Customer Segmentation Marketing Strategy Based on Big Data Analysis and Clustering Algorithm

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ABSTRACT

Traditional customer segmentation methods cannot obtain more effective information from massive customer data, which affects the formulation of marketing strategies. Based on this, this study constructs a customer segmentation marketing strategy model that integrates support vector machines and clustering algorithms. This model first utilizes support vector machines to segment existing customer data, and then integrates support vector machines and clustering algorithms to construct a customer segmentation model. Finally, simulation experiments are conducted using the dataset. The results show that the model algorithm obtains the optimal solution when the quantity of iterations is 50. Meanwhile, the average error rate of the model algorithm in the customer segmentation process is 6.82%, the average recall rate is 91.28%, and the average profit predicted by the impact strategy developed by the segmentation model is 29.88%, which is 2.53% different from the true value.

KEYWORDS

Big Data Analysis, Clustering Algorithm, Customer Segmentation, Marketing Strategy, Support Vector Machine

INTRODUCTION

Due to the internet and big-data technology, enterprises need more precise customer-segmentation marketing strategies to improve market share and customer loyalty in the face of fierce market competition. Traditional customer segmentation methods cannot respond effectively and in a timely manner to a large amount of customer data, thereby affecting the braking of marketing strategies (Othayoth et al., 2022; Weking et al., 2020). Support vector machine (SVM) and K-means clustering algorithm (CA) are widely used technologies in the fields of machine learning and data mining, respectively. SVM is a nonlinear classification algorithm, while K-means algorithm (KMA) is a classic CA. To better address customer-segmentation issues, this study combined SVM and KMA to enhance the accuracy of customer classification. The method of integrating SVM and KMA can utilize the nonlinear classification ability of SVM and the data-clustering ability of K-means to better discover patterns hidden in massive data (Widyawati et al., 2020; Corpuz, 2021; Cui et al., 2021; Fakhriza, 2021).

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This study aims to explore customer-segmentation marketing strategies that integrate SVM and KMA and analyze their feasibility and effectiveness in practical applications. First, SVM is used to segment existing customer data, and then SVM and KMA are fused to construct a customer-segmentation model. The model is used to process and analyze these data to discover different customer groups and features. Finally, customers can be divided into different subgroups, such as high-value customers, potential customers, low-value customers, etc. The main contribution of the research is to apply SVM and KMA to customer-segmentation marketing strategies to improve the accuracy and efficiency of customer classification. This will help enterprises comprehend customer requirements and improve market competitiveness.

The first part of the study introduces the current research status of customer data dimensionality reduction, clustering, and customer segmentation. The second part studies a customer-segmentation marketing-strategy model that integrates SVM and K-means CA. The third part verifies the performance of the constructed model through simulation experiments and practical applications. The fourth part summarizes the relevant outcomes and analyzes the merits and demerits of the research methods used.

RELATED WORK

Customer-segmentation marketing strategies play an important role in improving market competitiveness, reducing marketing costs, enhancing marketing effectiveness, and strengthening customer-relationship management. By segmenting customer groups, enterprises can better meet customer needs, achieve sustained growth, and achieve sustainable competitive advantages. To better leverage customer-segmentation marketing strategies, many scholars have analyzed and studied relevant sales data. Scholars such as Sokol and Holý (2021) have utilized data clustering analysis techniques to analyze customer behavior and value in the retail industry. This study obtained information on shopping proximity, frequency, and purchasing power by segmenting customers and applied data-clustering analysis to a chain pharmacy. The results indicate that this method can bring more customer needs to the attention of merchants.

Nikaein and Abedin (2021) constructed a data-mining method based on a radio frequency machine learning model for enhancing the efficiency of marketing and reducing costs during the marketing process and applied it to the pharmaceutical industry. The results indicate that this model can help sales managers more effectively plan for each customer, improve visit efficiency, and lower costs.

To reduce customer churn in potential customer orders, Fitriani and Febrianto (2021) compared data-mining methods such as naive Bayes, random forests, and SVM. They used these to obtain data-feature information about potential customers to eliminate the problem of category imbalance in the marketing process of banks. The results indicate that random forests have high mining ability, with a maximum accuracy of 92.61%.

To better segment customers, Ahani et al. (2019) constructed a method based on machine learning for hot spring hotel segmentation and travel-choice prediction, thereby helping hotels develop more efficient marketing strategies. This method classifies and processes customer-evaluation information on hotel websites to obtain marketing-related data. The results indicate that this selection-prediction method can obtain a large amount of data from social media and help hot-spring hotels better push advertisements to target customers.

To find potential customers for online stores through customer segmentation, Nurmalasari et al. (2020) constructed a clustering method based on KMA. This method involves clustering analysis of existing customer-browsing information to find the best clustering data and prepare for customer segmentation. The results indicate that applying cluster analysis to customer segmentation can provide improved sales strategies for each group of customers in online stores.

Bekamiri et al. (2020) proposed a dynamic model to better allocate more-effective promotion strategies to customer groups using the model to calculate customer lifetime value. Banks can propose

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