

# The Analysis of Intelligent Marketing Platform in High-Tech Products by Data Mining Algorithm

CHUNG-CHIH LEE

Graduate School of Business and Operation Management  
Chang Jung Christian University  
TAIWAN

HSING-CHAU TSENG

Department of Business Administration  
Chang Jung Christian University  
TAIWAN

CHUN-CHU LIU

College of Continuing Education  
Chang Jung Christian University  
TAIWAN

HUEI-JENG CHOU

Department of Accounting and Information Systems  
Chang Jung Christian University  
TAIWAN

*Abstract:* - Under the background of the rapid development in internet technology, the whole marketing is developing towards the direction of intelligence and high technology. The novel social network based on internet technology occupies an important part of the marketing, and has also been widely concerned by the academic community, because the internet makes information data transparent, and the mining, analysis and algorithm research of a large amount of data can provide decision support for marketing and intelligent marketing. Modern data mining analysis mode has become the main solution for data problems. With the development of network technology, business intelligence related to the marketing of high-tech products will become the key component of the future business system, which depends on the overall architecture of the cloud and plays a core role in the process of data analysis and mining.

*Key-Words:* High-tech products, intelligent marketing platform, Data mining algorithm, Machine learning, Cluster.

Received: July 24, 2021. Revised: January 5, 2022. Accepted: January 23, 2022. Published: February 9, 2022.

## 1 Introduction

Marketing is to convey to users a product, service, brand value, the purpose is to sell and sell products, services, improve the brand value [1]. Marketing techniques include selecting a target market through market analysis and segmentation, understanding consumer behavior, and communicating the value of the product to consumers through advertising. By collecting and analyzing relevant information of the company, intelligent marketing can accurately identify market opportunities and formulate market penetration strategies. Data analysis based on cloud environment is an important analysis technology,

which depends on the cloud and the overall architecture of the cloud [2]. The data construction module plays an important role in the process of data analysis and mining.

## 2 Data Mining Service Pattern Analysis

### 2.1 Service Modeling Approach

In order to realize effective data analysis, it is necessary to establish relatively effective models based on data mining through cloud computing and

other relevant service technologies, describe and identify functions through the whole process of data service, and better analyze the relationship between data and data. Generally, the data processing system mainly has different levels of content. The purpose of the infrastructure layer is to provide data information for each work, access physical resources through terminal interfaces, and provide critical interfaces for the virtualization process. The virtualization layer makes use of virtualization tools to summarize different data resources in the cloud environment, and logically encapsulates all the resources, and provides them to the platform layer for subsequent development from the allocation and scheduling process. The platform layer is the key part of the whole modeling system, and it is also the service layer for data analysis. Finally, there is the application layer, which directly provides services to users. If users want to manage the service structure through processing and requests, they need to expand their identity authentication through the application layer.

## 2.2 Data Mining Services

In the whole process of data mining, each step is closely related to each other. The process of target data analysis is completed by building a model, and the contents of the model are evaluated and discussed with the help of initial resources, and its practical application methods in subsequent work are analyzed. From this point of view, we carry out content analysis according to the problems, so as to understand the work objectives to be achieved and master the requirements of sales objectives in the field. If we evaluate the behavioral trend of consumers, we can analyze whether the existing resources can meet the needs of users through data mining. If we can satisfy the relevant information, we can further analyze the behavioral process of target data mining. The whole process is divided into several parts. The first is the initial data preparation, because the data processing process is not only for the large amount of data on the network, but also to clean up the data of many answers to determine how some overlapping resources are allocated. In addition, in the process of classification and integration of the basic data, more valuable indicators need to be found from the existing data to achieve the overall cleaning and impurity removal of the data, and finally complete the operation loading process. Then is the data collection, data mining work, the premise is to collect all the data, according to the data collection process in the problem planning. For example, the data included in multiple files or systems will

