Research on Automobile Marketing Customer Acquisition Technology Based on Data Mining Algorithm

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Abstract

With the continuous maturity of the automobile market and the increasing degree of competition, how to increase customer satisfaction and allocate marketing resources reasonably and effectively has become a problem that every automobile enterprise needs to face. After years of operation, automobile sales enterprises have saved a large amount of historical data in the operational database. The necessary analysis of these data can reflect certain laws in the process of automobile sales. The continuous development of Internet, computer and communication technology in the new era has fundamentally changed the traditional world economic structure. By using data mining, we can find potentially useful information and knowledge from a large number of actual business data, and apply these knowledge to the business decision-making process. In this paper, data mining technology is applied to the field of automobile sales, and a large number of business data in the field of sales are processed, from which the key data for assisting automobile sales decision-making are extracted, thus providing help for scientific automobile marketing customer acquisition.

Keywords*: Data mining, Marketing management, Automobile*

Ⅰ. Introduction

Sales is not only the starting point of enterprise management, but also the focus of realizing enterprise benefits. After years of operation, automobile sales enterprises have saved a large number of historical data in the operational database, which contains a lot of useful information [1]. The necessary analysis of these data can reflect certain laws in the process of automobile sales. Under the influence of the continuous development of market economy, enterprise products began to develop in the direction of homogenization. The product life cycle gradually shortened, the technology changed faster and faster, the customer selection was more diversified, the buyer's market competition gradually increased, and the customer transfer cost gradually decreased [2]. Due to the homogenization of cars and the maturity of customers, the introduction of products and the summary of characteristics are becoming less and less important. Instead, it is the acquisition of customer needs and the impact on customer needs [3]. Because if there is no customer demand, the future work will be impossible. The continuous development of Internet, computer and communication technology in the new era has fundamentally changed the traditional world economic pattern [4]. With the gradual acceleration of economic multi polarization, globalization and integrated information technology, the traditional sales strategy can not meet the needs of social development, and takes the central customer as the main development direction of business model [5]. How to use data mining technology to mine useful decision-making information from the daily business data of enterprises, so as to meet the personalized needs of customers as soon as possible and accurately predict the market trend will become the key to the survival and development of automobile manufacturing enterprises.

The sales services provided by many domestic automobile enterprises are roughly the same. For consumers, their choice range is very narrow. They can only judge whether they can obtain the maximum benefits by the price of these products and services [6]. Such a market environment makes enterprises have great sales pressure. In marketing, they can only attract consumers by reducing product prices. If it is difficult to win in an increasingly

competitive environment by relying solely on product progress and R & D, this is particularly prominent in automobile enterprises [7]. How to continuously improve the actual transfer cost of customers, realize the continuous extension of customer life cycle, and obtain a greater competitive share only by maximizing customer profits [8]. With the steady development of China's automobile market, the gradual prosperity of automobile aftermarket and the increasing desire of automobile marketers for digital marketing decision-making [9]. This paper proposes to apply data mining technology to the field of automobile sales, process a large number of business data in the field of sales, and extract the key data to assist automobile sales decision-making, so as to provide help for scientific automobile marketing customer acquisition.

Ⅱ. Significance of Data Mining in Automobile Sales Customer Analysis

In the face of massive information and increasingly diverse needs of customers, it is impractical to rely only on traditional manual analysis, and must rely on data mining tools, using classification, cluster analysis and association analysis algorithms. Through highly automated machine learning, the analysis of these massive data information can be completed, and the behavior habits and preferences of users can be found to help enterprises achieve the purpose of precise marketing. Compared with the traditional data statistical analysis method, in terms of assumptions, data mining technology is to discover the undiscovered and effective information from the actual massive data without setting explicit assumptions, that is, to discover hidden knowledge. The traditional analysis method is to manually establish an equation or model which is consistent with the hypothesis. In terms of data volume, data mining technology far exceeds the data volume that traditional analysis technology can carry. On the object, traditional data analysis can only analyze digitized data, while data mining can adopt different types of data. The implementation of customer relationship management requires comprehensive integration, collection, analysis and utilization of customer data and information.

Under the influence of people's rising demand and the growing development of automobile industry, effective customer relationship management plays an increasingly prominent role in the competition activities of modern automobile sales enterprises. Profit-oriented marketing has been gradually replaced by customer-oriented marketing. The structure of profit-product-customer relationship is shown in Figure 1.

