

## *Retraction*

# **Retracted: Brand Digital Marketing under Intranet Security Control Based on the Machine Learning Classification Algorithm**

## **Security and Communication Networks**

Received 26 December 2023; Accepted 26 December 2023; Published 29 December 2023

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This article has been retracted by Hindawi, as publisher, following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of systematic manipulation of the publication and peer-review process. We cannot, therefore, vouch for the reliability or integrity of this article.

Please note that this notice is intended solely to alert readers that the peer-review process of this article has been compromised.

Wiley and Hindawi regret that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

## **References**

- [1] Y. Liu and X. Huang, "Brand Digital Marketing under Intranet Security Control Based on the Machine Learning Classification Algorithm," *Security and Communication Networks*, vol. 2021, Article ID 9977221, 10 pages, 2021.

## Research Article

# Brand Digital Marketing under Intranet Security Control Based on the Machine Learning Classification Algorithm

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Received 12 March 2021; Revised 6 July 2021; Accepted 13 October 2021; Published 3 November 2021

Academic Editor: Chi-Hua Chen

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With the advent of the information age, digital marketing models have begun to receive attention and to have applications in many industries. Although the digital marketing model has thus become a hot spot in the sales world, there is still not enough research on digital marketing. In order to optimize brand digital marketing under internal and external security control based on the machine learning classification algorithm, this paper uses fuzzy system theory to perform fuzzy analysis on various experimental data studied, convert it into a fuzzy set, obtain the fuzzy solution of the related function, establish related models of machine learning classification algorithms, and identify and collect relevant experimental data in an intelligent way, saving time for data collection. This paper collects the customer characteristics, customer sensitivity, brand promotion, and brand revenue of a brand within seven days; then uses the classification algorithm and collected data to predict and analyze the future data results; and uses the machine learning classification algorithm model formula to solve the correlation function. The final experimental results show that, in the digital marketing mode, network marketing brings 75% of the benefits to the brand, which is the highest among the four digital marketing models, and it has the best brand publicity level, 45%. At the same time, customers' sensitivity to the brand reaches 50% under the network marketing model.

## 1. Introduction

**1.1. Background Meaning.** In the information age, the rapid development of the Internet has caused the artificial intelligence technology to be widely used in social life. Artificial intelligence technology has played a huge role in national politics, military, and technology, as well as people's production and life. However, artificial intelligence technology is still in the stage of exploration and development. If you do not know enough about the flaws of the technology itself, then there is no clear plan for the future development of the technology. The ethical risks in the high-tech era are uncertain and complex. It can be seen from the concept of the word risk that risk itself is uncertain, people's own cognitive ability is limited, and they cannot fully understand the emerging technologies produced in the high-tech era, especially the network security problem based on machine learning classification algorithm [1].

The application of intelligent technology has penetrated into all aspects of people's daily life and has also had a profound impact on the development of society. With the development of technology, human life styles and production methods will be deeply imprinted by machines. In terms of economic impact, machine learning algorithms not only facilitate people's daily life, but also bring huge economic benefits to people [2]. This also requires people to pay more attention to network security management and control issues on the premise of pursuing economic benefits.

**1.2. Related Work.** Many scholars in the academic world have conducted research on digital marketing. De Pelsmacker et al. investigate the extent to which digital marketing strategies (e.g., developing digital marketing plans, responding to guest reviews, and monitoring and tracking online comment information) directly or indirectly affect

hotel room occupancy through the mediating effect of room number and price [3], but this method is too cumbersome to collect data. Ateeq et al. aim to investigate the experience of using digital marketing platforms to promote an Internet-based health encyclopedia in Saudi Arabia [4], but the data in this study are not accurate and the results are not credible. Fawaid wants to know about the impact of using digital sales system to sell goat milk Etawa and the difference between traditional sales and digital marketing system [5], but the cost of this method is too high. Meriläinen focuses on studying the digital marketing capabilities of tourism SMEs [6], but the research is too one-sided. Centobelli et al. analyzed the application of network-based technology support companies in the field of digital marketing [7], but the operation of the research was too cumbersome. The purpose of Lekhanya's study is to establish an understanding of digital marketing, its use by small- and medium-sized enterprises in rural areas of South Africa, the scope of its use, and the factors influencing its use and its impact [8], but the cost of the study is too high. Sulaksono aims to increase knowledge and skills in digital marketing (especially social media) to help small- and medium-sized enterprise (SME) businessmen increase sales and profits [9], but the data in this study are too large. Ritz et al. aim to study the participation of small enterprises in digital marketing and integrate DIY behavior model and technology acceptance model (TAM) to explore the motivation and expected results of such participation [10], but the operation steps of the research are too complex. The aim of Vaculikova et al. is to investigate the contemporary state of digital marketing strategies and tools used in handicraft villages [11], but the data from this study are not accurate. Based on the research experience of previous scholars, we propose a digital marketing method based on machine learning classification algorithm in this article. This method can effectively improve research efficiency and save experiment time.