inevitably overlap, so it is necessary to perform repetitive cleaning and unified storage management of different data. In the face of a large amount of data, how to select valuable contents according to the actual needs of consumers can reduce a large number of invalid work, reduce the work scale of the calculated data, and select the appropriate tuples to the greatest extent on the premise of keeping the original data unchanged. In general, the filtering process of data requires unified management and control of the same type of data, especially how to automate data processing in the context of massive data, which has become the key to process standard management and control. In this process also involves the processing of the wrong data. After clarifying the essence of the wrong data, the existing defects are corrected. If there are a few errors in a large amount of data, it will not affect the overall degree of data perfection. On the contrary, if the error ratio is too high, directly deleting these data will inevitably affect the accuracy of the entire data set, and then affect the subsequent operation. Therefore, it is necessary to consider how to deal with the null values in the data set, for example, choosing the means of professional experience analysis and regression analysis to compensate for the null values. In the process of data conversion, the data attributes are discretized into different types of interval, if the data in the interval is mapped into the discrete value of the response. According to the whole process of data processing, the analysis technology process is closely related to the data processing of data sources. The correctness and integrity of this data will directly affect the quality of data mining. However, the current cloud computing architecture has a strong computing capacity, which can provide a large amount of data analysis for the daily behaviors of enterprises, so as to facilitate the analysis of relevant characteristics of commodity attributes and user behavior tendencies. The modeling process of data mining is a key part of data analysis [3].

## 3 Task Learning Methods for Intelligent Marketing in High-Tech Products

Product sales time is the active cycle of products in the market, and is also a key indicator to measure the market development of related industries. From the micro level, product sales time is not only highly concerned by the seller, but also the main reference for potential consumers to evaluate. Because in general, the shorter the product sales time is, the

more popular the product is. From a macro perspective, it can be used as a reference for market liquidity. The shorter the product sales time is, the better the market circulation performance of the product is. Therefore, we study the data mining methods related to product intelligent marketing, and establish a decision system based on it. The key is to determine the potential sales time of the product. In the process of modeling and prediction, it is necessary to analyze the possible adverse effects of various potential factors. After obtaining the characteristics from each type of data, the regression method based on multi-task learning can predict the time value. If necessary, it can carry out experimental verification through a large number of real product information, and determine the value and role of multi-task learning method and decision system through demonstration system. In countries and regions with relatively developed market economy, many enterprises begin to conduct in-depth processing of business information through data mining on the basis of the original information system, so as to establish their own competitive advantages and expand their turnover. American express has a 5.4-billion-character database to track its credit card business, which continues to be updated as the business progresses. Express company through the data mining, formulated the "relevant settlement base (ship) to provide" sales promotion strategy, that is to say, if a customer bought in shops and a group of fashion, so in the same shop to buy a pair of shoes, you can get a bigger discount, increasing sales, also can increase the utilization rate of expression. For example, cardholders who live in London and recently flew to Paris on a British airways flight might get a discount card for a weekend trip to New York. In this way, the data mining is very effective, which can not only accurately locate the information of the target customers, but also provide the necessary reference for the performance work [4].

The main work. The main work of task learning method can be divided into two aspects, one is the marketing time of the product, the other is the content of multi-task learning. Relevant experts and scholars have conducted in-depth research on product sales time, focusing on the relationship between product marketing and product price. It is worth mentioning that there are contradictions among some research results. For example, many documents mention that there is a positive correlation between product marketing price and time, while some studies believe that there is a negative correlation between the two variables. The reason for this kind of situation is that different

experimental Settings produce different results, for example, different mathematical models will bring different differentiation results to the variable relationship. As researchers, we should pay more attention to the attributes and information of the commodity itself, so as to provide reliable solutions for the platform construction. Specifically, each method has its own advantages and disadvantages in the prediction of results. In this study, we will try to adopt machine learning technology to improve the performance of the method, taking into account the logarithmic changes involved in variables. Multiple learning is a widely selected machine learning method, which USES the correlation between tasks to analyze the different performance of classification regression. This method first appeared in the research of neural network technology. In the subsequent research, the multi-task learning mode began to appear and formed a key research branch, which is also the basis of the method adopted in this project [5]. Its overall structure is divided into cluster structure, graph structure and tree structure, as shown in Fig 1, Fig 2 and Fig 3, respectively.

