Support Vector Machine (SVM) Marketing Strategy Analysis Method Based on Time Series

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Abstract. In the era of "Internet plus", the traditional marketing strategies of enterprises need to be adjusted, including the combination of advanced technology for marketing and innovative development of marketing strategies. Innovative marketing strategy is an opportunity and challenge faced by the development of enterprises. Seize the development opportunity and actively innovate marketing strategy to improve their own marketing level and enhance their core competitiveness. The purpose of this paper is to study the marketing strategy of support vector machine based on time series. In this paper, from the perspective of machine learning, in order to "Internet +" era of development as the background, according to the reality and the related theoretical basis, method innovation enterprise marketing strategy as the research object, build support vector machine (SVM) based on time series of marketing strategy framework, and starting from the actual situation of the framework of empirical analysis, in the hope of enterprise marketing strategy can fully embody the dynamic real-time dynamic. Enterprises use support vector machine (SVM) based on time series to predict and analyze marketing strategies, which can well deal with emergencies, deal with risks in time, solve crises faced by enterprises, contribute to the rapid development of enterprises, and promote the steady forward development of enterprises.

Keywords: Time Series, Support Vector Machine, Marketing Strategy, Information Gain

1. Introduction

With the advent of the "Internet plus" era, enterprises gradually begin to change their marketing concepts and strategies to improve their competitiveness in the market. In order to achieve the efficient and stable rapid development of enterprises, we must develop a scientific and reasonable precision marketing strategy. To ensure that enterprises can be standardized competition, in order to obtain higher profit value space. Marketing is the fundamental way for enterprises to obtain profits and achieve sustainable development. Enterprise internal innovation is also an inevitable process in its development. With the advent of information age, enterprises should update their marketing strategies for their own development. The combination of marketing strategy and support vector machine based

on time series can well cope with the existing environmental changes, improve the ability of enterprises to cope with and enterprise competitiveness.

Support vector machine (SVM) is a research hotspot in machine learning neighborhood in recent years. Foreign scholars firstly applied SVM to the prediction of time series, and tested the effect of SVM on the prediction of financial time series by using the futures data in Chicago. The empirical results showed that the effect of SVM was better than that of multi-layer BP neural network, and even combined SVM and ARIMA model for stock price prediction [1-2]. Domestic scholars pay more attention to the combination of support vector machines (SVM) and practicality. Through SVM, online medical information service quality prediction model, industry profitability prediction model and financial crisis warning model are constructed, which provide certain references for investors, creditors, listed companies and corporate regulators [3]. It can be seen that the research on support vector machine has been relatively mature and can be combined with various information for prediction [4]. However, there are still some deficiencies in the existing research results at home and abroad. When I read the literature, I did not find any literature on the combination of SVM and marketing strategy analysis, indicating that the research field of SVM is not comprehensive enough [5].

Therefore, under the upsurge of machine learning, this paper analyzes the marketing strategies of enterprises, extracts the indicators that affect the marketing strategies of enterprises, and constructs the quality prediction model of the marketing strategies of enterprises [6]. By identifying the factors that affect the quality of enterprise marketing strategies, it provides theoretical and practical basis for the innovation of enterprise marketing strategies, so as to improve the quality of enterprise marketing strategies and improve the market competitiveness of enterprises [7-8]. The research in this paper will expand the research field of support vector machine. In the prediction of the quality of marketing strategies of enterprises, the absolute value of the quality of marketing strategies is not pursued, but the problem is transformed into the prediction of the future change trend of the quality of marketing strategies, which can improve the accuracy of the prediction results [9-10]. In addition, adding time series to support vector machine can realize dynamic monitoring of the quality of enterprise marketing strategies, so that enterprises can timely deal with risks and remove marketing crisis [11].

2. Method

2.1 Study Key Points and Difficulties
Research of this paper is focused on collecting research data, determine the enterprise marketing strategy types and effect evaluation standard, and influence from many factors influencing the quality of the enterprise marketing strategy to extract the key influence factors, and the selection of appropriate and feasible quantitative research data perspective sensitive factors affecting the quality of the enterprise marketing strategy and build quality prediction model of enterprise marketing strategy[12-13]. The difficulty of this paper is to add the future trend of marketing strategy quality and time series into the SVM model, and to determine the parameters of evaluation support vector machine, through which the model of this paper can be evaluated.

