

A Framework and Analysis on the Application of Data Mining Technology in Financial Management

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Abstract — With the rapid development of information technology, services used grow from a simple business into a comprehensive service used in various aspects of the business and its management. Data mining as a key technology development of information technology, is showing its great commercial value, especially in the financial sector. Financial management is in an urgent need to develop in order to meet rapidly changing marketing concept from "product-oriented" to "customer-oriented." The data mining technology will be an effective tool to assist the successful transformation of the financial industry. In this paper, the key technologies of data mining and its applications in financial management is conducted in-depth with broad application value and market prospects.

Keywords - financial management; data mining; modern finance; banking information.

I. INTRODUCTION

With the rapid development of information technology, information technology and services used from a simple business, into a comprehensive service used in various aspects of the business and management. With the development of computer information technology, financial sector business day will have a lot of data, using the current database system can effectively achieve data entry, query, statistics and other functions, but cannot be found present in the data relationships and rules, cannot be based on existing data to predict future trends [1-2]. Data mining as a key technology development of information technology, is showing its great commercial value, especially in the financial sector. In this landmark financial reform, the data mining technology will be an effective tool to assist the successful transformation of the financial industry.

Financial analysis involves financing parties and the content, including financiers, financial market analysis and research. As for the company's financial position, credit situation, the company's value analysis, trading behavior of investors, investment decision-making methods, investment risk analysis, prices, interest rates, changes in exchange rates in the market analysis and so on [3]. Uncertainty in financial markets wood, but also the root causes of the financial analysis of whether it is financing, investors, regulators or service agencies, are often related to the use of quantitative analysis techniques and methods to market uncertainties determined. Its essence is to predict unknown variables goal for the final decision-making and action service, the general process of financial analysis is based on various assumptions, the mathematical model and the use of historical or current data to forecast analysis, and finally under the relevant financial theoretical conclusions. As forecast changes in prices, exchange rates, interest rates,

volatility, risk, return, etc. and both are based on the mathematical model under certain assumptions, and then to historical or current data as input variables to get the predicted output, as shown in figure 1.

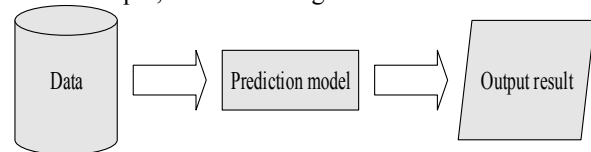


Figure 1. The financial analysis system model.

Obviously, this system function model and data mining technology is the same. Which is the key to build predictive models. Many financial theory is the study of the essence of how to construct a predictive model in line with reality, and to minimize the prediction error. But traditional financial analysis and theoretical prediction model used is often based on some critical assumptions, formal mathematical model is some simple expressions. Although this model is simple, with good explanatory and understandable, but it somehow damaged the prediction accuracy and data mining technology in some way and break this limitation. By analysis of the characteristics of financial data, we can more clearly see its advantages.

II. DATA MINING RELATED TECHNOLOGIES

Mining non-trivial knowledge determines the process data mining process large amounts of data is a multi-step analysis. The successful application of data mining techniques in order to achieve the target application process is a very complex thing. Process general data mining project to go through include: understanding, the understanding of the problem of data collection and preparation, set up a data mining model, evaluation model built application built

models and a series of tasks [4-5]. Here we introduce now the most commonly used data mining methods model, shown in Figure 2

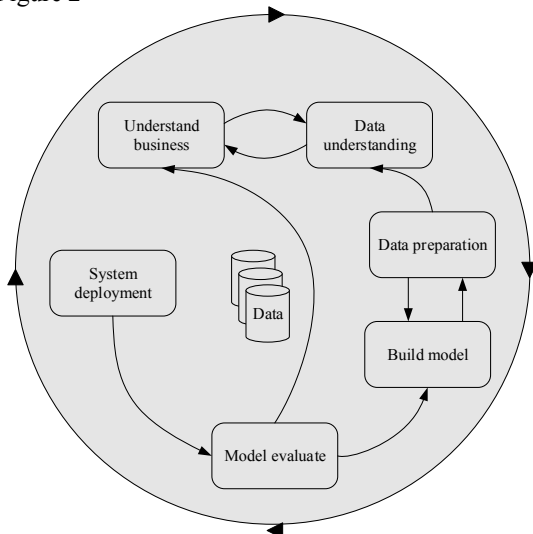


Figure 2. The model of data mining methods.

The following brief description of each step:

Business understanding stage. First determine the business goals, followed by project feasibility analysis, then determine the data mining goals, the final preliminary project plan.

Data Understanding stage. Data understanding phase includes the collection of raw data, describing data, exploring data, check data quality and so on. This project involved the collection of data, if necessary, the data load data processing tools, and make some preliminary data integration work, generate the appropriate report on the data to do some general description, such as the number of records, the number of attributes, etc. to give the corresponding report, to do simple statistical data analysis, such as the distribution of key attributes and the like.