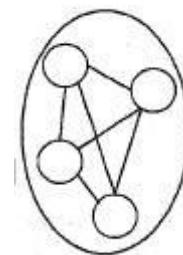


Fig. 1: Cluster structure

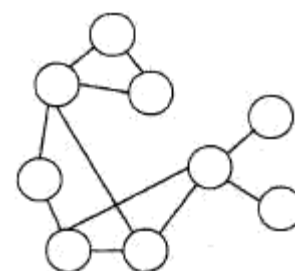


Fig. 2: The graph structure

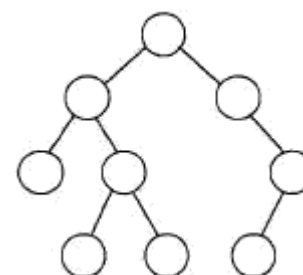


Fig. 3: Tree structure

The difference between learning tasks is reflected by the multi-task learning method. The main difference lies in the hypothesis between different types of task relationships, which is expressed in the form of regular terms [6]. In part of the research work, it is assumed that the tasks are related to each other and are represented by low dimension. By selecting some Shared features in the learning task, the structure analysis in the case of multi-task can be established and the learning task can be applied to different fields. Characteristics analysis. Feature analysis mainly focuses on the basic attributes of goods, such as the price of goods and the nature of goods. These attributes can be obtained directly from the raw data. In the prediction model, all numerical characteristics are standardized and represented by discrete features. In general, if there is no abnormal situation, this method is used to carry out feature transformation. In order to further improve the accuracy of prediction results of commodity sales time, some meta-features should be designed for integrated learning, and the prediction results of other models should be trained as characteristics. In the existing research, it has been proposed that different models can be combined to obtain more effective results. After training the model with its own training data, the predicted results can be added to the analysis process of other contents as the original characteristics. Intelligent platforms for high-tech products should take into account certain historical transaction information when the product is sold. The main feature of high-tech products is that there is a clear correlation between goods and technology level. The higher the technology level, the more difficult the management of products, and the functions of products themselves also lead to different types of product sales distribution. A more reasonable solution is to establish different prediction models for different types of products, so that coefficient vectors clearly indicate the dependence of commodities on influencing factors under the premise of uniqueness. After we propose to use multi-task learning for research, we can find a middle way from different solutions and control the similarity between models with the help of regularization parameters. A multi-tasking approach to product marketing time forecasting. The prediction model of product marketing time correlation should be discussed from the motivation of multi-task learning method, and the advantages of the model and algorithm should be analyzed. It is important to note that meta-characteristics were not added to the baseline approach in the study. In this regard, we set up a system platform, which is used

to predict the sales time of commodities. Users can input relevant information of commodities into the system, and the system will give corresponding data. If the data provided by the user is not complete, the system platform will use the average as the default value. This prediction model transmits information to users by means of offline training, so as long as users submit certain data, data results can be obtained immediately. In this way, the system can provide a very important ability to predict. The potential marketing time of goods. Both sellers and buyers can analyze the influencing factors under different situation characteristics based on the relevant content of products. The regression method of multi-task learning also plays a significant role in the prediction process and is of great value to the purchasers of products.

## **4 Data Mining Algorithm under High-Tech Product Marketing Platform**

### **4.1 Data Mining Process**

In the marketing process, the key information lies in the correlation between different commodities [7]. In order to analyze the attributes of commodities, it is necessary to select the algorithm of association rules, so that the resulting information can be displayed by association rules to the greatest extent, and the commercial value theory related to commodities can be found from the mass of data. After obtaining relevant information in a large number of data sets, it is necessary to generate different association rules according to the relationship between the information. During the association process, some non-redundant contents, including some misleading rules, should be screened out quickly. However, due to the existence of such information, the quality of association rules we obtain is not high, which may reduce the marketing results of some products, thus affecting the quality of product marketing. In order to improve this aspect of the problem, it is necessary to effectively improve the correlation between products and the generation pattern, so as to avoid the negative effects of useless rules. Generally, we can determine several different types of information according to the changes of users' interests. One is that the objective degree of interest is expressed in the form of data mining and information association. The other is the degree of subjective interest, which is used to evaluate the stability of rules and is also the key to customer value analysis [8].

Customer value is mainly composed of current value and potential value. Different values will be driven by the will of consumers to produce different values reflected by attributes, and information can be obtained by means of estimation. In terms of the analysis of current value, the information of business format can be obtained through the sales results of relevant products and platforms, and the content can be extended according to the operation characteristics and product sales capability, and different scores can be made according to the sales channels of some high-tech products. The difference between platform marketing and general marketing of high-tech products lies in that it is not affected by geographical factors, but the degree of social influence and consumers' consumption tendency indirectly reflect their trust on products or enterprises, thus affecting the subjective loyalty of consumers. In this process, if we want to classify customers, we should distinguish the difference between different customers and realize the unified management of customers. Consumer behavior and psychological dynamics are helpful for enterprises to provide personalized service contents in platform marketing, fully explore customers' consumption interests on the basis of existing data classification, and identify the potential value of different customers. For example, many users are inclined to the performance of high-tech products, and the performance of which type of products is suitable for which customers can become the key to the acquisition of preference attributes [9]. The details can be shown in table 1 below.