*1.3. Innovation of This Article.* This article uses machine learning classification algorithms to analyze brand digital marketing in the context of smart cities and collects and calculates relevant data to obtain the final result. The innovations of this paper are mainly reflected in the following aspects: (1) the research is conducted in the context of smart cities, and data is collected through intelligent methods such as the Internet, which saves the time of data mining and data collection. (2) Using machine learning classification algorithms for data calculation improves the efficiency of research. (3) Research on brand digital marketing keeps pace with the times, conform to the development of the times, and has certain research value for publicity and sales.

## 2. Digital Marketing Based on Machine Learning Classification Algorithms in the Context of Smart Cities

*2.1. Fuzzy System.* Fuzzy system is a system based on knowledge or rules, and its core is a knowledge base

composed of fuzzy rules. The American automatic control expert L. A. Zadeh once proposed the concept of fuzzy subsets. Since then, the theory of fuzzy systems has been developed. Fuzzy system is a system that defines input, output, and state variables in a fuzzy set and is a generalization of deterministic systems. From a macro perspective, the fuzzy system captures the fuzzy nature of human brain thinking and has advantages in describing advanced knowledge. It can imitate human comprehensive conclusions to solve fuzzy information problems that are difficult to solve with traditional mathematical methods and extend computer applications to complex systems such as humanities and social sciences. It can better solve nonlinear problems and has been widely used in automatic control, pattern recognition, decision analysis, time signal processing and human-machine dialogue systems, information systems, medical diagnostic systems, earthquake prediction systems, weather forecast systems, and other fields.

Fuzzy systems are now one of the most widely used tools in the field of artificial intelligence systems [12]. With the development of digital computers in the direction of intelligent machines, more and more fuzzy systems will appear. The advantage of a fuzzy system is that it can be integrated into the experience of experts, and its versatility is less affected by data. Due to the systematic and effective use of expert experience in the form of language, the fuzzy conclusion system may have to input the exact value and all fuzzy sets into the application at the same time when it is applied. However, the existing fuzzy system is not very good; to carry out this kind of operation, it needs to be improved and perfected. In the construction of a fuzzy system, the separation of in/out spaces and the determination of related functions and their parameters are mainly based on personal experience, which often requires trial and error, which has great subjectivity and uncertainty. The types of fuzzy systems include pure fuzzy logic systems, Takagi-Sugeno type fuzzy logic systems, and Mamdani type fuzzy systems.

The first type of fuzzy systems is mainly composed of a fuzzer, a fuzzy inference engine, a fuzzy rule base, and a defuzzifier. The specific structure is shown in Figure 1.

Similar to type 1 fuzzy system, type 2 fuzzy system is composed of type 2 fuzzer, type 2 inference rule group, type 2 fuzzy inference engine, and defuzzer, as shown in Figure 2.

It has been less than 50 years since the fuzzy system theory was proposed, but it has developed very rapidly. It has many important research results in various aspects such as fuzzy theory and algorithm, fuzzy reasoning, industrial control application, and stability research. However, there are still many defects in fuzzy systems, which are mainly reflected in the following: (1) fuzzy modeling of fuzzy control in the application of nonlinear complex systems; (2) correct establishment of fuzzy control rules; (3) determination of defuzzification methods; (4) accuracy of fuzzy control; (5) discussion on the stability theory of fuzzy control; (6) self-learning fuzzy control strategy and intelligent system structure and its realization; (7) simple and practical fuzzy with fuzzy inference function development and application of integrated chips, fuzzy control devices, and general fuzzy control systems.

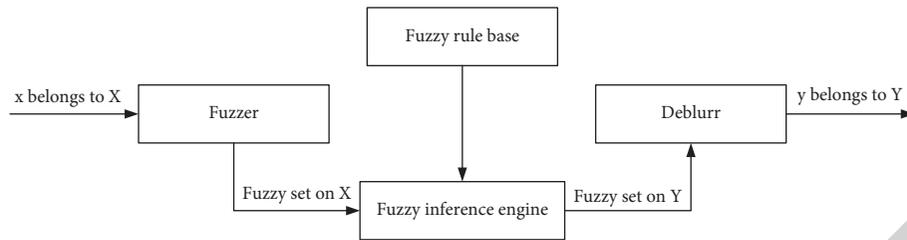


FIGURE 1: Structure diagram of a type 1 fuzzy system.

