

# Research on the Application of Business Intelligence based on Data Mining Technology in the New Industry

Min Dai, Yuan Wang

Jimei University, Xiamen, Fujian, China

**Abstract:** With the rapid development of Internet economy, new business forms emerge endlessly. In the face of massive commercial data resources, if modern enterprises want to cultivate their core business capabilities in the fierce market competition, they need to change the traditional data analysis methods to meet the needs of the development of the market. With the wide application of big data processing technology in various fields, the application of data mining technology in business intelligence has become the focus of enterprises. This paper discusses business intelligence and its related technologies, and analyzes the application of data mining technology in business intelligence under the background of new industries, then the existing problems and solutions in business intelligence application are analyzed, and finally puts forward innovative strategies of business intelligence application based on data mining technology.

**Keywords:** business intelligence; data mining; new industries; application

## I. Introduction

In the era of big data and in the ever-changing market, every field is transmitting information to enterprises every hour and every second. In order to respond to the market requirement and grasp market opportunities promptly, enterprises gradually turn their focus to business intelligence applications based on data mining technology. Through data processing technology, enterprises can accurately, timely and effectively transform data into information, and then turn information into knowledge, and use the acquired knowledge to assist leadership decision-making. Data summarizes knowledge, knowledge commands enterprise operation, and enterprise operation generates data. This continuous cycle can help enterprises to optimize and upgrade, and obtain greater benefits.

## 2. Overview of Business Intelligence and Business Intelligence Technology

In the era of big data, the amount of data is growing exponentially. Business intelligence is to mine knowledge through the integration of massive data inside and outside the enterprise, and provide a fast and accurate comprehensive business view to provide decision-making

basis, so as to achieve the transformation from data to knowledge and then to profit, and help enterprises make correct decisions to obtain greater benefits [1]. Business intelligence technology is not a single new technology in essence. It integrates data warehouse, data mining, data analysis and other technologies to provide a complete solution for enterprise decision-making.

## 3. The Characteristics of Business Intelligence

### 3.1. Fast Problem Finding and Data Analysis

With the continuous development of modern enterprises, business intelligence meets the business needs of fast problem processing and high data analysis efficiency. By using business intelligence in business process, Internet enterprises and platforms can form a more flexible work-flow. With the acceleration of data analysis speed, the speed of solving problems is also accelerated, and then reduce the difficulty of enterprise operation and management, also improve the operation efficiency of enterprises.

### 3.2. Trace to the Source and Solve the Problem Efficiently

In order to meet the enterprise's fine management, business intelligence uses OLAP online processing technology to perspective the data and conduct confirmatory driven discovery, that is, to analyze the causes of special phenomena by verifying or negating the previous assumptions. Through slicing and dicing, drilling, rotating and other operations of the data set, we can get the results from different angles to verify the conjecture, so as to obtain valuable information, and draw conclusions from it, and finally solve the problem.

### 3.3. Multi-dimensional Analysis with High Accuracy of Data Analysis

Business intelligence uses data warehouse and other technical methods to organize data, obtain data sources from data warehouse, establish multi-dimensional data sets, and observe data from various angles by rolling up and drilling down. It not only avoids the troublesome process of searching target data from a large number of data, but also intuitively allows observers to analyze data, and timely screen, retain and backup data to ensure timely use of useful data for more accurate information analysis, in

order to help enterprises achieve a good match between customers and products.

#### 4. Main Classification of Data Mining Technology

##### 4.1. Association Rules

Association rules are the correlation analysis between the two things, that is, quantifying the influence of the appearance of one thing on the appearance of another thing by numbers [2]. This method is often used in e-mail shopping websites such as Taobao to recommend related ancillary goods after purchasing goods. For example, after purchasing a mobile phone, the bottom of the settlement page will recommend mobile phone case, headset and other products, or after buying clothes, the matching pants will be recommended, which will provide a faster screening scheme for customers who want to buy together. By integrating the purchase data of historical users, establishing association rules model, and predicting the given commodity collocation set, it can provide users with convenient, personalized and professional collocation purchase scheme, realize precision marketing, and help businesses achieve the purpose of promotion.

##### 4.2. Classification Analysis

Classification analysis is based on a certain standard to be analyzed object class label, and then according to the class label to distinguish classification. Classification analysis obtains the standard through the training set, and predicts the classification of the unknown label object with the standard.

*Decision tree model:* The decision tree model is to classify the data and generate rules by constructing a tree. In the decision tree model, the data needs to be partitioned into training set and test set. In other words, the training set is used to generate rules, and then the test set is used to test the accuracy of the rules. The rules generated by decision tree are easy to understand.

*Bayesian model:* Bayesian model emphasizes causality, and does not need to partition data like decision tree. Bayesian model predicts the importance of variables by itself, and then establishes Bayesian network through the relationship between decision variables. Assuming that each attribute is independent of each other, as a prerequisite for the formation of Bayesian network, then the conditional probabilities between attributes only need to query the nodes in Bayesian network.