Table 1. Customer value index analysis

Type of value indicator	The specific content
The current value	Business type information, customer buying tendency, corporate social impact, customer classification
The potential value	Customer purchase volume, customer consumption level, high-tech product performance and attributes

#### 4.2 Customer Interest Eigenvalue Acquisition

To realize intelligent sales of high-tech products, we need to provide personalized key services for different customers. In this process, we not only need to accurately grasp the interests and trends of different customers, but also need to analyze the future work demand according to the marketing situation of the existing products to carry out user preferences and interest characteristics worth acquiring based on the mass of data. There is a concept involved in this work, namely "customer

portrait". Customer portrait in essence can be understood as a kind of information label is a mark of characteristics to the customer, the purpose is to make enterprises understand the different habits and customer information, such as they browse when browsing the traces and commodity attribute information can be provided the effective reference data mining, and the customer data can be as a text feature vector. After the behavioral data of different customers are counted and classified, their preferences can be obtained, and pure analysis can be made on whether high-tech products are applicable to users and whether they can obtain high-tech products they are interested in by means of interest measurement. Before this is done, the first task is to preprocess the text file, i.e. to accurately select the keywords that describe their characteristics from the relevant information of the customer. In the selection of general reference to three aspects of the content, one is to express the customer attributes of the words, that is, those who have similarities and regularity of the description. The second is to choose the description with specific meaning, that is, the description that can reflect the characteristics of things. The third is the hierarchical distinction in the process of feature description selection and the selection of different feature contents in different information. Under the relevant conditions of the same platform, different types of consumers have different characteristics, and their demands for products will be different according to their personal tendency, thus generating the classification in the text information. Good results can be obtained by using the classification analysis method of machine learning. After feature attributes are extracted, the data collected by the platform are manually modified to ensure the accuracy of consumer classification information in the process of continuous update. The similarity degree and measurement method of various information can be expressed by the following formula:

$$\text{Cos} = \frac{a \cdot b}{\|a\| \|b\|} \quad (1)$$

a and b is the vector.  $\|a\|$  and  $\|b\|$  is the the length of a and b, respectively.

It can be seen that the cosine value is used in the formula to analyse the similarity degree of different information. Information a and information b are regarded as two different information. The closer the value of two vectors is to 1, the higher the similarity degree of information is. Conversely, the

closer the cosine value is to 0, the lower the similarity between the two information is. For the marketing platform, these two pieces of information have a clear reference value, because the more characteristic elements contained in the two pieces of information, the higher the degree of relevance and relevance of the two consumers are potential customers, which is conducive to the marketing of similar products. Of course, there are different types of products in the market at this stage, and even personalized recommendation of customer interest will be affected by a variety of factors. Enterprises face different customers and can also consider modelling based on different attributes of the goods. For a customer who needs to buy products, the degree of correlation between different products will affect their consumption behaviour. For example, if a high-tech electronic product is of interest to a certain customer, the products of other brands that are close to such products will also make the customer interested. At this time, we can choose representative description of commodity characteristics to calculate the degree of similarity between the two commodities according to different characteristics of the products. During the operation of the platform system, these modules will read by historical information and obtain the user's interest value. After the content information in the page has been classified, different information categories can be added to the user evaluation of the interest file. If there is something similar to this property in a traditional dataset, the feature can be added directly to the original dataset, or a new dataset can be created in the file. Product preference analysis. In the previous paper, the customer's interest and purchase desire have been determined according to different types of product attributes. After obtaining the customer's basic information and adding these attributes into the model research, the correlation can be regarded as the prediction result of product preference data. All of these contents can be expressed as the customer's interest category in the model, and then the data of weight value is arranged to obtain the customer's preference interest matrix for the product. In fact, for the same type of high-tech products, there will be different categories, and accurate positioning of the correlation between product attributes and customer interests will provide us with key information, so as to facilitate the acquisition of result set data. Overall, under the big data environment, customer similarities of association rules based on the system to exploit their interest trend, analysis of customer value and product value under different situation, with the aid of clustering algorithm in data mining modelling

classification, and on this basis, evaluate customer characteristic vector and information between the product attributes [10].