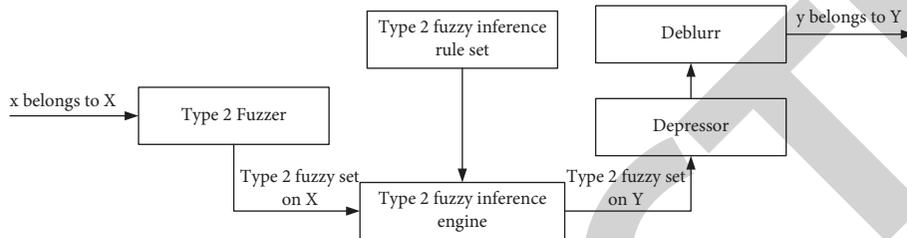


FIGURE 2: Structure diagram of the type 2 fuzzy system.

**2.2. Cyber Security.** At the moment when the Internet was born, people could not imagine how much surprise it could bring to the world. With the continuous advancement of social economy, science and technology are advancing at a rapid pace. Undoubtedly, the Internet has become the foundation of infrastructure construction. Apart from national strategy to people's lives, the Internet has become a necessity. People gain knowledge from the Internet, enrich their lives, and understand the surroundings. The Internet is irreplaceable. In particular, with the development of software and hardware technology, more and more enterprises and institutions have begun their intranet construction [13, 14], more and more servers appear, and more and more network services appear. While units and individuals benefit from the network, they are also threatened by more and more network security issues. The network is like a double-edged sword. The wider the coverage of the network, the more prominent the security problems; in particular, the internal network security has always been one of the focus issues of network security threats [15]. As a result, enterprises and institutions have increased their internal network security investment, purchased routers and switches with multilayer protection functions, and deployed security products such as firewalls, intrusion detection, and antivirus systems [16, 17]. These measures ensure protection. The security of the network boundary is improved, but it cannot really solve the security problem of the internal network.

At present, the general way of leaking secrets in the corporate intranet is mainly focused on internal personnel, using the internal network management negligence and stealing company data through duplication. In the more than ten years, since the birth of intranet security, it has gone through multiple stages of development. In addition to the government's requirements for corporate compliance, enterprises and institutions themselves have also realized the importance of strict network management to internal

networks. At present, intranet security no longer only focuses on technical risks. The focus of security is gradually transitioning from system and network infrastructure level protection to application level security protection issues, and protection is more flexible [18, 19].

The internal network security monitoring and management system defines two roles: configuration administrator and data administrator. The configuration manager manages network devices and device configuration information through the network management module and can perform the functions of defining keywords and remotely disabling/enabling the host's USB, printing, infrared, and Bluetooth ports. The data manager can view network information and USB monitoring information. The system is composed of four modules: network management, mobile storage device monitoring, remote port control, and system management.

**2.3. Machine Learning.** Machine learning is the branch of improving performance through the research of theories and methods. Machines can simulate human learning activities and acquire knowledge and skills through these theories and methods. The goal of machine learning is to build a learning machine based on existing experience, use it to further classify or predict unknown data, and continuously improve and build it in the process. Machine learning (ML) is a subdivision of artificial intelligence based on the biological learning process [20] and is one of the most promising artificial intelligence tools. The field of machine learning aims to develop computer algorithms that can be improved with experience. It is expected to enable computers to help people analyze large and complex data sets [21]. The success of machine learning in various applications has led to an increasing demand for machine learning systems.

The important concepts of machine learning are learning function and risk. Assuming that the variables  $x$  and  $y$  satisfy a certain unknown dependency relationship, we fit the joint probability distribution  $F(x, y)$ . Machine learning is based on  $n$  independent and identically distributed samples:  $(x_1, y_1), (x_2, y_2), \dots, (x_n, y_n)$ . In a set of prediction functions  $\{f(x, w)\}$ , an optimal function  $f(x, w_0)$  is calculated to evaluate this dependency, so as to minimize the expected risk. The calculation formula of expected risk is as follows:

$$R(w) = \int L(y, f(x, y))dF(x, y), \quad (1)$$

where  $w$  is the generalized parameter of the prediction function and  $L(y, f(x, w))$  refers to the loss caused when  $\{f(x, w)\}$  is used as the prediction function, where  $\{f(x, w)\}$  is called the learning machine, prediction function, or learning function. In practical problems, the ‘‘empirical risk minimization principle’’ is usually used instead of expected risk minimization. The defined experience risk is as follows:

$$R_{\text{emp}}(w) = \frac{1}{n} \sum_{i=1}^n L(y_i, f(x_i, w_i)). \quad (2)$$

The learning process of machine learning is the process of minimizing experience risk. ERM is the basis for most current machine learning and pattern recognition methods and can estimate the expected risk of the entire sample. The learning result is obtained through EMP minimization, the probability of  $1 - \eta$  between the actual risk and the expected risk meets a certain relationship, and the relevant formula is as follows:

$$R(w) \leq R_{\text{emp}}(w) + \sqrt{\frac{h(\ln(2n/h) + 1) - \ln(\eta/4)}{n}}, \quad (3)$$

where  $h$  is the VC dimension of the function set and  $n$  is the number of samples. This conclusion theoretically indicates that the actual risk of machine learning is composed of experience risk and confidence range. Formula (3) can be converted to

$$R(w) \leq R_{\text{emp}}(w) + \Phi\left(\frac{h}{n}\right). \quad (4)$$

This shows that the machine learning process must consider reducing the confidence range while minimizing the experience risk. With different machine learning methods, the main problem to be solved is how to build better learning functions, which can reduce the risk as much as possible while reducing system consumption.

Machine learning (ML) is the fastest growing field in computer science [22]. According to different learning tasks, machine learning methods can be roughly divided into three categories: supervised learning, unsupervised learning, and reinforcement learning. Supervised learning learns features from a given set of training data. When new data is entered, it can predict the result based on the function. The set of supervised learning should include

input and output, which can also be regarded as features and goals. The targets in the training set can be marked by individuals. Unsupervised learning is often used to find possible structures in data, such as cluster analysis. In addition, unsupervised learning can also explore patterns in the data, transform most of the data input into concise and compact input, and narrow the scope of the learning model. Learning reinforcement is used to let the machine learn how to act according to the environment [23]. The machine will gradually adjust its behavior as the environment changes and evaluate whether the feedback received after each action is positive or negative.

**2.4. Digital Marketing.** Digital marketing usually refers to marketing activities that use digital communication channels to promote products and services. It includes not only Internet communication channels, but also mobile phone communication and outdoor digital advertising. Digital marketing is a data-oriented high-level marketing activity that uses the Internet as a platform, uses a large amount of data on the Internet, and uses digital media channels to achieve precise marketing and achieve quantifiable marketing effects. Digital marketing has five characteristics: diversified forms, no space limitation, no time limitation, interactivity and experience, and entertainment. The impact of digital marketing is poorly understood [24]. It covers a variety of digital marketing concepts and is mainly used in the effective coordination of logistics, capital flow, and information flow. There are many ways of digital marketing, including network marketing, mobile marketing, multimedia marketing, and outdoor marketing. In the practice of digital marketing, web analysis and key performance indicators can and should play an important role in the formulation of marketing strategies [25].

Digital marketing strategy is considered to be one of the most influential marketing strategies for enterprises to exert the greatest influence [26]. Digital marketing is in line with current economic growth trends and can help companies gradually establish their own competitive advantages in a fierce market. Digital marketing is a rapidly increasing field, bringing new challenges to marketers. It changes the way organizations and their brands connect with customers and the way business is done [27]. Extensive use of advanced computer network technology and information processing technology in marketing activities provides convenience for businesses and customers in buying and selling. Digital marketing is becoming more and more important in all areas of economic activity [28]. Digital marketing is an inevitable trend in the new economic society, because the new economy is an economy driven by information technology and knowledge, and its core is the network economy. The era of the new economy requires companies to adopt a compatible marketing model to facilitate their development and growth.

There is a big difference between digital marketing and traditional marketing model: according to the traditional

marketing model, corporate communication is more based on traditional media communication tools and means, but this traditional media communication is a one-way information transmission, without interaction. The spread of digital marketing is mainly based on digital search engines and social media. Its publicity is very much humanized, and its good interactive effect can help the company quickly adjust the content and communication strategy, and have a significant impact on product updates.

### 3. Modeling and Prediction of Machine Learning Classification Algorithms

*3.1. Machine Learning Classification Algorithm Modeling.* Machine learning classification algorithm is the core content of supervised learning. The target of machine learning classification algorithm is to learn by training existing class label of a sample model that can predict the class for each input sample. In the machine learning classification algorithm, the set of all possible input values is called the input space. The set of all possible output values is called the output space. The input space and output space can be a collection of finite elements or the entire Euclidean space. Generally, the output space will be much smaller than the input space. We set the input quantity to  $X$  and the output quantity to  $Y$ . Each specific input unit is a sample, all sample information and attributes are represented by sample attribute vectors, and the space where the attribute vectors exist is the attribute space.