##### 4.3. Cluster Analysis

Clustering analysis does not need to provide class labels as a standard in advance, but starts from the sample data, and the clustering algorithm automatically groups the data with high similarity, and then explores the causes of the group. For example, in the analysis of commercial customer data, clustering algorithm analyzes whether the attributes of customers have greater commonness to some extent, so as to group customers. According to the group results, the characteristics of each customer group are summarized, so as to cluster customers with similar characteristics in the future.

#### 5. Intelligent Application Based on Data Mining Technology

##### 5.1. Application in Epidemic Prevention and Control

The data are extracted from the large-scale database collected during the COVID-19, and the disordered and unorganized data are extracted, cleaned and transformed by using data mining technology to mine the hidden information. By determining the travel address, work style, interpersonal communication and other data of the patient group, the relevant parameter algorithm is set up, and the association rule model is established. Then track the key groups to realize the management and control of personnel, so as to view the real-time dynamic and detect the epidemic situation, and provide effective information for the decision-making of government departments. In the epidemic period, the number of clues collected through various channels is huge and complex, so it is difficult to obtain useful information through manual processing of these unstructured text data. Therefore, important texts can be extracted through data cleaning, integration, specification and other preprocessing methods, and then cluster analysis based on semantic or structural similarity can be carried out to establish infectious disease clue information mode [3,4], so as to obtain reliable and effective information for managers.

##### 5.2. Application in E-commerce

*Product intelligent recommendation and information retrieval service model:* With the online shopping mode being accepted by more and more people, the frequency of e-commerce transactions is gradually increasing. Using data mining technology, we can build an intelligent recommendation model based on user characteristics according to user's historical data, and customize personalized services and promote products by combining user's browsing history and consumption interest characteristics. Push the content of goods and services through mobile phone software or Internet platform, and transfer the latest first-hand information to users. In addition, the traditional way of information search has been far from meeting the personalized needs of users, e-commerce information retrieval to intelligent direction has become the mainstream of the development of the times. On the one hand, data mining technology provides technical support for the construction of information retrieval service model. Providing information retrieval service model can help users solve the problem of information overload and easily obtain the target content from a large amount of information. On the other hand, the use of artificial intelligence on the graphics and image retrieval system, from a large number of business information to screen out the characteristics of the transaction products, can meet the needs of users through image recognition to buy goods.

##### 5.3. Application in Customer Relationship Maintenance Management

The business service concept of "customer-centered" requires enterprises to think about how to better meet

customers' consumption needs in the process of customer relationship maintenance and management [5]. Through the data mining technology of deep mining and analysis of customer information, we can explore the potential business value of a large number of information. Such as the analysis of customers' use or satisfaction of the platform or products, so as to provide consumers with interested products in view of customers' consumption behavior. This can not only improve customer satisfaction and build customer loyalty, but also maintain the stability of the object, which is conducive to the long-term development of the enterprise.

#### 5.4. Application in Financial Enterprises

Data mining technology also has important applications in the financial field, mainly reflected in risk identification and investment. Financial enterprises need to identify and evaluate the investment risk before investment in order to minimize the investment risk. Therefore, financial enterprises can use data mining technology to predict the risk of planned investment objects. For example, when dealing with loan problems, banks can use the data of previous default loans to judge the customer characteristics of default repayment by establishing a model. According to these characteristics, we can reduce the loan or provide other products for the customers who meet these characteristics in the future, so as to reduce the loss of the bank by avoiding the risk of some customers not repaying the loan.

#### 5.5. Application in Telecommunication Field

With the help of data mining technology, it can help telecommunication enterprises quickly screen and integrate business data such as SMS number, call duration and call fee details to achieve the purpose of more timely and flexible analysis of business problems. The combination of data warehouse and data mining technology creates better services for telecom enterprises in customer churn analysis, revenue analysis and product analysis, so as to create more revenue for telecom companies. For example, in the aspect of customer churn prediction, through the automatic mechanism of data mining, on the one hand, it analyzes the reasons of customer churn, improves the deficiencies of enterprise operation to enhance the user experience. On the other hand, it calculates the possibility of retaining customers according to the success rate of model prediction. In this way, it is convenient for customer managers to care about customers purposefully and emphatically, and take other relevant measures to improve customer service, so as to minimize the cost of retaining customers and reduce enterprise losses.

## 6. Existing Problems and Solutions of Business Intelligence Application

### 6.1. Commercial Data Security

In the era of big data, most enterprises do not maintain the data system in place or lack the awareness of confidentiality supervision, and fail to really consider the data and information security of users. Therefore, user

data leakage and other business data security problems have become the important problems that need to be solved urgently. For example, when consumers use software like Didi Taxi, the platform can obtain the user's specific location information, as well as the user's mobile phone number, name, address and other personal data. Although this kind of mobile terminal software meets people's diversified travel needs, it is also prone to the risk of personal privacy leakage. For the protection of private data, some business platforms have not yet provided strong and powerful security protection, which makes it difficult for users to use related products with confidence.