Data preparation phase. Including data selection, data cleaning, data creation, data consolidation, data formatting and other methods. According to the data mining goals and data quality selection of suitable data, including the selection of the table, record and attribute selection options, choose good data to improve quality, such as removing noise estimate missing values, etc., to generate a new property on the basis of the original data or recording, the use of table joins, etc. and several data sets together, finally converting data into a format suitable for data mining process.

Model stage. Including the choice of modeling techniques to model, test plan design, model train, model testing and evaluation. Determine data mining algorithms and parameters, may use multiple algorithms, design quality and effectiveness of the mechanism of some kind of test models run on the prepared dataset of data mining algorithms, draw one or more model, model testing and evaluation: According to the test program for testing, from the perspective of data mining techniques to determine the success of data mining goals.

Model testing and evaluation. Tested according to the test program, from the perspective of data mining techniques to determine the success of data mining goals. Usually for the same data mining problem type, there will be a variety of methods. Some methods in data form, there will be specific requirements. Therefore, it is often necessary to return to the data preparation phase.

Once data mining is not a solution to end. In the processes and solutions lesson may lead to new, often more focused business issues. Behind data mining process will benefit from the experience of the past several.

III. DATA MINING IN FINANCIAL MANAGEMENT APPLICATIONS

Application of the financial sector in the field of customer relationship management. Commercial finance has been realized that customer is crucial to the business resources, and establish efficient CMR management system, can make the financial industry to better understand customer requirements, evaluation of customer value, to provide customers with personalized financial services, improve customer value, strengthen customer loyalty and retaining existing customers and explore potential customers and improve the financial industry profitability objectives. Data mining can bring a lot of existing customers into different classes, in each class of customers with similar properties, but not in the same customers have different properties. Data mining to help finance a detailed and practical customer classification, make marketers to better understand customer needs, attitudes and desires, to better provide diverse financial services, keep high quality clients, which in turn to cross-sell these customers..

Applications in Financial Risk prediction and control field. For this high financial risk and high-return industry, the key is to be able to control the risk to the limits they can afford while obtaining the maximum profit. To achieve this goal, we must account for scientific analysis and classification, and found the problem, and resolve risks. In this regard, the effect of data mining applications will be highlighted. Using the data in the financial industry customer information system database, using data mining techniques change and deviation analyzes customer credit risk analysis and fraud prediction, you can analyze why these risks will occur; what factors cause these risks; these risks mainly come from to where; how to predict the risks that may occur; measures taken to reduce risks; these risks by evaluating the severity, likelihood of occurrence and cost control these risks, the summary results of the evaluation of the risks, you can establish a set of strategies and monitoring system of credit risk management, credit risk management in order to improve the ability to accurately and timely monitoring of various credit risk, assessment, early warning and management, and then to the credit risk prior to its early warning and control.

Application of credit assessment and credit decisions in the field. Financial industry data mining applications second major trend is the establishment of credit evaluation model and credit decisions. The current trend of the financial sector corporate and individual customer's credit rating is not only

to guard against the risks, but also to the financial industry marketing needs. Scientific and comprehensive credit assessment is based on the industry a lot of basic data on the basis of large fusion, with more than financial areas, enterprises, governments have to establish a unified data platform, the integration of the underlying data will gradually be achieved. With data centralization gradual deepening our structured data and unstructured data, to build up a unified data platform which, for the application of data mining in the financial industry sector credit evaluation and lay a solid foundation.

IV. FINANCIAL MANAGEMENT DATA PROCESSING

The enormous data in a database, often contains judgment on rules, laws, such as high-level information or knowledge, only through the query processing is impossible to obtain the high level information. Data mining technology can provide data in the database, through the analysis and reasoning methods for certain internal relations between data, to unearth the potential, of forecasting and decision-making behavior plays a very important role in the model, to establish a new business model, in order to help decision makers to make the right decision. For financial management of the general data mining process is shown in figure 3. Among them, the search is a critical step in data mining model, because the data contained in the laws, rules or characteristics are shown in data patterns [6-8].

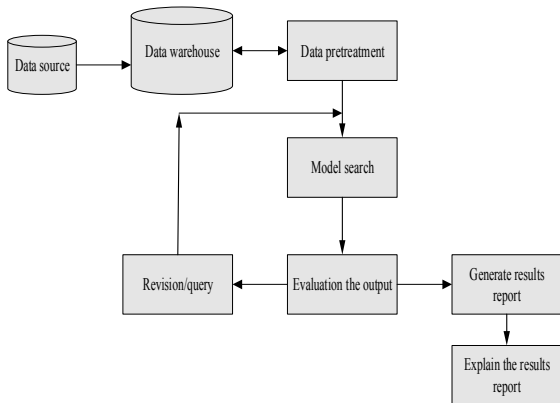


Figure 3. General process of data mining for financial management.