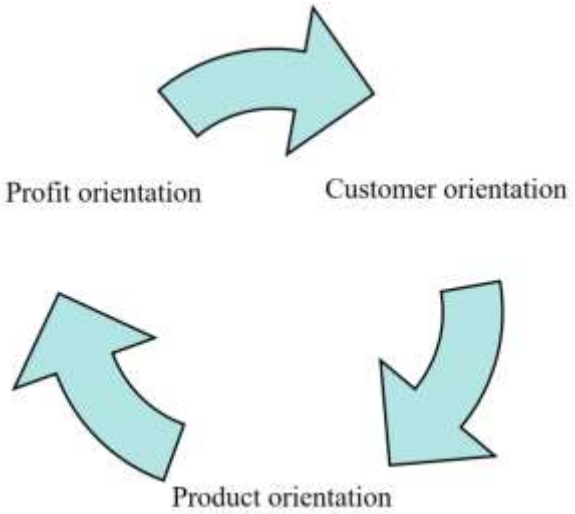

Fig.1 Profit-Product-Customer Relationship Structure

Under the influence of information explosion era, how to obtain downhill information from complicated data has become a concern of many people. Data mining obtains hidden and unknown information from incomplete, massive, fuzzy and noisy data. The combination of data mining and data warehouse technology can help decision makers to mine hidden regularity in data more effectively. In automobile marketing, we can use clustering method to analyze

who prefers middle and high-grade cars and what customer characteristics they have. By using data mining technology, we can comprehensively understand the various characteristics of user behavior and quantitatively analyze the behavior of automobile users. For example, classification analysis can be applied to market research of automobile industry. In the automobile industry, for the high-value customers who buy a lot of cars and purchase a lot of money, automobile enterprises should win, expand and maintain these high-value customer groups. The practical application of data mining technology in automobile sales industry can help sales staff find more target customers and mine gold customers, thus providing more information and data support for further cultivating enterprise loyalty. The theoretical model of customer behavior intention is shown in Figure 2.

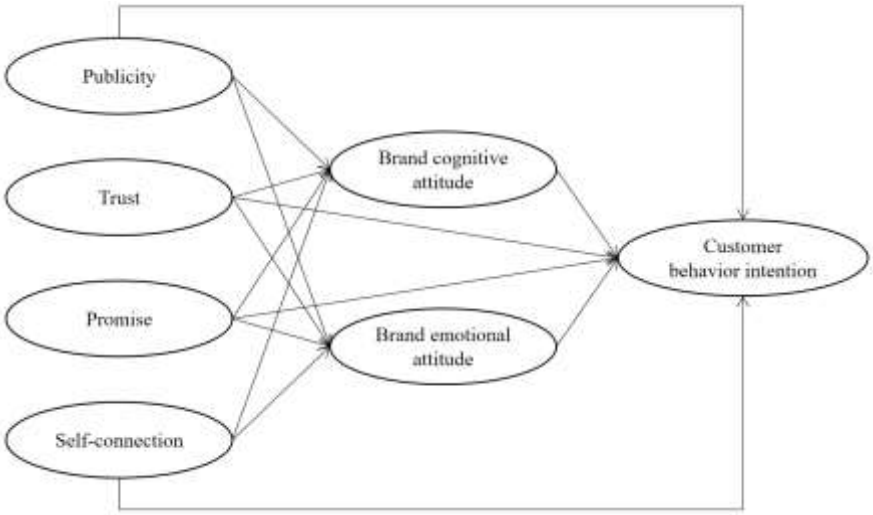

Fig.2 Theoretical Model of Customer Behavior Intention

In terms of customer churn and customer retention, auto companies or auto dealers can build early warning models of customer churn and formulate customer retention strategies by using data mining algorithms to reduce the tendency of customer churn. The idea of building the early warning model of loss is to analyze and process the representative automobile users' data information, sum up the behavior characteristics and laws of customers with loss tendency, establish a data mining model, and constantly carry out empirical verification [10]. The implementation of customer management system can help enterprises to better understand customer needs, thus improving the relationship between customers and enterprises, ensuring that customer satisfaction is improved and the competitiveness of enterprises is continuously improved. In the fierce competition of market economy, enterprises must link business operation with market demand, and make scientific and correct decisions on this basis in order to survive. For this reason, enterprises have set up their own databases, which are managed by computers instead of manual operations, so as to collect, store and manage business operation data, improve the office environment and improve the work efficiency of operators. If automobile enterprises want to realize digital marketing, they need to have sufficient reserve of experts in data mining, automobile and marketing, and integrate their capabilities and business through an effective management organization platform to give full play to their business value in precise marketing.