In the sample feature space, each dimension corresponds to a sample feature. The input attribute vector is usually expressed as

$$x_i = (x_i^1, x_i^2, \dots, x_i^n)^T, \quad (5)$$

where  $x_i$  represents the  $i$ th sample input and  $x_i^j$  represents the  $j$ th feature of the  $i$ th sample input. The machine learning classification algorithm learns the model or objective function from the training examples and tests the memory category of the test examples. The set of training examples is usually expressed as

$$T = \{(x_1, y_1), (x_2, y_2), \dots, (x_N, y_N)\}. \quad (6)$$

The output variable  $y_i$  is the category value of the input variable  $x_i$ . Input variables and output variables can be continuous or discrete. The mapping model of the machine learning classification algorithm can be expressed as a probabilistic model or a nonprobabilistic model. Machine learning classification algorithms include learning to create a common objective mapping function and example-based learning. When learning to create a generalized objective mapping function, a set of training examples will be used to learn the mapping operation model, and then the mapping model will be used to predict the category of the test example. The model learning process can be divided into two parts, the learning system and the prediction system, as shown in Figure 3.

*3.2. Model Prediction.* First, a training sample set is provided, as shown in (6);  $x_i \in x \subseteq R^n$  is the feature and feature space of the input sample, and  $y_i \in y$  is the output category value and category space. The training sample data and the test sample data  $F(x, y)$  are independently distributed according to the joint probability. In the learning process, the learning system uses the training sample set to obtain a mapping model, which can be represented by the conditional probability distribution  $P(Y | X)$  and decision function  $Y = f(x)$ . The input sample data  $x_{N+1}$  is predicted by the prediction system, and its probability distribution through the model is

$$y_{N+1} = \operatorname{argmax}_{y_{N+1}} P(X | Y). \quad (7)$$

Decision function is

$$y_{N+1} = f(x_{N+1}). \quad (8)$$

The corresponding category prediction results are  $y_{N+1}$ .

The hypothesis space of the model contains all the conditional probability distributions and decision functions involved. The hypothesis space is represented by  $H$ . The set form of the hypothesis space is

$$H = \{h | Y = h(x)\}, \quad (9)$$

$$\text{or } H = \{P | P(Y | X)\}, \quad (10)$$

where  $H$  is a family of functions determined by the parameter vector:

$$H = \{h | Y = h_\theta(X), \theta \in R^n\}, \quad (11)$$

$$\text{or } H = \{P | P_\theta(Y | X), \theta \in R^n\}. \quad (12)$$

The parameter vector  $\theta$  comes from the  $n$ -dimensional space  $R^n$ .

### 4. Digital Marketing Model under the Machine Learning Classification Algorithm

*4.1. Customer Characteristics under the Digital Marketing Model.* In order to analyze the consumption of a certain brand within 7 days, we conducted statistics and analysis on the basic characteristics of the brand's customers within 7 days. Data is collected from four aspects: gender, marital status, age, and education of customers. First of all, the proportion of customers according to gender and marital status is shown in Table 1.

From the ratio of male to female and the number of married and unmarried customers of a certain brand in Table 1, it can be seen that the brand's digital marketing model can attract more female customers and unmarried customers. These data show that female customers or unmarried people are more interested in marketing activities, and they have more free time. In order to see the trend of the

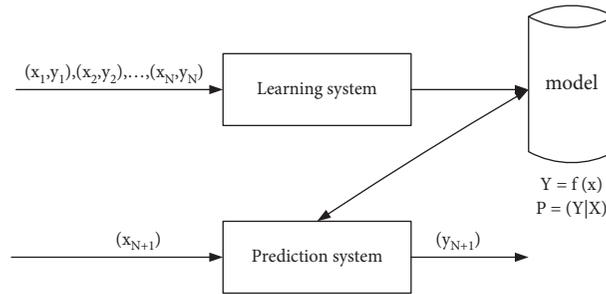


FIGURE 3: Model learning process diagram.

TABLE 1: Customer gender and marital status data statistics table.

	Sex		Marital status	
	Male (%)	Female (%)	Married (%)	Unmarried (%)
First day	45	55	29	71
Second day	30	70	37	63
Third day	50	50	12	88
Fourth day	52	48	46	54
Fifth day	36	64	47	53
Sixth day	41	59	55	45
Seventh day	47	53	50	50
Average	43	57	39.4	60.6

data more intuitively, we changed the table data to a line graph for observation, as shown in Figure 4.