Therefore, the business platform should pay attention to data security, adopt hierarchical management system, so as to implement the responsibility to increase supervision. Effective maintenance of network system, background database or data warehouse is an important means to ensure network security. Timely improvement and maintenance of the system can effectively reduce the occurrence of system vulnerabilities. Big data is the inevitable product of the development of the times. Only by strengthening the supervision and protection of users' information and the law enforcement supervision of businesses, can we prevent users' information from being illegally used by bad businesses.

### 6.2. Data Screening and Identification

Clean and complete underlying data source is the basis to ensure the accuracy of the model in data mining, and the effective data analysis results of the model can provide accurate matching services for enterprise supply and demand. Even if the source data of an enterprise is clean, integrated and verified, they may still contain untrue and messy data from the real world. Without the authenticity, objectivity and effectiveness of the data as a guarantee, the data analysis results will have huge errors, which will lead to decision-making errors.

In order to ensure the quality of data, enterprises should continue to monitor the internal operation process, and make periodic summary and report to strengthen personnel's screening and identification of data, so as to ensure the real value of data mining technology.

### 6.3. Lack of Talents with Comprehensive Data Analysis Ability

Talent with comprehensive data analysis ability is an indispensable support for enterprise data operation. However, some enterprises lack the awareness of setting up professional data processing team. On the one hand, it leads to the lack of data processing thinking and big data concept in the operation process. On the other hand, the enterprises lack the support of relevant data analysis results in the decision-making process of major issues, which fails to achieve the optimal decision-making effect and affects the future development planning of enterprises.

In the era of big data, enterprises need to cultivate a professional team to fully tap and utilize the value of big data, build a big data processing center, and realize the data operation of enterprise marketing management through the internal cooperation of departments and the

optimization of data thinking, so as to promote the sustainable development of enterprises.

## 7. Innovation Strategy of Business Intelligence Application

### 7.1. Intelligent Integration of Logistics System

At present, China's logistics industry is developing rapidly, but the logistics system involves the coordination of customers, finance, scheduling, vehicles and warehouse management, so it is still difficult to establish a relatively complete logistics system. The management of logistics system is not only the management of materials, but also the comprehensive management of logistics information [6]. The integration of business intelligence and logistics management can realize the comprehensive observation and analysis of the whole process of logistics operation. The application of ETL Technology can integrate the data inside and outside the enterprise, realize multi-party data sharing, improve business processing efficiency and establish a perfect supply system through multi-dimensional call of data storage management. Finally, the logistics report forms are provided or the data analysis intelligent database is established by using the digital visualization processing method to provide decision-making basis for enterprise managers.

### 7.2. Refine the Field of Consumer Services

Business intelligence can provide different dimensions of analysis ideas for enterprises. Through multi-dimensional analysis of customers' consumption tendency, product category, consumption level, gender ratio and other aspects, enterprises can carry out corresponding marketing activities according to different characteristics of consumers' needs, and further refine the field of consumer services. For example, in the field of e-commerce, for male users, we can provide detailed services of science and technology products, while for women, we mainly provide cosmetics and other beauty products. It provides multiple shopping experiences for different types of consumers through similar user differentiation.

### 7.3. Consumers' Accurate Portrait, Data Strengthen Shopping Behavior

Enterprises can use the data mining model to generate a list of customers with applicable rules, find out the common characteristics of these customers, determine the objects of promotional information distribution, and draw accurate consumer portraits. Distinguish different levels of users, so as to develop different value levels of sales strategy. At the same time, the platform can guide consumers to shop according to the data in the analysis results, and strengthen consumers' shopping behavior. For example, through the data analysis of support, confidence and deployment ability of association rule model, using the relationship between goods in strong association rules, we can optimize the arrangement of goods when placing goods in shopping malls, and place the goods with strong association together or in the same area. When a user

purchases a product, the probability of another product being purchased together will also increase. On the other hand, according to the promotion rate of association rules algorithm, it can be seen that recommending products to customers according to rules will improve certain efficiency than randomly recommending products, so we can judge whether to recommend products to customers through appropriate parameter selection, so as to strengthen customer consumption behavior.

## 8. Conclusion

With the interconnection of everything and the rapid increase of data resources in the era of big data, it is not enough to rely on traditional data processing methods to obtain useful business value from a large number of data information. The application of business intelligence technology, on the one hand, can save manpower and material resources, improve the efficiency of data processing, on the other hand, can accurately obtain market feedback information, and provide strong data support for enterprise decision-making. In the future, reasonable business intelligence application will become the strategic orientation of many enterprises. Business intelligence based on data mining technology will be applied and developed in more fields such as medical treatment, manufacturing, scientific research and so on. Therefore, fully understand the importance of business intelligence technology application based on data mining technology, master the relevant algorithms and theories, and select the appropriate data mining technology in the application process combined with the actual situation, then we can maximize the commercial value of data and data technology.

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