Application of Data Mining Technology in CRM System of Commercial Banks

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Abstract. Data mining analyses the massive data in the CRM system of commercial banks effectively, by turning the information into knowledge, data mining benefits the banks with making better business decision. Based on the introduction of data mining technology and the main mining targets, this paper summarizes that the customer cluster character analysis, buying model research and fraud detection are the main application fields of data mining in CRM system, and then introduces its application in these research fields in detail.

Introduction

Commercial banks have accumulated large amounts of data in the business process, in the information age, the ability to quickly and accurately from the data mining rules and acquire knowledge; ability to effectively use these rules and knowledge for the bank management, decision-making services for banks to enhance the competitiveness and long-term development, is essential.

Commercial banks in developed countries and regions have already used data mining technology to excavate knowledge in database. For example, the United States HSBC data mining tool KXEN (Knowledge Extract Engine) to increase the customer data mining, to find the cross selling and "roll" sales, the bank also Citibank and Bank of Switzerland is also one of the earliest use of two data mining technology; the first bank of the United States as the representative of the Bank of credit and in-depth data mining technology use of the credit card user analysis. However, the data mining technology in the banking industry really get attention after the rise of customer relationship management system, many European banks have adopted data mining technology to serve their own business decisions, including Bank of America, the commerce bank, Royal Bank of Scotland, Societe Generale Bank, Deutsche Bank, Holland bank, National Australia Bank so, in a short while, the scale of the rapid expansion of data warehouse, database technology is increasingly mature today, has very few developed countries and regions of the Bank of the data mining technology as an important strategic decision means.

European and American banks not only improve the efficient data CRM system, the most important is the data warehouse data effectively into useful knowledge, and in the business process, to achieve the transformation from knowledge to wealth. Compared with the European and American banks, the application of data mining in China's commercial banks in CRM are relatively pale, most banks still in data collection, collation, specification stage; no effective means and technology by further processing of massive data. For data mining, the majority of commercial banks still stay at the conceptual level, do not understand the scope of data mining in CRM, in this area of research is not enough. Based on the introduction of data mining technology, this paper discusses several possible applications of data mining in commercial banks follow.

Introduction to Data Mining Techniques

Data mining is a nontrivial process of finding effective, novel, potentially useful, understandable patterns in data [1]. Data mining research in this area is a product database, pattern recognition,
machine learning, statistics, artificial intelligence, parallel and distributed computing, mathematics and visualization of interdisciplinary, is a new but promising research field. The main tasks of data mining can be further divided into the following categories.

**Association Rule Mining**

Association rule mining finds interesting association or correlation between item sets from massive data, which is an implication of \( A \Rightarrow B \), Support s\% refers to the transaction database D at least s\% transactions include \( A \cup B \), credibility c\% refers to the transaction database D contains A transactions at least c\% also includes B. Association rules can help formulate many business decisions.

**Classification and Prediction**

Classification need to construct classification function or classification model, through the classification function, the database data items mapped to a class. Classification models can be expressed in many forms, IF-THEN rules, classification trees, mathematical formulas or neural networks. Classification and prediction can be used to describe the trend extraction model or forecast data important data for the future, for example, through the establishment of a classification model, classification of bank loans to customers, in order to reduce the risk of loans.

**Cluster Analysis**

Clustering technique for discovery in database is unknown, and the classification of different, before clustering number and type of the class are unknown, is in accordance with the "Like attracts like." principle, will satisfy the similarity conditions of object classification in a group, does not meet the conditions of the classification of objects similarity in different groups. Each group is called a cluster, each class of objects as much as possible, and different classes of objects as different as possible.

**Outlier Analysis**

The database may contain some data objects that are inconsistent with the general behavior or model of the data. These data objects are outliers. Statistical methods often discard outliers as noise or anomalies, or attempt to minimize the effects of outliers. But in some applications outliers themselves may be very important information, for example in fraud detection, outliers may represent fraud.

**Cluster Analysis**

Evolution Analysis describes the behavior of the development of the object with time changes or trends, and its modeling. For example, from the stock trading data mining the entire stock market and the evolution of the specific stock of the company to help predict the future direction of the stock market, to help make stock investment decisions.

**Application of Data Mining Technology in Commercial Bank Crm**

As early as ten years ago, foreign scholars have proposed, data mining technology can make CRM system to provide customers with more targeted, higher quality services [2]. Data mining can find the database data between the deep association; can be essentially similar data reduction for the same class; to abnormal data mining in databases, which are the traditional method of measuring capability not available. So when the bank set up the CRM system, what needs to be done is to use data mining as a powerful tool to database customer information into wealth.

