meet the urgent needs of commercial banks in the field of financial risk exposure management, and commercial banks can also re-examine and regulate the overall IT framework within banks by means of Internet big data technology, so that the risk management tasks can be effectively implemented.

Customer Relationship Management and Customer Demand Analysis. Machine learning and big data mining methods can provide more accurate customer relationship management for commercial banks. For example, when new customers apply for credit cards and loans, commercial banks can form long-term partnerships with big data companies, acquire customer travel and transaction habits at very low cost, and use machine learning classification method to score customer credit. We draw accurately the conclusion whether to approve the application.

At present, commercial banks need to make further use of artificial intelligence methods to turn passive into active ones. For example, in order to increase the function of mobile banking or provide targeted products to attract new customers or increase the frequency of use of old customers, commercial banks can use their mobile banking business to find out the internal relationship between customer demographic characteristics: gender, age, education, occupation, income and mobile banking services through comparative analysis, and then use machine learning classification method and decision tree method to predict and analyze. Commercial banks can use big data analysis technology to support their business intelligence. In order to achieve better customer experience, commercial banks can identify the most valuable customers through real-time business intelligence, and enable them to contact banks at the personal level. This technology also enables organizations to speed up processes to better understand customer needs and improve innovation.

How to retain existing customers of commercial banks, it is very important that banks improve service quality and communicate with customers dynamically. Cluster analysis is applied to

customer communication, and artificial intelligence agent technology is used to help users choose the best service and communicate repeatedly. The specific performances are as follows: analyzing user's occupation and finding general features, storing and updating user's relevant preferences, translating user requests in service level specification parameters, and communicating with service providers the high-quality services they need. At the same time, the bank monitors the real-time quality, compares it with the communication results, and obtains the user's alternative information in decision-making.

Improvement of Service Quality of Commercial Banks. At present, Artificial Intelligence can provide intelligent financial advisory services for commercial banks. Intelligent investment can obtain individual users' risk preferences and their changing rules through big data technology. According to user's personalized risk preferences and algorithm model, personalized asset allocation scheme can be formulated. At the same time, personalized asset allocation scheme can be tracked and adjusted in real time by using the Internet. In order to ignore the high return of risk and maximize the return within the risk range that users can bear, it has the characteristics of high efficiency and convenience, diversification of allocation, high quality of service, low threshold of amount, low rate and so on. It can reduce costs and improve efficiency, and also better meet the needs of users for investment and financial management.

Intelligent Investment Consultants first need to collect data such as customer investment risk preferences. After obtaining the customer risk preference data, commercial banks can obtain the recommended portfolio based on the corresponding computer algorithm. At present, since the intelligent investment of commercial banks is still in its early stage in our country and cannot rely entirely on the computer display results, commercial banks can adopt appropriate manual adjustment to select portfolio. The era of big data has played a role in promoting the development of intelligent investment field. Commercial banks can continue to improve and innovate computer algorithms, gradually reduce the dependence on bank personnel for later adjustment and grasp a large number of small-capitalized customers.

When commercial banks have a large number of customer and potential customer data, they can use clustering analysis to discover more potential characteristics contained in the data, so as to help commercial banks to subdivide the market. At the same time, classification methods can classify users' specific purposes, or annotate and analyze the characteristics of different users in machine learning.

Relevance analysis in big data mining is also very useful. Relevance analysis can help commercial banks find potential correlations, such as whether customer income, age and types of financial products are correlated, whether large-sum customers will probably buy money market financial products while choosing high-income and high-risk financial products, and whether customers will have a certain amount of time deposit as diversified investment chips while they buy high-yield and high-risk financial products. Commercial banks can conduct matching sales of financial products after mining potential correlations through correlation analysis, so that they can make more accurate market positioning of their own financial products portfolio.

