Hindawi

Retraction

Retracted: New Retail Marketing Strategy Combining Virtual Reality and 5G Mobile Communication

Mathematical Problems in Engineering

This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope

(2) Discrepancies in the description of the research reported

(3) Discrepancies between the availability of data and the research described

(4) Inappropriate citations

(5) Incoherent, meaningless and/or irrelevant content included in the article

(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets 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 own 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] X. Zhang, "New Retail Marketing Strategy Combining Virtual Reality and 5G Mobile Communication," *Mathematical Problems in Engineering*, vol. 2021, Article ID 6632701, 14 pages, 2021.

Research Article

New Retail Marketing Strategy Combining Virtual Reality and 5G Mobile Communication

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At present, China's retail industry has been completely opened to the outside world, and it is exactly the same. The retail industry has become one of China's most market-oriented and competitive industries. At the same time, the changes in consumer demand are becoming more and *more* diversified. In order to meet the diversified and personalized needs of consumers, retail companies must continue to increase investment in services, management, marketing, and branding. This paper combines virtual technology and 5G mobile communication technology to design and realize a set of 3D virtual fitting system. According to people's fitting needs, the research is carried out from two aspects: clothing style and body type matching degree and clothing fabric drape. In the comparison of body shape test results with conventional body shape judgment experience, the correct rate of the virtual fitting system's body shape judgment was 86%, and the error rate was 14%. In the comparison of online shopping data of consumers on different communication networks, it was found that the speed of different networks is different. The shopping experience has a relatively large impact. As a newly developed network mobile communication technology, 5G's ultra-high speed advantage has a great impact on the consumer experience; in the analysis and comparison of the traditional operation mode and the combination of online and offline operation modes, it is concluded that the traditional marketing model is far from meeting people's current life needs, and new retail is catering to the consumer needs of people in the new era.

1. Introduction

1.1. Background Meaning. The continuous development of information technology has enabled the telecommunications industry to develop rapidly and extensively [1]. While continuing to promote social development, it has had a huge impact on people's life and work styles and has become a pillar industry for world economic development. Mobile communication, satellite communication, and optical fiber communication are important components of modern communication networks for integrated services, and it is said that they are three new communication methods [2]. In particular, with the success of the recent development of mobile Internet and Internet of things services, mobile communication technologies continue to develop and develop [3]. In such a huge environment, 5G mobile communication technology has become a new hot spot to promote the development of communication technology, providing prospects for various applications.

1.2. Related Work. With the development of communication technology, people have entered the 5G era, and the demand for communication technology is increasing, and at the same time, it has brought great convenience to people. Tang analyzed and discussed the characteristics of 5G mobile communication, its development trend, and several technologies of 5G mobile communication [4]. Pan conducted an in-depth study on the future development trend of transmission under 5G mobile communication technology, hoping to provide help for the rapid development of mobile communication technology [5]. Zhang and Ma deeply explored the marketing of the mobile communication industry and proposed a suitable marketing strategy for mobile communication enterprises in the new era [6]. Liu et al. proposed a mobile VR network solution, which further analyzes the expansion effect introduced in application activation and aims to provide a reference and promote mobile VR applications in 5G networks demonstration effect of application development of 5G ecosystem [7, 8]. Zhao

et al. analyzed the current status of virtual reality equipment based on VR technology and a complete set of supporting exoskeleton structures and pioneered the creation of a virtual reality system with multiple senses and multiple synergistic devices as virtual real world provides new ideas [9]. Wang proposed the multidimensional impact of 5G on mainstream media integration. To correct the development direction of mainstream media, mainstream media needs to have an objective and profound understanding of the specific impacts of 5G on the ecology and pattern of media integration [10, 11]. In summary, judging from the current status of 5G technology research in the past, most of them are stating the future development trend of 5G, a few of them describe the application of 5G to a certain field, and few mention the use of virtual reality and 5G mobile communication technology.

1.3. Innovations in This Article. (1) Virtual technology and 5G mobile technology are combined to design and implement a 3D virtual fitting system. (2) The 3D modeling technology in the clothing CAD field is used to show the 3D visual dressing effect. (3) The clothing model of the 3D virtual fitting system is created by Maya three-dimensional modeling.

2. Overview of Related Theories Such as Virtual Reality and 5G Mobile Communication

2.1. Virtual Reality. Virtual reality refers to an artificial media space created by a computer [12]. It is a kind of virtual reality that can produce a sense of immersion when using a device to enter a virtual environment. With the rapid development of computer software and hardware technology, computer graphics applications have also been rapidly developed in various industries. Virtual reality, scientific visualization, computer animation, and computer graphics are the three main research directions [13, 14]. This kind of virtual environment can be created by a computer and can simulate the real world or the virtual world.