Prior to data processing, business understanding, understanding of the data is very important, which determines what data you want to select raw data mining, workload before entering the "data factory" is usually account for more than 60% of the entire process. In terms of raw data, more and more Internet-line dynamic big data is added. For example, a loan applicant false information through the analysis of network behavior can be identified traces of a real Internet users on the network will always leave clues. Timeliness of data useful for credit is also very critical, is generally recognized as a valid credit industry dynamic data is usually backwards from now on 24 months of data [9]. By obtaining a large multi-channel raw data, use statistical calculations and mathematical models to analyze, to evaluate a borrower's credit risk. The data for the financial

management process can be summarized as shown in Figure 4.

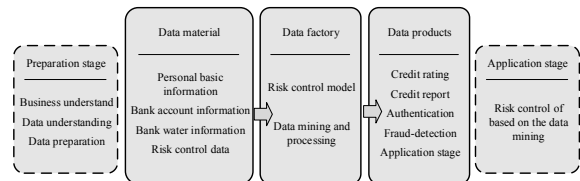


Figure 4. Data processing procedure for financial management.

Application of Data Mining Technology in the Financial Account Management

Banking to establish CRM data warehouse system was designed from the customer needs, timely and accurate decisions to develop the market, continue to maintain and expand the customer base, while optimizing the bank's internal resources, improve the operational efficiency of the banking and tap more revenue opportunities, in order to achieve earnings continued to grow. complete and accurate customer information enterprise to implement effective prerequisite and foundation of customer relationship management, and only in-depth understanding, understanding of customer basis, be possible to achieve effective marketing and customer service .CRM system a variety of information management to manage customer information should not be limited to the customer's name, address, telephone number and other basic information, but you want to understand customer needs and strive to provide help to totally manage customer-centric. for customers Classified information for standardized management, in order to provide relevant customer standard customer segments analysis in accordance with certain criteria will classify customers, identify basic consumer characteristics of each class of customers can get real value and consumption characteristics of customers, business Bank customers targeted marketing, sales and service provide the basis through the establishment of the bank's data warehouse system for CRM provides comprehensive, accurate data, in order to achieve support decision-making to make an accurate and rapid decision-making.

The CRM data mining is data mining theory and technology to create a model to describe and predict customer behavior in order to achieve effective customer relationship management business. Statistical data mining and machine learning ability, the Bank, through data mining tools, mining

The potential of customer information, including forecasting customer behavior, found that key customers, the investment behavior of customers advice and warnings, policy makers adjust the marketing strategy to help banks reduce the risk, make the right decisions. General banking CRM data mining process shown in Figure 5.

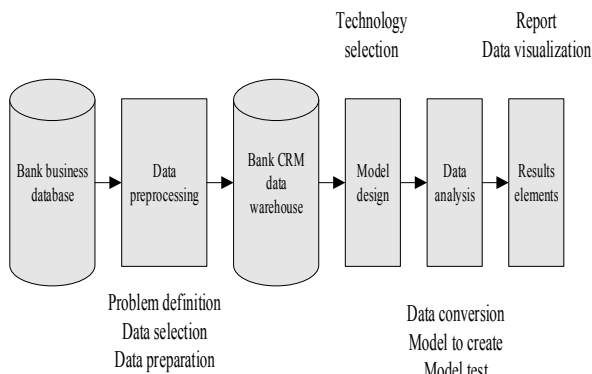


Figure 5. The bank CRM system of data mining process.

Data preprocessing stage. At this stage, we must first ask questions correctly. What is clear this operation the main task is, so to have targeted data mining. Later raised issues related to the database can be extracted from the business in the bank-related data, and data for data extraction, cleansing and summary. On the basis of domain knowledge on issues related to business, export verification, selection and preparation of data are required in order to discuss issues. Preprocessing data requires a lot of time, because the data must be culled from the system, and then be matched, screening and classification.

Model design stage. This phase requires in-depth examination of data and extract those issues most relevant fields. For example, through a variety of in-depth analysis of customer data to understand customer behavior, modeling, and predicting future behavior of customers. Minimize segmentation data into a general need to trim set and one or more test sets. Subdivision may also include the use of polymer technology to classify data into subsets based on common characteristics, then analyzed separately for each subdivision.

Data analysis phase. After the preparatory work of the previous two stages, this stage is the data mining data. We need to build the model for this data mining tasks designed after the model, and then the selected data mining tools applied to the data, the last independent set by at least one test data to validate the model. Also, the accuracy and validity of this model can be effectively interpreted and evaluated.

V. CONCLUSION

Data mining is a process of continuous improvement. After data mining can not be expected to conduct a try, we

can achieve the best results of data mining, so we can not instant success in the implementation of data mining. In fact, the first mining resulting model, its effect is usually less than ideal. We need by comparing actual and predicted values, the measurement accuracy of the forecasts, and thus more accurately identify the relevant factors, improved prediction methods. In the financial sector data mining is a long cycle process. Secondly, in the process of implementation of data mining, the financial practices of operators, financial database administrators and data mining developer of the three to be a tight fit. Because the correct understanding of the meaning of the data business model needs to work closely with these three categories of personnel; the same time, the number of mining results also need to work closely with its interpretation of these three areas. If any one component is missing, data mining would be difficult to continue.

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