Chapter 63
A Machine Learning Approach for Predicting Bank Customer Behavior in the Banking Industry

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ABSTRACT

Currently, Chinese commercial banks are facing extremely tremendous pressure, including financial disintermediation, interest rate marketization, and internet finance. Meanwhile, increasing financial consumption demand of customers further intensifies the competition among commercial banks. Hence, it is very important to store, process, manage, and analyze the data to extract knowledge from the customer to predict their investment direction in future. Customer retention and fraud detection are the main information for the bank to predict customer behavior. It may involve the privacy data and sensitive data of the customer. Data security and data protection for the machine learning prediction is necessary before data collection. The research is focused on two parts: the first part is data security of machine learning and second part is machine learning prediction. The result is to prove the data security for the machine learning is important. Using different machining learning analysis tool to enhance the performance and reliability of machine learning applications, the customer behavior prediction accuracy can be enhanced.

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INTRODUCTION

Banks was obliged to collect, analyze, and store massive amounts of data. But rather than viewing this as just a compliance exercise, machine learning and data science tools can transform this into a possibility to learn more about their clients to drive new revenue opportunities. In order to predict the customer behavior, we used machine learning algorithm by python to evaluate the customer segmentation for prediction. This section introduced the Chinese banking industry, the statement of problem in the banking industry, the project aim, objective and project scope, and project development schedule.

OVERVIEW OF CHINESE BANKING INDUSTRY

For banks globally, 2018 could be a pivotal year in accelerating the transformation into more strategically focused, technologically modern, and operationally agile institutions. They might remain dominant in a rapidly evolving ecosystem. According to Investopedia (Investopedia, 2018), the banking system in China used to be monolithic, with the People's Bank of China (PBC), which was the central bank, as the main entity authorized to conduct operations in that country. In the early 1980s, the government started opening up the banking system and allowed four state-owned specialized banks to accept deposits and conduct banking business. These five specialized banks were the Industrial & Commercial Bank of China (ICBC), China Construction Bank (CCB), Bank of China (BOC), Bank of Communications (BOC) and Agricultural Bank of China (ABC). The data security of machine learning was conducted before start the machine learning prediction.

In this work, supervised artificial neural network algorithm was implemented for classification purpose. First, challenge of Chinese banking industry was defined. Second, literature review for the machine learning approach and ANN model was evaluated. Third, data visualization and evaluation by using ANN algorithm had been analyzed for classifying the customer pattern. Fourth, the accuracy rate of customer behavior prediction was conducted. Lastly, after find tuning parameters by using XGB Classifier, the better result was awarded. Yaokai (Yaokai et al, 2018) expressed the most serious problems in recent years including problems of privacy leakage and denial of services. Early stage detection of cyber-attack was important and proposed different selection approach to test the performance of machine learning algorithm. The process had six stages. These were session splitting, feature extracting, feature ranking, cross validation, removing features gradually, and classifier.

CHALLENGE OF CHINESE BANKING INDUSTRY

Accuracy customer data prediction was essential for planning the business. After that, being armed with information about customer behaviors, interactions, and preferences, data specialists with the help of accurate machine learning models could unlock new revenue opportunities for banks by isolating and processing only this most relevant clients' information to improve business decision-making. This was a challenge to predict the customer pattern and behavior for planning the business in advance in this dynamic competition environment. Zhenyu (Zhenyu et al, 2018) stated that "*Machine learning is one of the most prevalent techniques in recent decades which has been widely applied in various fields. Among them, the applications that detect and defend potential adversarial attacks using machine learning method*