In the field of financial technology, with the recent development and integration of information technology (such as social computing, big data, Internet of Things or cloud computing), the role of IT departments has gradually changed, which enables commercial banks not only to automate existing business processes, but also to provide new products, services, processes and business models.

One of the applications in the field of financial science and technology is to redefine the inherent product-centric service logic centered on customers and their processes in order to achieve a new service system. Mixed and overlapping customer processes based on interaction are used as design centers for financial products and services. One example is the electronic wallet, which includes not only payment, but also selective collection, storage and consumption loyalty scores and other personal data.

In order to cope with the impact of network financial management represented by Yu E Bao, commercial banks can construct a similar financial platform-based Internet financial model.

Financial platform-based Internet finance means that Internet e-commerce enterprises provide financial products and services to investors through the internet, covering the sales and transactions of funds, insurance, Treasury bonds, foreign exchange, futures, precious metals, bank financial products and so on. Commercial banks can also imitate and create financial platform-based Internet finance. In the sub-area of business platform, commercial banks will "rebuild a bank on the internet" as the goal, and banks have broken the original division pattern of electronic banking department and retail banking department, and set up a special department to deal with Internet finance.

Cost Control of Commercial Banks Through Cloud Computing. First of all, the data in cloud computing system are stored in the "cloud" side. The huge data storage space can well store the huge amount of data and information in the banking industry, which makes the banking industry reduce the cost of IT infrastructure construction to a certain extent. The banking industry does not need to set up a dedicated IT team, nor need to purchase and maintain related IT products. Secondly, the huge storage and large-scale data processing capabilities of cloud computing also reduce the overhead of unit data storage and processing. Finally, users do not need to have the relevant expertise and direct control, which makes the cost of technical support teams of banks greatly reduced. At the same time, the use of cloud computing by commercial banks can also reduce risks, improve security and enhance data analysis capabilities.

Security Issues in Development of Commercial Banks

In the era of big data on the Internet, it is an unavoidable question whether the data security of commercial banks and whether the innovation process of commercial banks will bring risks to the whole financial system. Internet finance will increase the systemic risk of commercial banks in the short term, but commercial banks and Internet finance can develop together as mutually beneficial things in the medium and long term. Internet finance can change the cost-income ratio of commercial banks by affecting the asset-liability structure of commercial banks, which will increase the systematic risk of commercial banks accordingly.

In the era of Internet big data, when commercial banks use artificial intelligence to innovate their business, they mainly carry out big data mining on the basis of big data. There are two major risks in data security of commercial banks: firstly, the technical security risks caused by possible loopholes in network systems and storage centers; secondly, the information leakage risks of massive customer information and personal privacy.

The major security problems encountered in commercial bank innovation are big data security. So far, Big data is subdivided into structured data and unstructured data, and the security of unstructured data is more difficult to deal with, because unstructured data has many classifications such as text, image and so on. In order to deal with the problem of unstructured data security, commercial banks can construct the nodes of the database after analyzing the data and store those data in the node. The node stores different types of data, and designs a security suite, which uses the algorithm to interface the data nodes with the security suite. According to data type and sensitivity level, the security suite contains several security algorithms to provide security for classified data.

Because of the rapid development of financial technology, Internet Finance and artificial intelligence has accelerated the business and product innovation of commercial banks; at the same time, it has also brought security problems. The traditional way of supervising commercial banks has been difficult to meet the regulatory needs of modern commercial banks. In order to meet the needs of supervision in the era of big data on the Internet, China has begun to gradually develop from "separate operation, separate supervision" to joint supervision, while playing the role of China Banking and Insurance Regulatory Commission, Ministry of Industry and Information Technology, Ministry of Commerce and other departments to achieve cross-industry and cross-industry joint supervision. The era of big data on the Internet has brought business innovation to commercial banks as well as the upgrading of regulatory technology. This upgrading has deeply applied Internet of Things, big data, artificial intelligence, block chain and other technologies to regulatory science and technology.