2.2. 5G Mobile Communication System. The 5G cellular network is a digital cellular network, an updated version of the previous 4G. In the 5G network, the coverage area covered by the supplier is divided into many small cell geographical areas [15]. The analog signal of the mobile phone is digitized by an analog-digital converter and then converted into a bit stream. All 5G radios in the cell use radio waves to communicate with the local antenna array and low-power automatic transceivers in the cell [16]. The transceiver allocates channels from the public rating pool, and these channels can be reused in geographically separated units. The local antenna is connected to the telephone network and the Internet through a high-bandwidth optical fiber or wireless backhaul connection. Just like existing mobile phones, mobile devices will automatically switch to the antenna of the new cell when switching from one cell to another cell [17]. The main advantage of the 5G network is that the data transmission rate is much faster than the previous 4G network, up to 10 Gbps, which is faster than the current wired Internet and the previous 4G network nearly 100 times faster than talking. Another advantage is that compared with 4G's 30–70 milliseconds, the network delay is less than 1 millisecond.

2.2.1. Features of 5G Mobile Communication

(1) Good System Performance. As the number of antennas, points, users, and communities in 5G networks continues to grow, the focus of technology applications is on networks with antennas and coordination between users and communities [18]. This improves the performance of all aspects of the system. In the communication business process, indoor business has become the center of existing business methods. The 5G system takes indoor business as the business premise, continuously expands three new business areas, and gradually expands the area coverage. The wireless network has completely covered [19].

(2) Using Hyperspectral. Through in-depth research and development of 5G communication technology, the use rate of high-frequency radio waves is very high, so that light professional wireless network technology, broadband wireless technology, and wireless technology are effectively combined [20]. The use of radio frequency spectrum ensures the stable development of 5G mobile communication technology [21].

(3) Low Price and Low Energy Consumption. When researching cellular network technology, affected employees are worried about reducing costs and using electricity. With the deepening of research, designing software configuration has become an important part of the research. After a comprehensive market analysis, operators can understand business development and traffic requirements, continuously optimize network resources, and further reduce system costs and power consumption [22].

2.3. Overview of New Retail. New retail is that companies that rely on the Internet are using advanced technologies such as big data and artificial intelligence to improve and change the production, distribution, and sales processes of their products [23]. This will improve the new business structure distribution model and redesign the offline experience of online services in the ecosystem and tightly integrate the latest logistics [24].

2.3.1. Characteristics of New Retail. Now, "new retail" is a conceptual representation of a new retail format that is different from existing retail stores. It is dominated by information technology (big data, Internet, artificial intelligence, etc.), which can improve customer experience (shopping scenarios that meet the different needs of consumers). A new business form is produced by refactoring three elements: online and offline people, products,

and disciplines [25, 26]. People correspond to consumer portraits and data, products correspond to supply chain organizational relationships and brand relationships, and markets correspond to shopping malls. The market is the shape of the front end of the new retail store, and people and goods are the main changes in the back end. For example, "Hema Xiansheng" opened by Alibaba is a combination of "fresh supermarket + e-commerce experience + catering + logistics distribution" and other business functions, creating a "supply chain-store-warehousing-distribution" and other business functions [27, 28].

From a human perspective, online e-commerce platforms have multiple ways to obtain traffic, and offline physical stores are also actively implementing traffic data, so that customer portraits can be more and more accurate, and demand analysis is fully explored [29, 30].

From a product perspective, the era of big data and artificial intelligence has fundamentally changed the traditional retail industry's reliance on past experience in purchasing and management models [31, 32]. For example, Hippo Fresh uses big data from consumer terminals to digitize various application scenarios from front end to back end, accurately record consumer needs, and provide customers with targeted products and services to quickly integrate into the business community [33].

In specific locations, the gradual maturity of technologies such as image recognition, artificial intelligence, and intelligent manufacturing, as well as the rapid popularization of mobile payments, not only make the consumption scene more diversified but also greatly improve the comfort level [34–36].

2.4. Commonly Used Wireless Propagation Models.

In the mobile network environment, the complex and changeable wireless propagation environment directly determines the loss of signal propagation and affects the quality of wireless signal transmission [37]. In order to simulate the attenuation of wireless signals in the actual environment, it is necessary to summarize and establish propagation models based on different environments according to theoretical research and measured data and to correct the models according to the needs of the actual scene, so that it can more accurately fit the actual situation wireless communication environment. Currently, the frequently used wireless propagation models include Okumura–Hata model, COST-231 Hata model, and LEE model [38].