## 5 Application of Marketing Platform

### 5.1 Analysis of Enterprise Marketing Data

The purpose of the analysis of enterprise marketing data is to conduct data mining for the overall manager of the enterprise, and obtain valuable information from it, which is helpful to analyze the product, the operation situation in the market and the trend of market changes, and to develop personalized intelligent marketing strategies for different customers. Generally speaking, the way of data presentation is described by using map information. The color of different depth represents the difference of product sales volume, which can also provide effective reference for the selection of marketing strategy. In the whole process of marketing data analysis, the importance of customers is obvious. To measure the potential value of a customer to an enterprise, it is necessary to analyze the relationship between customer value and sales according to the relevant theories of life cycle, so as to locate the consumer behavior of customers. For example, the development potential of customers is mainly reflected in their ability to purchase commodities. The higher the customer is, the more capital he has to buy a certain product. Especially for intelligent products, the promotion mode of products is obviously more important, because it can clarify the purchase philosophy of different customers, take the initiative to promote a large number of certain products, with the help of data mining algorithm to integrate information into the platform, so that enterprises can make targeted product recommendations according to individual users.

### 5.2 Marketing Platform

Within the marketing platform, the information of all customers can be identified and processed by the application layer and cloud computing platform. Both the online and offline shelf of products and the analysis of customers' purchasing behaviour can be adjusted through the platform. When customers visit the platform, they will generate service information, which will become the reference basis of the enterprise system after classification, and enable the enterprise to find

similarities among different customers to meet the actual needs of the enterprise for product marketing business. It is foreseeable that this personalized recommendation model will also become a major development trend in the future marketing.

## 6 Conclusion

Nowadays, the intelligent marketing mode provides a clear direction for the development of enterprises, and the personalized marketing system also provides a reference for the sustainable development of enterprises. In this study, data mining algorithm and hybrid model are used to improve the personalized recommendation of products. Of course, in a sense, the role of data mining will be paid more attention in the future research, because it conforms to the development trend of modern intelligent marketing and the development law of future business operation. There are still some deficiencies in our research, which need to be further improved in the future practice. For example, in the case of customer classification, it needs to be more detailed, select a wider range of regions for personalized recommendation, according to the customer's interest trend to optimize the operation and sales model of the enterprise, to create greater value of profits. With the support of intelligent platform, the positioning of customers will be more accurate, which will help enterprises to make business operation plans, maintain their sustainable development by good economic means, and promote the modern marketing of products and the smart marketing of products.

In the future, relative scholar can try to implement decision support system based on proposed intelligent marketing platform for enterprise to use.

### References:

- [1] Suraksha Gupta, David Gallear, John Rudd, PanteaForoudi, (2020). The impact of brand value on brand competitiveness. *Journal of Business Research*, Vol. 112, 210-222.
- [2] Omar M. Ahmed, Lailan M. Haji, Hanan M. Shukur, Rizgar R. Zebari, Shakir M. Abas, Mohammad A. M. Sadeeq. (2020). Comparison among cloud technologies and cloud performance. *Journal of Applied Science and Technology Trends*, Vol. 1, No. 2, 40-47.
- [3] Zhang yanqin, Pan liqiang. Application of Apriori algorithm in WEB book sales intelligent system, *Network security technology and application*, Vol. 9, 2017, pp. 58-59.
- [4] Liu ping, Fan jinding, Sun jianhua, Yang ruogu, Song jian. Research on SmartC on Petro oil and gas production big data mining system technology based on intelligent oil and gas field cloud platform, *Digital design*, Vol. 5, No. 03, 2016, pp. 47-52.
- [5] Nan nan. Application research of improved Apriori algorithm in solar energy sales system, *Journal of tongling vocational and technical college*, Vol. 14, No. 4, 2015, pp. 43-45.
- [6] Zhang lei, Han wenteng, Wang guofei, Customer quality rating in the telemarketing mode of insurance industry (based on data mining), *Enterprise leader*, Vol. 22, 2015, pp. 107 - 109.
- [7] Mu jun. Discussion on business intelligence architecture and data mining technology based on industrial chain collaboration platform. *Journal of jixi university*, Vol. 15, No. 5, 2015, pp. 25-28.
- [8] Lin hui. Research on accurate marketing of local retail industry in the era of big data -- from the perspective of data mining, *Business times*, Vol. 04, 2014, pp. 58-59.
- [9] Cao qihong. Research on traffic intelligent data mining -- storage and centralized application of data based on unified signaling monitoring platform, *China new communications*, Vol. 15, No. 17, 2013, pp. 66.
- [10] Gao pan, Guo li. Application of multi-strategy data mining model in book sales intelligent analysis system. *Information systems engineering*, Vol. 4, 2010, pp. 60.

### Creative Commons Attribution License 4.0 (Attribution 4.0 International, CC BY 4.0)

This article is published under the terms of the Creative Commons Attribution License 4.0

[https://creativecommons.org/licenses/by/4.0/deed.en\\_US](https://creativecommons.org/licenses/by/4.0/deed.en_US)