2.2 Research Ideas and Methods
In this paper, the importance of choosing the information gain theory as the measure feature of data perspective in the study refers to the information gain difference of the existence or absence of a feature in a prediction model. The larger the difference, the more important the feature is for model prediction. Support vector machine (SVM) algorithm can realize the prediction ability on small sample set by minimizing the risk of demand structure, which conforms to the small sample characteristics of data in this study. Moreover, with the addition of time series, SVM algorithm becomes more flexible and can dynamically predict the quality of enterprise marketing strategy. In conclusion, the information gain theory and vector machine algorithm based on time series are selected as the main data analysis methods.

This paper is divided into two parts: data collection and data analysis. There are three main processes of data collection: firstly, the literature review method is used to collect as many factors as possible that affect the quality of corporate marketing strategies, and these factors are classified and summarized. Secondly, through the method of character interview, we can obtain the factors that deeply affect the quality of enterprise marketing strategy and improve the system of factors that affect the quality of enterprise marketing strategy. Then, questionnaires are issued and designed on the basis of the first two factors. Surveys are conducted online and offline. Data analysis, there are two main parts: first of all, according to the data we collected, using the theory of information gain analysis all the factors of correlation between the quality and the enterprise marketing strategy, and calculate the information gain of each factor value and sorted, information gain value maximum 10 identified as key factors influencing factors, thus constructs a model of key factors affecting the quality of the enterprise marketing strategy; Secondly, support vector machine (SVM) model based on time series is used to predict the quality of enterprise marketing strategy. Finally, the key factor model of enterprise marketing strategy quality is analyzed accurately.

According to the result of data collection and data analysis, analysis of key factors influencing the quality of the enterprise marketing strategy and the reasons, finally using the parameters of support vector machine (SVM) to evaluate the merits of the model in this paper, the countermeasures to improve the quality of the enterprise marketing strategy analysis, in order to improve the quality of enterprise's marketing strategy, so as to improve enterprise's market competitiveness, make a certain contribution to the development of the country's GDP.

3. Experiment

According to the methods of literature review, character interview and questionnaire survey, there are 20 influencing factors of enterprise marketing strategy, which are divided into internal dimension and external dimension. Taking the 20 factors as independent variables and the quality of enterprise marketing strategy as dependent variables, the information gain value was calculated and sorted. Finally, only seven variables were determined as the key influencing factors of this study.

The internal dimension of the enterprise mainly includes five factors, namely the market influence of MI enterprise, the internal innovation power of II enterprise, the degree of youth of YE enterprise, the type of marketing strategy of TMS enterprise, and the combination degree of marketing strategy and big data of DSBD enterprise. The external dimension of enterprises mainly includes two factors, namely the influence of NPI national policy and the support of GSFE government to enterprises. According to the key factor model of the quality of enterprise marketing strategy and the support vector machine method based on time series, the quality prediction model of enterprise marketing strategy is constructed. In the process of model construction, there is only one optimal model solution between the high quality of enterprise marketing strategy and the low quality of enterprise marketing strategy. Finally, according to the forecast model, the quality of enterprise marketing strategy is predicted, and the plan to improve the quality of enterprise marketing strategy is proposed.

4. Discuss

4.1 Experimental Results Show

Table1. Information gain value for each factor

Influencing factors	Information gain value
MI	0.3362
II	0.3356
YE	0.3270
TMS	0.3104
DSBD	0.3014
NPI	0.2993
GSFE	0.2865

According to the information gain theory, the information gain values of 20 factors were calculated and sorted, and 7 key factors affecting the quality of enterprise marketing strategy were finally determined. The information gain values of the seven variables are shown in table 1.