2.4.1. Okumura–Hata Model.

The Okumura–Hata model is an empirical formula based on the statistical analysis of a large number of wireless propagation loss test data in the city. It is mainly suitable for macrocellular systems with a cell radius of 1 km~20 km. Other applicable conditions include frequency between 150 and 1500 MHz, base station effective antenna height is between 30 and 200 m, and the effective antenna height of the mobile station is between 1 and 10 m. The empirical formula of Okumura–Hata model path loss is

$$L_{\text{Okumura–Hata}} (\text{dB}) = 69.55 + 26.16 lg f_c - 13.82 lg h_{\text{te}}$$
$$- \alpha(h_{\text{re}}) + (44.9 - 6.55 lg h_{\text{te}}) lg d + C_{\text{cell}}. \tag{1}$$

In the formula, L is the path loss between the base station and the mobile station, in dB; f_c is the operating frequency, in MH_z; h_{te} is the effective height of the base station antenna, in m; h_{re} is the effective height of the mobile station antenna, in m; d is the horizontal distance between the base station antenna and the mobile station antenna, in m; $\alpha(h_{\text{re}})$ is the effective antenna correction factor; and C_{cell} is the cell type correction factor.

2.4.2. COST-231 Hata Model.

The COST-231 Hata model is an extended version of the Hata model proposed by the European Research Council. It is mainly suitable for macrocellular systems with a cell radius of 1 km~20 km. Other applicable conditions include the following: the application frequency is between 1500 and 2300 MHz, and the effective transmitting antenna height is 30. Between ~200 m, the effective receiving antenna height is between 1 and 10 m. The empirical formula for calculating the path loss of the COST-231 Hata model is

$$L_{\text{COST–231Hata}} (\text{dB}) = 46.3 + 33.9 lg f_c - 13.82 lg h_{\text{te}} - \alpha(h_{\text{re}})$$
$$+ (44.9 - 6.55 lg h_{\text{te}}) lg d + C_{\text{cell}} + C_M. \tag{2}$$

In the formula, L is the path loss between the base station and the mobile station, the unit is dB; f_c is the operating frequency, the unit is MH_z; h_{te} is the effective height of the base station antenna, the unit is m; h_{re} is the effective height of the mobile station antenna, the unit is m; D is the horizontal distance between the base station antenna and the mobile station antenna, the unit is m; $\alpha(h_{\text{re}})$ is the effective antenna correction factor; C_{cell} is the cell type correction factor; and C_M is the correction factor for the metropolitan center.

2.4.3. Improved LEE Propagation Model.

This article improves the traditional LEE propagation model and proposes a propagation environment correction factor G_{AREA} to accurately describe the comprehensive impact of different test areas and different geographic attributes. The improved LEE propagation model is shown in the following formula:

$$P_r = P_{r_1} + (-\gamma) \cdot \lg \frac{d}{d_0} + \alpha_0 - n \lg \frac{f}{f_0} + G_{\text{AREA}}. \tag{3}$$

In the formula, P_r is the received power; d is the horizontal distance between the transmitting and receiving antennas; γ is the distance attenuation factor; P_{r_1} is the received power at 1 km of the base station antenna used in the actual measurement in a specific city under the normal transmitting state; G_{AREA} is the propagation environment correction factor, which locally corrects the propagation loss according to the geographical attributes in the test area; and α_0 is the correction factor for sending and receiving. In

actual use, when the base station antenna is different from the standard antenna, it is corrected. The calculation formula of α_0 is shown in the following formula:

$$\alpha_0 = \left(\frac{h_t}{h_{t_{\text{REF}}}}\right)^2 \frac{P_1}{P_{t_{\text{REF}}}} 10^{G_t - G_{t_{\text{REF}}}/P_{t_{\text{REF}}}}. \tag{4}$$

In the formula, h_t, P_t, G_t are the actual base station antenna height, base station transmitting power, and base station antenna gain, respectively; $h_{t_{\text{REF}}}$, $P_{t_{\text{REF}}}$, $G_{t_{\text{REF}}}$ are the base station antenna height, base station transmitting power, and base station antenna gain when measuring P_{r_1} and γ, respectively.