Suggestions and Prospects for Commercial Banks to Innovation Using Artificial Intelligence Method

Strengthening the Maintenance and Construction of Commercial Bank Database. In the big data era, most data analysis methods rely on a large number of historical data as samples for model building and training. Nowadays, commercial banks can obtain massive data through daily transactions, customer loan data, information sharing among commercial banks, social network data mining and other channels. However, if we do not classify and update the relevant data, the result will be: before data analysis, data preprocessing, data cleaning and database matching will consume a lot of manpower, financial resources and time; using historical data to get wrong data analysis results and make wrong decisions will make commercial banks suffer losses. Therefore, the strengthening of database maintenance and creation by commercial banks reflects the timeliness and value of data in the era of big data.

In terms of database construction, major commercial banks should not only make use of many common databases such as Oracle, DB2, SQL Server and MySQL, but also pay special attention to Hadoop, Spark and other data platforms. Commercial banks can build their own large data databases based on Hadoop and Spark.

Enhancing the Understanding and Application of New Algorithms for Large Data. Whether commercial banks can innovate and acquire value in the era of big data also depends on their analysis methods of data information, such as machine learning and data mining methods. Therefore, whether commercial banks can understand and apply the latest big data algorithms determines the future development prospects of commercial banks to a certain extent.

Commercial banks should not only increase their research and development departments' investment in scientific research, but also encourage research teams to learn from the latest international top-level computer conferences, such as the latest and authoritative computer vision and pattern recognition technologies emerging at CVPR (Conference on Computer Vision and Pattern Recognition) conferences. In the past two years, scholars all over the world have continuously improved the performance of the new deep learning algorithm GAN (Generative Countermeasure Network) and published the results in the top international conferences such as CVPR. Commercial banks can apply these new algorithms to face recognition to improve the recognition accuracy and reduce the losses caused by false exchanges. At the same time, commercial banks can also learn from the AAI (Association for the Advancement of Artificial Intelligence) meeting some robotic technology and artificial intelligence algorithms, to achieve robot dialogue and thus save labor costs. The other international computer conferences, such as ICML and NIPS, put forward an improved RNN (Circulating Neural Network) algorithm every year. Commercial banks can use it to realize forecasting of foreign exchange for foreign exchange management. In addition to encouraging research and development departments to learn and apply the latest algorithms at international conferences, commercial banks can also pay attention to the results of computer competitions (e.g. kaggle and ImageNet), such as Xgboost, ResNet and other new algorithms, which can also be applied to credit risk control and credit card handwriting recognition of commercial banks.

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References

- [1] S.H. Jiang. Exploratory Practice and Development Strategy of Artificial Intelligence Application in China's Banking Industry[J]. Southwest Finance, 2018(02):44-49. (in Chinese)
- [2] T. Yang. Reflections on the Application of Artificial Intelligence in Finance [J]. International Finance, 2016(12):24-27. (in Chinese)
- [3] Z.C. Wei and H. Ling. Theory, Practice and Impact of Big Data Application in Commercial Banks [J]. Shanghai Finance, 2013(09):28-32+116. (in Chinese)
- [4] J.Q. Lin. Discussion on the Big Data Application of Commercial Banks in China --- From the Perspective of Data Analysis [J]. Shanghai Finance, 2017(06):83-86+82. (in Chinese)
- [5] Y.Y. Yang. Practical Exploration, Future Prospect and Policy Suggestions of Financial Supervision Science and Technology[J]. Southwest Finance, 2017(11):22-29. (in Chinese)
- [6] S.S. Wang, I Petrounias. Big Data Analysis on Demographic Characteristics of Chinese Mobile Banking Users[C]. Business Informatics. IEEE, 2017:47-54.
- [7] E, Halil, E, Aykut. A Comparison of Various Artificial Intelligence Methods in the Prediction of Bank Failures[J]. Computational Economics, 2013, 42(2):199-215.