Then, we analyzed the age and education of customers, counting the number of customers between 21 and 60 years old and indicating their education level. The final result is shown in Figure 5.

According to Figure 5, we can know the following: from the perspective of education level, the number of customers of the brand in high school and university is more, and the average proportion of customers in four age groups is about 7.5%. From the perspective of age, the proportion of the brand in 51–60 years old is the least, which indicates that some people in this age group can accept the new marketing mode, but their number is still too small, and their ability to accept new things is too slow.

#### 4.2. Brand Revenue under the Digital Marketing Model.

The income of a brand largely depends on the degree of publicity of the brand, which indirectly affects the customers' familiarity with and sensitivity to the brand. To increase the degree of brand publicity, its publicity model is particularly critical. Therefore, in this part, we analyze the benefits of the brand's different publicity methods and the sensitivity of customers to find more beneficial publicity methods for the brand. Figure 6 shows the customers' sensitivity to the brand, the degree of brand publicity, and the brand sales revenue under different sales models.

From the relevant data of customer sensitivity, brand publicity degree, and brand revenue in Figure 6, it can be seen that, in different digital marketing modes, the online marketing brings 75% of the revenue to the brand, which is the highest among the four digital marketing modes.

Furthermore, its brand publicity degree is also the best, being 45%. At the same time, under the network marketing mode, the customer's sensitivity to the brand reaches 50%. Outdoor marketing model is inferior to other marketing models in terms of customer sensitivity, brand publicity, and profitability. Its customer sensitivity is 3%, brand publicity is 5%, and brand revenue is 3%.

*4.3. Predictive Analysis of the Digital Marketing Model under the Classification Algorithm.* We analyze and calculate the relevant data of the brand within seven days to predict the total number of customers of the brand under the digital marketing model in the next few days and the number of customers who will purchase the brand, as well as customer sensitivity and brand revenue. According to the data extracted by the machine learning classification algorithm in this article and the classification algorithm used to predict and analyze the data set, the final results are shown in Table 2.

According to the prediction results in Table 2, in the next seven days, the number of customers of the brand is very objective. The number of customers will be the largest at weekends. According to the previous analysis of the age groups of customers, it can be seen that the reason for the largest number of customers on weekends is that most of the customers are students or office workers, and they are on holiday at weekends. In order to visually observe the data in the table, we converted the data in the table into a bar graph as shown in Figure 7.

In the next seven days, the sensitivity of customers and the number of buyers of the brand will be the highest at the weekend. Therefore, it can be inferred that the brand can get

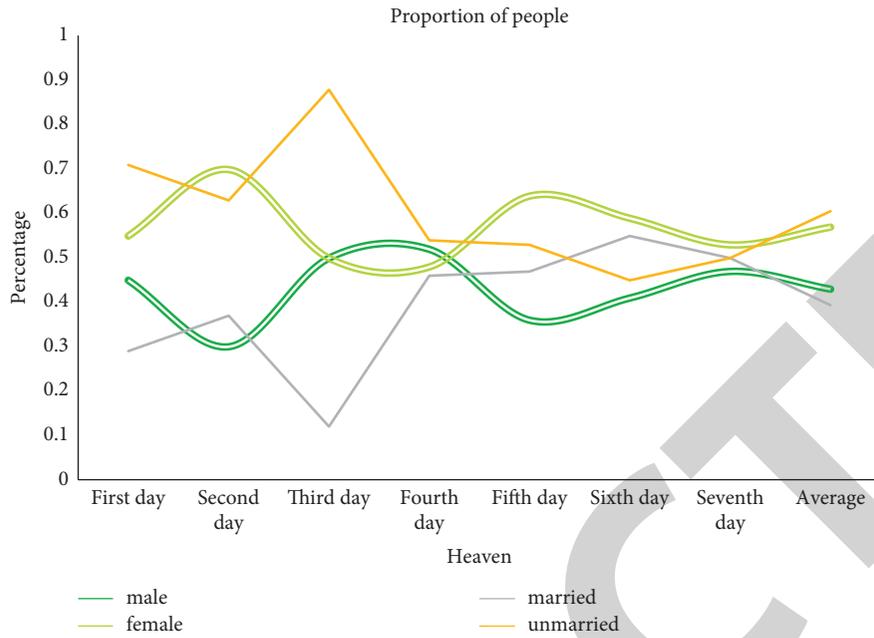


FIGURE 4: The proportion of customer characteristics.