In the improved LEE model, d_0 takes 1 km, f_0 takes 850 MH$_z$, and n is determined by f and f_0, as shown in the following formula:

$$n = \begin{cases} 20, & f < f_0, \\ 30, & f < f_0. \end{cases} \tag{5}$$

2.5. Cluster Head Selection Algorithm Based on Fuzzy Logic in Wireless Sensor Networks

2.5.1. Trust Management Plan.
Suppose the evaluation node and the evaluated node are node i and node j, respectively. Direct trust calculation is based on the direct observation of node i to node j, using node α_{ij} to represent the number of normal behaviors of node j and β_{ij} to represent the number of abnormal behaviors of node j. The trust value DT_{ij} of node i to node j can be calculated from the mathematical expectation of the *Beta* distribution.

$$\text{DT}_{ij} = \frac{\alpha_{ij} + 1}{\alpha_{ij} + \beta_{ij} + 2}. \tag{6}$$

More interaction between nodes will improve the accuracy of trust calculations; however, some different situations will lead to the same direct trust value. Therefore, Conf is introduced to reflect the reliability of direct trust:

$$\text{Conf} = \frac{\int_{D_{ij}-\varepsilon}^{D_{ij}+\varepsilon} p^{\alpha_{ij}-1} (1-p)^{\beta_{ij}-1} dp}{\int_0^1 p^{\alpha_{ij}-1} (1-p)^{\beta_{ij}-1} dp}. \tag{7}$$

Among them, ε is the error level, assuming that p is the threshold of Conf, when Conf $\geq p$; it means that the direct trust is sufficiently reliable, and the total trust value $T_{ij} = \text{DT}_{ij}$; otherwise, indirect trust calculation is required.

In indirect trust calculation, it is necessary to collect the suggested values of the common neighbor nodes of node i and node j, and these common neighbor nodes are called suggested nodes. First, calculate the direct trust DT_{ik} of node i and node k according to the above formula. Taking γ as the threshold, when $\text{DT}_{ik} < \gamma$, it means that node i does not trust node k, and node i will ignore the suggestions from node k. If $\text{DT}_{ik} \geq \gamma$, it means that node k can be trusted. ω_k represents the weight of different suggestions, calculated as

$$\omega_k = \frac{\text{DT}_{ik}}{\sum_{m=1}^n \text{DT}_{im}}, \quad k = 1, 2, \ldots, n, \tag{8}$$

where n represents the number of trusted suggestion nodes, and highly reliable trusted nodes have a higher weight. Assuming that α_{ij} and β_{ij} are the recommended information about node j, the indirect trust value IT_{ij} can be expressed as

$$\text{IT}_{ij} = \frac{\sum_{k=1}^n \omega_k * \alpha_{kj} + 1}{\sum_{k=1}^n \omega_k * \alpha_{kj} + \sum_{k=1}^n \omega_k * \beta_{kj} + 2}. \tag{9}$$

In the formula, α_{kj} and β_{kj} represent the number of normal and abnormal behaviors of node i observed by the proposed node.

In order to improve the adaptability, the trust value is updated with the period π. Because the trust value and the interactive behavior are bright, the evaluation node $T + \pi$ updates the historical record at all times:

$$\begin{aligned} \alpha^{t+\pi} &= (1 - \theta) * \alpha^t + \theta * \Delta\alpha, \\ \beta^{t+\pi} &= (1 - \theta) * \beta^t + \theta * \Delta\beta. \end{aligned} \tag{10}$$

Among them, $\Delta\alpha$, $\Delta\beta$ represent the behavior record in the period π, and the parameter θ is the forgetting factor, which reflects the weight of the historical record. The forgetting factor can change dynamically during the update process:

$$\theta = \begin{cases} \theta_h, & \text{if } \Delta\alpha < \Delta\beta, \\ \theta_i, & \text{if } \Delta\alpha \geq \Delta\beta. \end{cases} \tag{11}$$

Among them, $0 < \theta_i < \theta_h < 1$ means that if the evaluated node performs badly in the period π, its abnormal behavior will be severely punished. When the node performs well in the period π, its influence on the current trust evaluation becomes smaller. This is to prevent the node from pretending to improve its trust value.

Finally, the overall trust value T_{ij} of node i to node j is obtained:

$$T_{ij} = \mu * \text{DT}_{ij} + (1 - \mu) * \text{IT}_{ij}. \tag{12}$$

Among them, μ is a weighting factor reflecting the importance of direct trust, which can be selected according to different application scenarios.

2.5.2. Fuzzy Logic Cluster Head Selection.
When selecting cluster heads, the fuzzy logic system requires three input variables: trust value T, energy parameter E, and parameter D, reflecting the density of nodes:

$$\begin{aligned} E &= \frac{E_r}{E_0}, \\ D &= \frac{n}{N}, \end{aligned} \tag{13}$$

where E_r represents the remaining energy of the node and E_0 represents the initial energy; N represents the number of neighbors of the node, and N represents the total number of nodes.