Ⅲ. Customer Analysis Based on Data Mining Technology

The requirement of enterprise customers' resources requires not only a sufficient number of customers, but also a higher level of customer groups. Using scientific customer information analysis method can not only get the overall level of the existing customer groups, but also understand the position and competitiveness of some major customers in the industry, and then tap more potential customers for enterprises. Customer management system can help sales enterprises to search customer information according to established requirements, help enterprises to analyze customer systems by using a relatively unified interface, implement necessary classified management for enterprises

to search their information from customers at different levels, implement necessary classified management, and sell products to customers at different levels and different grades to avoid the phenomenon of customer churn. Using data mining method to analyze the dynamic process of enterprise development from the long-term accumulated data of enterprises can analyze the advantages and disadvantages of enterprises according to their management level and the development level of their industries. Finally, the analysis data is used to improve the management level of enterprises and the level of customer relationship management. In the process of data mining, it is necessary to extract a sample data set related to the exploration problem from the original data set. The platform structure of intelligent Web information retrieval platform based on big data marketing mode is shown in Figure 3.

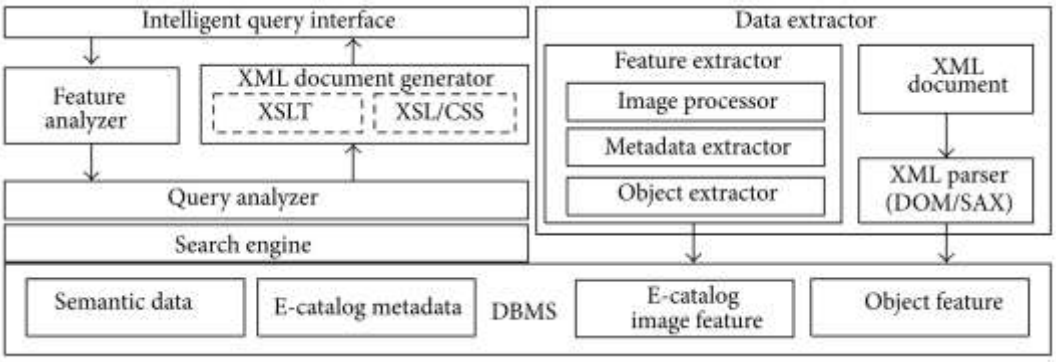

Fig.3 Intelligent Web Information Retrieval Platform

In the process of data selection, the most important thing is to pay attention to the quality of data. Only high-quality data can help to draw more correct conclusions. Its main work is to determine the inclusion and elimination of data in the analysis. Diversification of customers requires enterprises to subdivide different customer groups and provide personalized services to them. In the specific method, the customer group can be subdivided by decision tree algorithm, and each customer can be subdivided by decision tree algorithm according to their age, educational background and income. Misdeletion or malicious deletion of data by users will bring serious consequences to enterprises. Deleting data requires a perfect confirmation mechanism. When an abnormality is found, the data can be recovered within a limited scope. In addition, the system must provide data backup and data recovery functions, and can track key operations [11]. Dealers need to forecast the market demand of automobiles so as to make sales plans, while manufacturers also need to forecast the automobile market so as to make production plans. The premise of data mining is to collect customer information and establish a database. Its advantage is that it can centrally manage relevant information, and the data of various departments need to be managed uniformly and effectively, which cannot be dispersed. Only by comprehensively understanding the data of customers and other information can enterprises achieve long-term development. Different from traditional CRM, CRM in automobile industry must reserve a place for dealers, which is determined by the particularity of automobile industry.

Like traditional CRM, CRM in automobile industry also needs to analyze customer life cycle carefully, which is actually analytical CRM. With the development of test technology and the expansion of application scope of the system, new test data types and data dimensions will appear, and the corresponding conditions description items will also increase. The system should support the dynamic addition of the above contents and apply them to the import process of new data types, and the corresponding retrieval items should also be dynamically added to ensure that the system fully supports the management of new data. Between enterprises and customers is no longer a simple transaction behavior [12]. When customers and enterprises are in an equal position, business rules become more complicated, including signing contracts, financial lending, resource sharing and other business activities. The credit maintenance of customers needs scientific analysis, because excellent customers can bring profits to enterprises and discover potential markets.

Facing the market environment with diversified customer sources and diverse customer value preferences, it is necessary to capture this market signal as timely as possible, and catalog it according to the customer's consumption

characteristics and preferences, so as to form different customer groups with their own characteristics but connected with each other. The data mining process in financial analysis is shown in Figure 4.