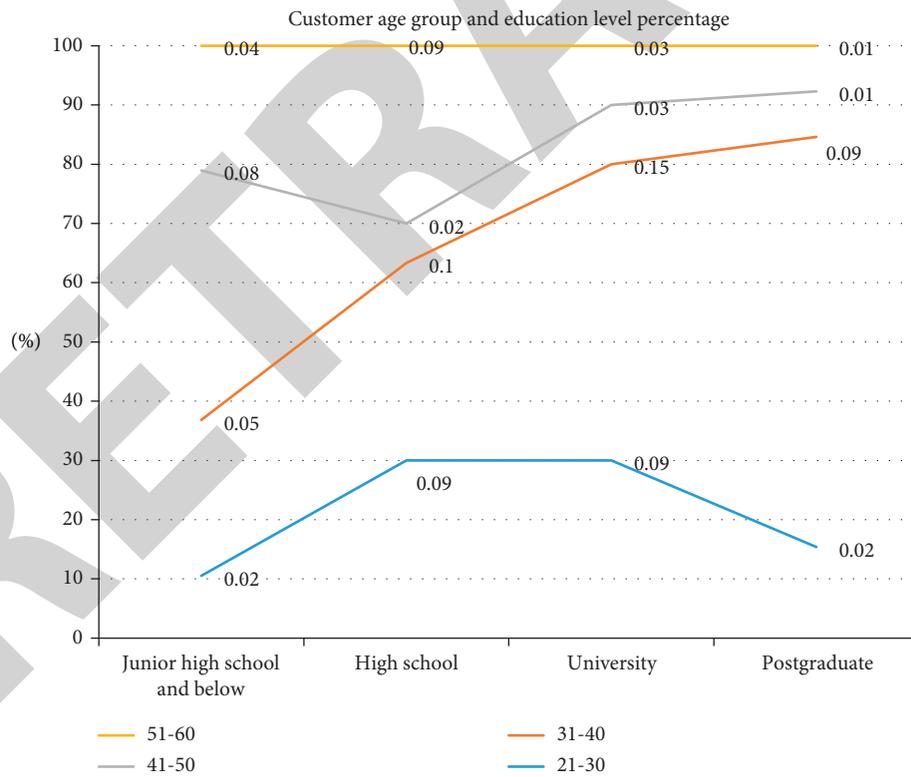


FIGURE 5: Customer age group and education level percentage chart.

better profits by properly publicizing its products or releasing some activities during the weekend, and the degree of publicity will also become higher.

The comparison results of different methods using machine learning classification algorithm, k-nearest neighbor classification, random forest, etc. can be seen in Table 3.

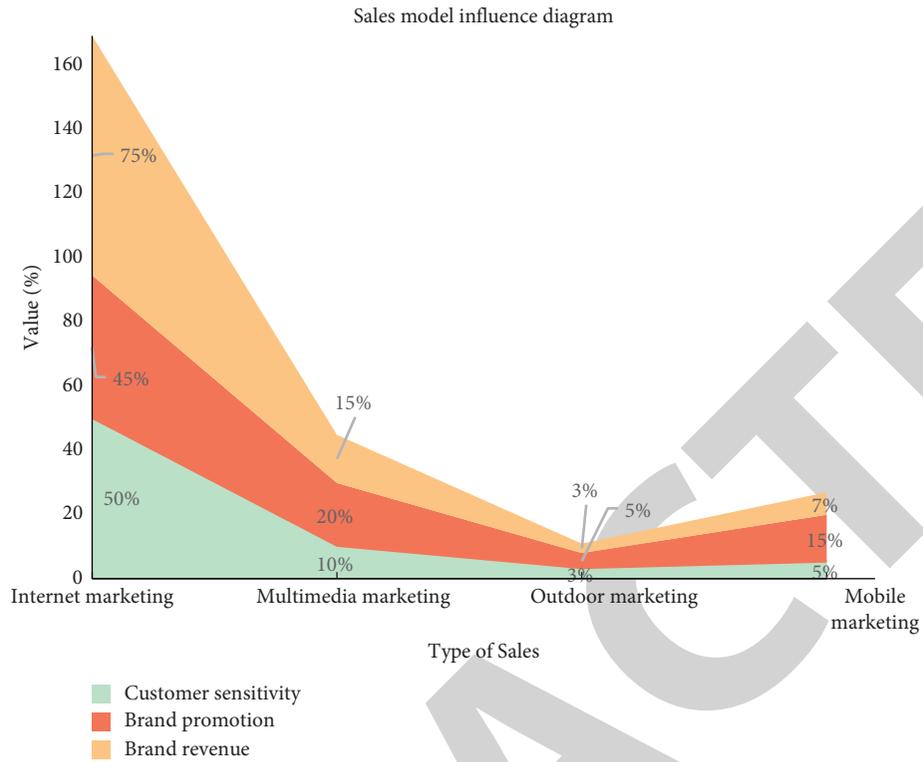


FIGURE 6: Sales model impact analysis diagram.