After the current cluster head works for a period of time or when its remaining energy is lower than a preset value, the cluster head broadcasts a new election message. Once new election information is received, each node will automatically generate a random number between 0 and 1. If the random number is less than the threshold $T(n)$, then the node becomes a candidate cluster head. The calculation formula of the threshold $T(n)$ is as follows:

$$T(n) = \begin{cases} \dfrac{P}{1 - P \times [r \bmod (1/P)]}, & n = G, \\ \\ 0, & \text{otherwise}, \end{cases} \tag{14}$$

where P is the percentage of cluster heads and r is the current round number and G represents the set of nodes that have no cluster heads in the last $r \bmod (1/P)$ round.

Fuzzy processing of variables:

$$\text{priority} = \frac{\int x \cdot \mu(x) \mathrm{d}x}{\int x \mathrm{d}x}, \tag{15}$$

where $u(x)$ is the membership function of the fuzzy set $priority$. Ordinary nodes select the highest priority node from the trusted candidates as the cluster head and then send a $join-in$ message. After receiving the $join-in$ message from the member node, the cluster head rejects the request of the node with low trust value to isolate the malicious node.

3. Design of a 3D Virtual Fitting System Based on the Combination of Virtual Reality Technology and 5G Mobile Communication Technology

At present, China's retail model has been transformed into a physical retail model closely integrated with e-commerce. However, in the field of clothing, more and more traditional methods of buying clothing must be seen first and the display methods of current online shopping platforms are increasingly used. For example, the unique text introduction of clothing and 2D product photos can no longer meet the needs of this person. Therefore, 3D virtual personalization technology has emerged. As a 3D virtual technology, it provides real-time interaction, visual display, and the advantages of meeting the psychological needs of consumers.

3.1. 3D Virtual Fitting System Architecture Construction

3.1.1. Layered Architecture Design. At present, the software architecture model widely used in the software field has adopted several layered architectures of virtual switchgear system architecture. The characteristics of multilayer design are to simplify the design and keep the system structure clear, accurate, and loosely coupled. At the same time, it recognizes that the user interface layer, business logic layer, and data access layer are separated from each other, and it improves flexibility and scalability.

3.1.2. System Model Architecture Design. The virtual fitting system can be designed and described with a simple three-tier architecture under the B/S mode. In the three-tier architecture design used by the virtual fitting system, the presentation layer is located at the outermost layer of the entire architecture and is the layer directly contacted by the user. The data used to determine the body shape in the virtual fitting system is entered by the user at this layer and display the body shape judgment result directly based on the relevant judgment data. Between the presentation layer and the data access layer is the business logic layer, which is in a very important link in the overall architecture relationship. Mainly check the business logic relationship of the whole system, test the effect of fitting, and provide the mutual interface with other layers.

3.1.3. System Flow Design. The process design of this system is mainly to display the operation procedures of clothing browsing, clothing, and body type matching effect. The user name and password entered by the user at the front desk of the system are used to determine their identity. For the system administrator, it is also necessary through the identification of the foreground to obtain the authority of the background operation.

3.1.4. System Module Design. The user can enter the homepage of the fitting system after obtaining the identity recognition. Through the registered user identity recognition, they can enter body data, obtain body type judgments, browse clothing styles, view clothing wearing effects, etc., and the system administrator can pass through the system homepage. After identification, you can enter the system background through the link entry on the homepage. After the administrator is in the system background, the administrator can modify the user name and password of the administrator, add or delete clothing styles, manage body types, and perform clothing and body types. The system design adopts modular design, which makes it easier to build, maintain, and modify the system. Modular design also has the characteristics of easy maintenance and clear thinking of system design. Divide the function of the entire system into several small problems, analyze, and design their functions one by one. Through the connection and combination between modules, the overall functions of the system are realized, so that the whole system can realize the functions of the system set at the beginning of the design. The main functions are as follows:

(1) Body Shape Judgment Module. In order to achieve the effect of fitting, it is first necessary to obtain the user's body characteristics. The design of this module completes the judgment of the user's body characteristics through the input of the user's body shape data, which is the leading link for the subsequent virtual fitting.

(2) Clothing Browsing Module. The design of this module is based on the characteristics of clothing styles in the clothing sales businesses, adding the model diagrams of the clothing

styles in the store to the background management system. In the clothing browsing module, the user can view the styles of clothing that the store owns, then make a choice and decide whether to try it on.

(3) Virtual Fitting Module. Consumers' demand for fitting is to see the effect of different styles of clothing on themselves as a basis for judging whether to buy clothing. The design of this module mainly realizes the effect of virtual try-on. According to the body shape judged by the previous module, combined with the clothing style selected by the user to browse the clothing, a clothing effect diagram is given (providing a multiangle display effect), so that the user can get an immersive try-on experience.