There are four kernel functions in SVM, which are linear kernel (LKF), polynomial kernel (PKF), gaussian radial kernel (GRKF) and Sigmoid kernel (SKF). After data input, the kernel function of SVM model was determined, and then the established model of influencing factors of enterprise marketing strategy was evaluated. The results are shown in figure 1. It can be seen from the figure that all indexes of the gaussian radial kernel function are the highest, so the gaussian radial kernel function is used as the dynamic prediction model in this paper.
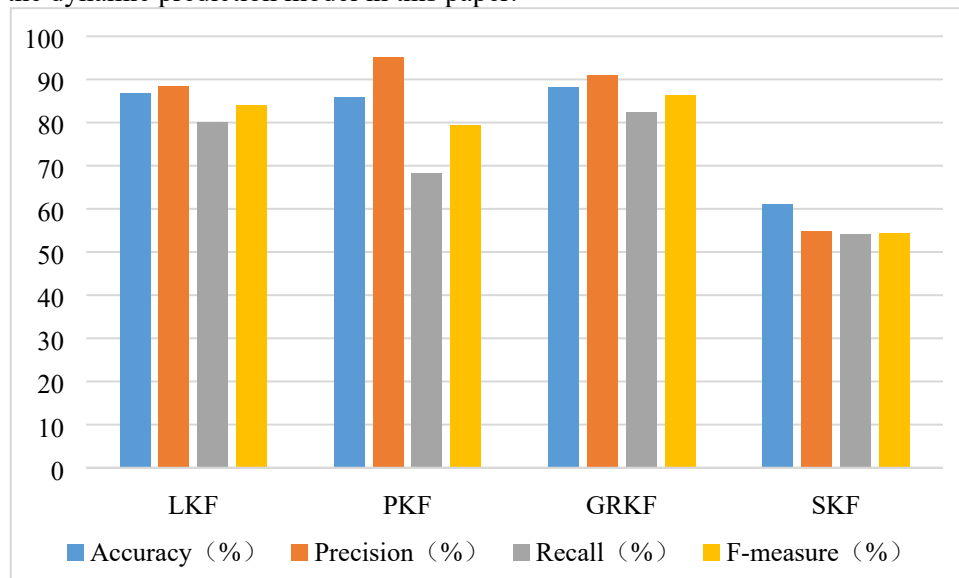

Figure1. The Evaluation results

4.2 Analysis of Influencing Factors and Countermeasures
(1) Improve the pertinence of marketing strategies

Enterprises should reasonably use big data technology, strictly screen business information, analyze consumers' consumption preferences and habits, and make practical decisions, so as to improve the pertinence and effectiveness of marketing strategies. Establishing the pertinence of marketing strategy can serve as the vane of enterprise development and contribute to its development.

(2) Reconstructing the marketing order

In order to protect the rights and interests of consumers and prevent businesses from violating consumers' privacy in order to seek personal gains, China should issue relevant laws to restrict these behaviors of businesses. At the same time, businesses should also rebuild the marketing theory, through legal means to obtain consumer information, to maintain the market order of the country. Reconstructing the marketing order, strengthening the control of different links of each sales channel, ensuring the quality of products, improving relevant services, so as to enhance the market competitiveness of enterprises.

(3) Build a marketing culture system

In the overall environment, not only the country, the government, but also enterprises should strive to build a marketing cultural system, with a good cultural system to promote the development of enterprises, to create a new pattern of market development. The construction of marketing culture system can combine traditional media and new media to carry out marketing propaganda. The advantage of the traditional media is that they are directly under the control of the government and speak for the country and the people. The new media can make up for the shortcomings of the traditional media, to achieve full coverage of all customers.

(4) Build the "Internet plus" marketing strategy platform

In order to give full play to the role of the Internet, enterprises can build an Internet marketing platform, expand sales channels, and make products more dynamic in the market. On the network platform, consumers can communicate directly with manufacturers and sellers, which can help consumers get more detailed product information and services. Manufacturers and sellers can also develop marketing strategies based on consumers' purchasing preferences. Enterprises can also collect consumers' opinions on the network platform to meet consumers' needs and make marketing more humane.

5. Conclusion

The information age has come, and information will bring vitality to enterprises at present and in the future. The transformation of the consumer market is actually the transformation of people's consumption concepts and needs. Therefore, enterprises need to innovate marketing strategies and give play to the advantages of the network platform in the context of the rapid development of the network economy. Enterprises should correctly understand the marketing characteristics of the information age, closely follow the pace of The Times, combined with their own development situation, to achieve enterprise development and innovation, promote the improvement of enterprise technology level, to ensure that enterprises can achieve sustainable development in the information age.

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