In general, to carry out customer relationship management to achieve the purpose of using several data mining: the first is to retain existing customers in Europe, for a new customer is ten times the cost of sales to an existing customer. Through the analysis of the characteristics of existing customers, customer's hobbies and interests, so as to respond to the needs of customers with the fastest speed, to provide financial products and services, improve customer loyalty, so as to
retain existing customers; second is to maximize the current customer value, the client determines
the life cycle in different stage, customer demand for financial products and services are different,
so they want to reasonable service with a customer in different life stages in demand, customer
satisfaction and maximize customer value; finally through the products and services provided by a
more competitive, more effective marketing means to attract customers of other banks.

The application of data mining in customer relationship management can be summarized into
three categories: customer group characteristics research, customer purchase model research and
credit card fraud behavior of commercial banks.

**Customer group Characteristics Research**

In order to meet the above three objectives of customer relationship management, we need to deeply
understand customer characteristics, and the process of market segmentation is the process of
discovering customer characteristics. The banking industry is shifting from mass marketing to the
one to one marketing transformation of [3], Lloyds TSB Accucard group and the Bank of
Montreal's Mosaik products have been respectively by allowing customers to create their own
account, Select annual rate of return, cost, card type and reward feedback to explore one of the
marketing concept. Data mining classification and clustering technology to the database in detail,
the two technology difference is that one is supervised learning is an unsupervised learning, can
play a good role in the research of customer segmentation, which found that different customer
demand for products. On the basis of customer segmentation, through the feature extraction of each
market segment, the customer characteristics of the market segments can be obtained. The purpose
is to extract features by helping marketers to quickly identify the type of new customers so as to
their effective targeted marketing; at the same time also can assist the customer managers find other
types of customers: Marketing sensitive customers, the type is easy to change customers, these
customers for some other marketing strategy.

**Customer Purchase Model of Commercial Banks**

Based on commercial bank customer research group characteristics, through the analysis of
customer buying patterns, to find the probability of customer purchase of several products, if this
probability is large enough, these products constitute a frequent pattern mining of frequent patterns
can tell researchers a lot of useful information, for example, in the mining frequent mode, it is easy
to generate association rules can directly, which can find the sales relationship between each other,
contribute to the realization of cross selling products. Cross selling as an important marketing tool,
not only can better product marketing, more important role is to retain customers can bring profit.
The research of customer purchase pattern should be applied to classification, clustering,
association rule mining and so on.

**Credit Card Fraud Research**

The experience of developed countries shows that with the increase in the number of issuers, the
risk of fraud of credit cards rises linearly, and the losses caused by credit card fraud will be high.
The financial performance of customer fraud in the database is outlier, however, if using traditional
statistical method, outlier in large databases is often as noise elimination, or try to make to minimize
the influence of outlier. Data mining technology can overcome the problems of statistical methods,
and can find some important financial phenomena by analyzing abnormal data.

Currently the data mining technology is mainly used in classification, such as neural network,
decision tree classification and combination method, and the association rules in the credit card
fraud research also has certain application, Chiu and Tsai (2004) [4] using the improved Apriori
algorithm is studied according to the number of typical forms of fraud. Internationally, Citibank, the
first American bank and other European banks have long been an important tool for data mining as
credit card fraud research. However, China's credit card business started late, the lack of adequate
understanding of the particularity and potential risks, whether academic level or in the commercial
bank's anti-fraud level, there are no small distance with the international advanced banks, data
mining technology has not been applied effectively almost.
The above is the application of data mining in customer relationship management of commercial banks. At present in domestic commercial banks, not only for the understanding of data mining is shallow, the academic research is also at the exploration stage, most belong to the description and article, although in recent years there had been some empirical analysis of data mining application in customer relationship management of commercial banks, but almost all concentrated in the use of the software. By using this kind of software algorithm which is based on the number of data mining algorithms, accuracy and speed of mining should be improved, for example, clustering algorithm adopted the famous data mining software SPSS version 17 only two step clustering and K-means algorithm in data mining, clustering algorithm of the scholars all know, a lot of clustering results clustering is far better than the two algorithms, such as DBSCAN algorithm based on density; in addition to the defects of the algorithm, the academic research content is limited largely to classification and clustering, no more extensive research; in addition to the data mining results are not in-depth explanation and elaboration, in short, it is necessary for commercial banks to strengthen data mining technical understanding, thus the use of advanced data processing technology for the rapid development of bank service..

Concluding Remarks

According to the domestic commercial banks mining adverse problems of data, first introduced the data mining technology and its main task, and then introduces the main application of data mining technology in customer relationship management in commercial banks. It points out that most commercial banks in our country still remain on the concept of data mining technology, whether commercial banks or academia need to strengthen research and practice in this area.

References