(4) Administrator Login Module. This module is one of the main modules of the system and the basic module of the system. Users with administrator rights can enter the background interface of the Metropolitan System through this module. The setting of this module ensures the effectiveness and safety of the front-end release system to prevent ordinary users from arbitrarily changing the management of clothing style models and body type classification management.

(5) Clothing Management Module. The function of this module is to add, modify, delete, and do other operations on the clothing model diagram. The clothing in the clothing store needs to be updated from time to time according to seasonal changes and sales conditions. The virtual fitting environment also needs to be adjusted accordingly. The design of this module can be added and deleted in time according to the change of clothing styles to ensure the effectiveness of the fitting environment.

(6) Body Type Module. The current research and design of the system are only at the preliminary stage, and the classification of human body types is relatively preliminary. In order to improve the satisfaction of the try-on effect, it is necessary to continue to subdivide according to the characteristics of the human body to improve the effectiveness of the try-on clothing.

(7) Display Graph Management Module. The system needs to make timely adjustments to the clothing model according to the style changes in the clothing store and wear the new virtual clothing on the virtual model. This process requires the help of an experienced 3D expert to complete it. The setting of this module is designed to ensure the rationality of the clothing try-on effect.

(8) Administrator Module. This module is mainly designed according to the changes of staff in the store. According to the actual situation, the staff in the store may be replaced. For the use of the system, different employees can set their own login names and passwords to improve the feasibility of system maintenance and application.

3.1.5. System Design Goals. In the design of the overall system framework, according to the actual needs of the

virtual fitting project, the system is divided into multiple functional modules to achieve different functional requirements, and the functions of each individual module are designed separately to make the entire fitting system. The function is realized. Each module is provided with its own function, and an external interface is set between one function module and the other function module, and the modules are assembled according to the overall framework of the design, so that they can realize different functions.

The ultimate goal of system design is to clarify the specific role of each module; let they play their respective functions, determine how to implement the program function implementation, and make the design of the entire system as simple and clear as possible, easy to learn, and easy to operate for users.

Through the program management in the background, the system administrator can clearly manage clothing information, body shape information, etc., and add or delete clothing styles, body subdivision styles, etc., and can also manage the details of clothing wearing effects to enable front-end users to operate more timely and clear. After logging into the homepage of the system through registration, the user can obtain the body shape judgment through the input of his body shape data; after browsing the various clothing styles provided by the store, he can choose his favorite clothing and check the effect that the clothing is wearing a similar body shape on the model. Any piece of clothing content of the clothing style management function can be deleted, and new clothing styles can be added according to the fashion trend and the purchase situation in the store.

Figure 1 is the flow chart of the fitting system. When a user logs in, his identity is verified to determine whether he is a front-end user or a system administrator. When you are an administrator user, you can manage the addition and deletion of clothing style models according to the new synchronization of the store's clothing styles and manage the renderings of different virtual body types wearing corresponding styles of clothing models; if it is a general user, enter the clothing style browsing and style selection, body shape data input, and body shape judgment operation process. The fitting process is shown in Figure 1:

3.2. System Database Design. The database is developed on the basis of the file management system. It is a data collection that can realize the unified management of large-scale data. It is the core and foundation of the digital system. The database enables the information system to obtain the required information accurately, conveniently, and timely.

3.2.1. Database Security

(1) The Security of Information in the Database. In order to ensure the security of the information in the database, system administrators must pass identity verification before they can enter the system background for operation. Each legal administrator needs to enter a user name, and each legal administrator user only corresponds to a password. This kind of identity verification operation can prevent
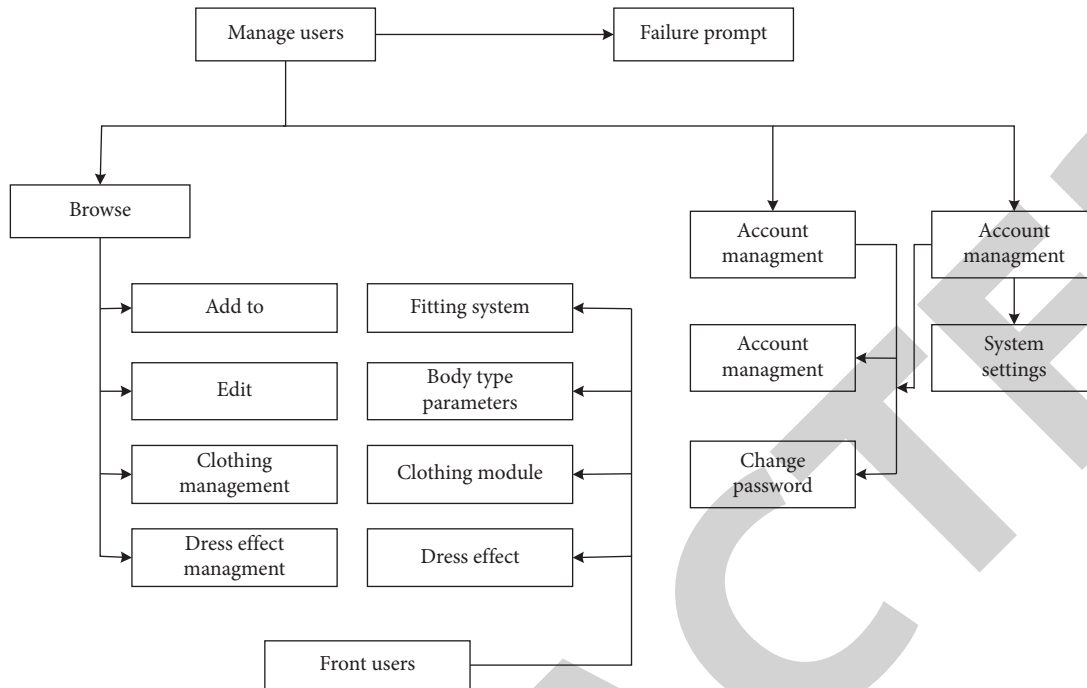
Figure 1: Fitting system process.