TABLE 2: Classification algorithm prediction data table.

The next seven days	Total number of customers	Sensitivity		Number of purchasers	Brand revenue (%)
		Sensitive	Not sensitive		
First day	495687	0.55	0.45	295437	60
Second day	514124	0.6	0.4	365189	63
Third day	354186	0.5	0.5	174396	51
Fourth day	528741	0.56	0.44	264581	50
Fifth day	196547	0.39	0.61	96145	35
Sixth day	654789	0.72	0.28	631476	74
Seventh day	594397	0.45	0.55	421467	43

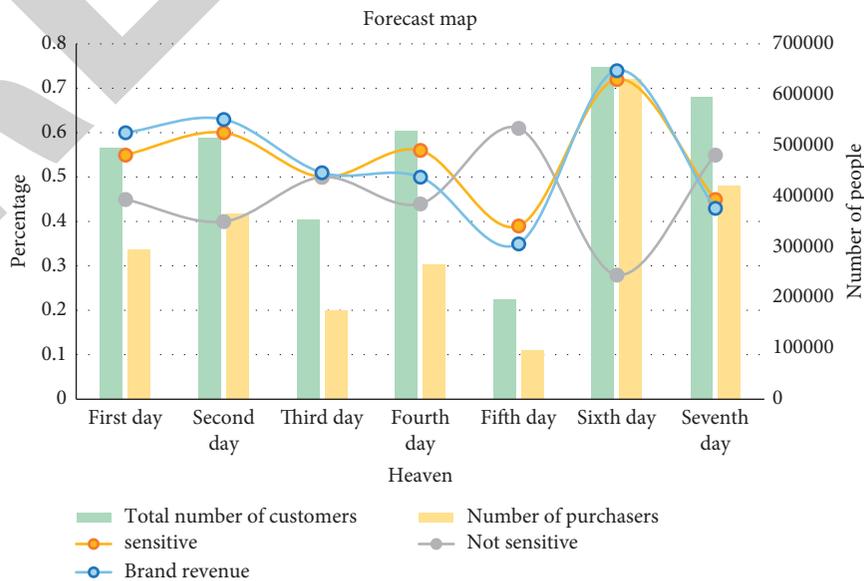


FIGURE 7: Forecast of the next seven days.

TABLE 3: Comparison results of different methods.

Method	Forecasted total number of customers	Predicted number of buyers	Revenue forecast (%)	Accuracy
Machine learning classification algorithm	594397	421467	43	0.92
$k$ -nearest neighbor classification	594300	421487	47	0.89
Random forest	594360	421427	41	0.90

## 5. Conclusions

Digital marketing model is a product of the new era developed under the development of the Internet and the construction of smart city, which has important commercial value for enterprises and brands. Compared with the traditional marketing mode, digital marketing mode saves the time of enterprise and brand publicity and only needs to push the products out through the Internet, which can complete the product publicity and reduce the waste of human and material resources. Its sales mode changes, which is convenient not only for enterprises and brands, but also for customers. The transaction mode under the digital marketing mode also changes; customers and brands can pay and collect money on the Internet, which is more convenient than traditional transaction methods.

This research uses machine learning methods to analyze brand digital sales in the context of smart cities and process digital sales related data using classification algorithms. In this paper, the number of customers, customer characteristics, degree of brand publicity, and brand revenue in the digital marketing of a brand within seven days are collected and analyzed. Through the modeling of machine learning classification algorithm, the related data of the brand in the next seven days are predicted. By calculating the experimental data many times, we can get the data forecast of brand digital marketing in the next seven days.

This research analyzes digital marketing through e-commerce data. Although the research has made some progress, there are still some deficiencies, which need further improvement. The data acquisition in this paper pays more attention to the relevant attributes of customers, which has no practical significance, so it needs to choose other methods. Moreover, the data processing in this study is limited by memory, so it can only simplify the operation accordingly. In order to obtain more comprehensive and accurate data and results, a large number of experiments and comprehensive comparison of the performance of various algorithms are needed.

## Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

## Conflicts of Interest

The authors declare that they have no conflicts of interest.

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