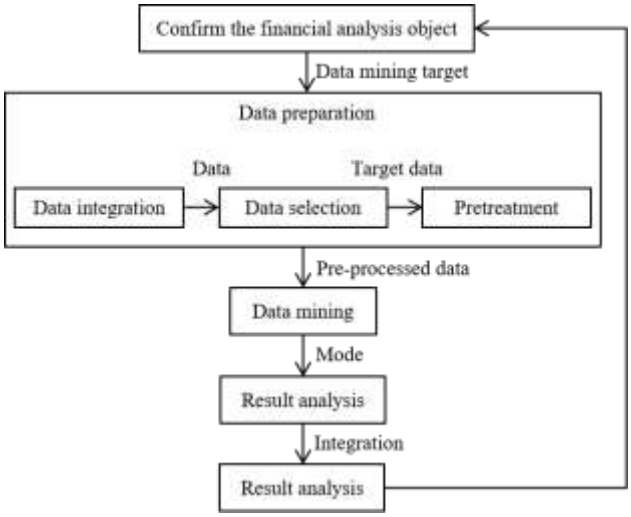

Fig.4 Data Mining Process in Financial Analysis and Management

According to the transaction data and the user's evaluation information, the user's preference for each automobile product category can be calculated:

$$PC_{u,j} = \frac{\sum_{i \in I_u} PI_{u,i} \times \mu_j(x_i)}{\sum_{i \in I_u} \mu_j(x_i)} \quad j = 1,2,3\ldots \quad (1)$$

In the formula: $PC_{u,j}$ represents user u's preference value for category, $PI_{u,i}$ represents user u's rating value for product i, I_u represents the set of products that user u has evaluated, and $\mu_j(x_i)$ represents the degree of membership of product i to category j.

According to the past and present data information of the automobile market, the automobile sales forecast will use the existing knowledge, experience and scientific methods, and the existing historical data of the enterprise to pre estimate and speculate the future development trend of automobile sales, so as to help the enterprise make decisions, so as to provide the basis for production or sales planning. The result of data mining, that is, the model or business rule set, needs to be quickly deployed to the business application end to guide the actual marketing business, dynamically evaluate the accuracy and robustness of the model through the timely feedback of the business end, and carry out the next round of model optimization [13]. Due to the increasingly saturated market and fierce competition in the automotive industry, the cost of acquiring new customers is much higher than that of retaining original customers. Predicting the loss of customers and taking effective measures to retain customers have become an important issue in automotive sales. Using the genetic algorithm in data mining, we can find the most profitable customer group, and automobile enterprises can treat the customers with the customer characteristics as the company's key customers and prevent the loss of customers. For auto dealers, the credit evaluation system can analyze the credit of target customers from the customer information database, and the credit analysis results can formulate corresponding marketing strategies for enterprises [14]. Using data mining, we can find valuable information for enterprises from a large number of customer information. The general process is to collect customer data, and then analyze the data. The salesperson can find the basic needs and differentiated needs of the target customers, and finally make the salesperson adopt marketing strategies for effective marketing.

Ⅳ. Conclusions

With the increasingly fierce competition in the automobile distribution industry, the sales profit of new cars is getting lower and lower, and the core of the automobile industry shifts from products to services, and customers have become the key to improve the core competitiveness. A large amount of data accumulated in the automobile sales system are all operational data, and the data in the data sources we need to mine data are distributed in different data tables. The application of data mining is a complex system engineering, which requires the cooperation of users, data mining technicians and domain experts. Data mining can be used to find valuable information from a large number of customer information. The general process is to collect customer data, and then analyze the data, so that the sales staff can find the basic needs and differentiated needs of the target customers, and finally make the sales staff adopt marketing strategies for effective marketing. Under the influence of network information technology, the differences between enterprise products began to shrink slowly, and high-quality customer service gradually became a powerful weight for modern automobile sales enterprises to participate in the competition. Applying data mining to the customer management system in the field of automobile sales can help sales enterprises to formulate targeted marketing strategies, thus gaining greater competition and development advantages.

Ⅴ. Acknowledgment

Fund Project: The “14th Five-Year Plan” of Hebei Vocational Education Scientific Research Project “Study on the Construction of Work Manual Textbook in Higher Vocational Colleges-Taking Automobile Sales Practice as an Example” (Project ApprovalNo.: JZY21078).

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