nonadministrators from entering, so that the data in the database can be adjusted and changed at will.

(2) Data Security. In the process of data setting, in order to ensure data security, the system isolates the database layer from the client layer, so that the data in the database will not be arbitrarily destroyed, and data cannot be added or modified.

(3) Consistency of the Database. When setting the clothing style information and clothing dress display settings, it is ensured that when the clothing style information is deleted, the corresponding clothing dress effect is also deleted, ensuring the consistency of the database.

3.2.2. Database Design. Database design is mainly used to solve the input method and implementation method of the entire system design, how to map the model to a specific software system structure, and how to divide modules to determine each function of each module and the relationship between them. When performing system design work, designers must use multiple design methods based on the analysis methods used in the analysis phase. Data express abstract things in the form of data and analyze and obtain the real world. There are internal connections in the specified application environment, and designers can effectively process data according to user information requirements and data processing requirements.

3.3. 3D Clothing Model Creation

3.3.1. 3D Modeling Technology in the Field of Clothing CAD. With the continuous update of computer technology, the clothing industry has higher requirements for the three-

dimensional and real sense of clothing in computers, which promotes the development of clothing CAD to three-dimensional technology. Garment CAD 3D technology not only overcomes the defects of virtual imaging in 2D but also makes it possible to network the production and purchase of garments. Garment CAD technology operates in accordance with the traditional garment design and production process. First, the designer's conceived garment image is drawn into a plane dressing effect drawing and a style structure plan, and then it is input into the 3D module for virtual stitching; you can see the 3D visualization of the dressing effect. At present, the transformation from a structural plan of a clothing style to a two-dimensional clothing piece is still an artificial conversion process, which requires professional cutting knowledge to complete.

At present, the geometric modeling technology of clothing still focuses on how to express the glossiness, reflection and absorption of light, fold texture, and other effects of clothing fabrics. For the soft nature of clothing fabrics, the performance of fabric tension and tensile strength needs to be more in-depth research and discussion. The current 3D modeling technology only uses all kinds of fabrics as deformable geometric objects and uses B-spline surfaces, Bezier surfaces, and INURBS surfaces to express the surface modeling of clothing.

3.3.2. Physical Modeling. The physical modeling of clothing is to imitate the physical characteristics of clothing, such as the refraction and reflection of light and the reflection of gravity, through computer graphics technology; to create it visually, this kind of method can be more realistic. The physical model creation method analyzes the physical data embodied by the fabric through mathematical models and

algorithms, so as to realize the reproduction of the specific physical object form in the virtual environment. In clothing physical modeling, it is usually divided into energy method and force method according to different calculation methods. Among them, the energy method is usually used to simulate the static drape fabric, and the force law is mostly used for the dynamic drape fabric simulation.

3.3.3. Photographic Method to Obtain Clothing Model.
The most commonly used in the field of photography modeling is the IBMR technology. The use of IBMR technology to model is faster and more convenient, and the technology of building a 3D model on the basis of 2D images can make the model feel like a photo. It is a modeling method that generates a three-dimensional model according to the contour line of the captured object image, in which determining the position of the camera is an essential and important step. In this step, it is not only necessary to determine the orientation of the camera but also the parameter settings during shooting will become reference values. This camera calibration process can be achieved by using a specific device to set the position of the subject to be fixed and change the position of the shooting camera; it can also use a controllable mechanical turntable to rotate the subject while the camera position is fixed. This type of calibration can ensure the accuracy of the 3D model.

3.3.4. Creation of Clothing Model in the Fitting System.
In this virtual fitting system, the aesthetic difference between the circumference change and the clothing wearing is solved first, and the clothing fitting effect suitable for the weight of the user is provided. Consumers' body types are preliminarily divided into four basic body types: "thin body type," "standard body type," "fat body type," and "fat body type." In order to provide users with the effect of wearing the same clothing with different body shapes, clothing models are created based on the obtained human body shapes to show users the visual display effect of corresponding body shapes wearing the same clothing.

3.3.5. Establishment of 3D Clothing Model.
Due to the limitation of technology and equipment, the creation of clothing model in this system is obtained by Maya three-dimensional modeling. The clothing model creation first locks the total length of the clothing and creates it according to the height of 165 mm. In order to retain the style characteristics of the clothing in the try-on renderings, it is first necessary to determine several key points and key line parameters of the clothing. For example, clothing length, waistline height, neckline width, neckline depth, shoulder width, sleeve length, hem size, and other dimensions are all obtained from the measurement of clothing products, combined with the effect of wearing clothing on a model with a standard body shape of 165 mm. For example, the lower edge of the neckline is at the reference position of the clavicle of the model, the shoulder width is at the corresponding position of the shoulder point, and the size of the sleeve is lower than the relative position of the armpit; the clothing model is created based on the measurement positions of the standard body model wearing the clothing.

3.3.6. Stakeout Display of Clothing Model.
The key lines set in the clothing model play a great role in the clothing stakeout link. According to the clothing model standard and the key girth in clothing cutting, the difference between different body types (only the difference between body weight and thinness is considered as the body type judgment standard in the first stage of the system creation) on the key line data is used as the basis. Use the difference in the key line circumference setting of the clothing model to obtain the lofting effect of different models of clothing.

4. 3D Virtual Fitting System Test and Analysis

4.1. Body Shape Judgment Test.
In order to test whether the fitting system's body shape judgment is reasonable and to experience whether the virtual fitting system can achieve the aesthetic needs of clothing styles, the body shape data of some potential users are selected for body shape judgment testing. This experiment selects the body type data and age of 20 potential users. See Table 1 and Figure 2 for specific data information.

It can be seen from Table 1 and Figure 2 that according to the comparison of the body shape test results with the conventional body shape judgment experience, the correct rate of the virtual fitting system is 86% and the error rate is 14%. Among them, the improper body shape judgment of data no. 009 is caused by the difference of body shape. The body shape of the tested object of 009 is obviously a body shape, and the test result shows "fat" because its hip circumference parameter is obviously larger than the standard parameter, and the waist circumference parameter slightly larger than the standard parameters are caused by the fact that the hip bones are wider and the hip circumference parameters are larger, which makes the result of the virtual fitting system judged by the actual body shape gap. The 003 data and the 011 data are judged to be "fat" by the system, but in fact, the skeletons of the two measured objects are large skeletons, and the circumference parameters of the bones themselves are relatively large, and the actual body type is thin. From the results of the above tests, the system can basically meet the body shape judgment of young and middle-aged women during virtual try-on, and the accuracy rate is high.

4.2. Comparison of Online Shopping Data of Consumers on Different Communication Networks.
This experiment is mainly to test the impact of different mobile communication networks on online shopping. Twenty people (divided into 4 groups, 5 people in each group) were randomly selected to use 2G, 3G, 4G, and 5G networks on an e-commerce platform to limit the time to one-hour online shopping; the main test data are total online shopping time, average purchase time per item, purchase quantity, purchase type, and online shopping satisfaction (standard:

TABLE 1: Body type test data.

| Serial number	Height	Bust	Waistline	Hips	Age	Test body shape
1	155	83	83	97	38	Bust+
2	162	69	69	97	30	Bust+
3	164	66.5	66.5	93	29	Fat
4	167	73	73	91	27	Waistline+
5	170	84.5	84.5	98	48	Waistline+
6	165	68	68	98	25	Fat
7	181	81	81	97	58	Waistline+
8	160	75	75	98	36	Normal
9	160	68	68	95	19	Fat
10	160	77	77	104	19	Bust+
11	170	61	61	91	19	Normal
12	163	68	68	89	19	Normal
13	168	71	71	96	19	Fat
14	160	63	63	87	19	Normal
15	168	70	70	95	19	Fat
16	160	67	67	91	19	Fat
17	165	64	64	91	19	Normal
18	162	71	71	93	19	Bust+
19	162	72	72	91	19	Bust+
20	170	65	65	92	19	Slightly fat
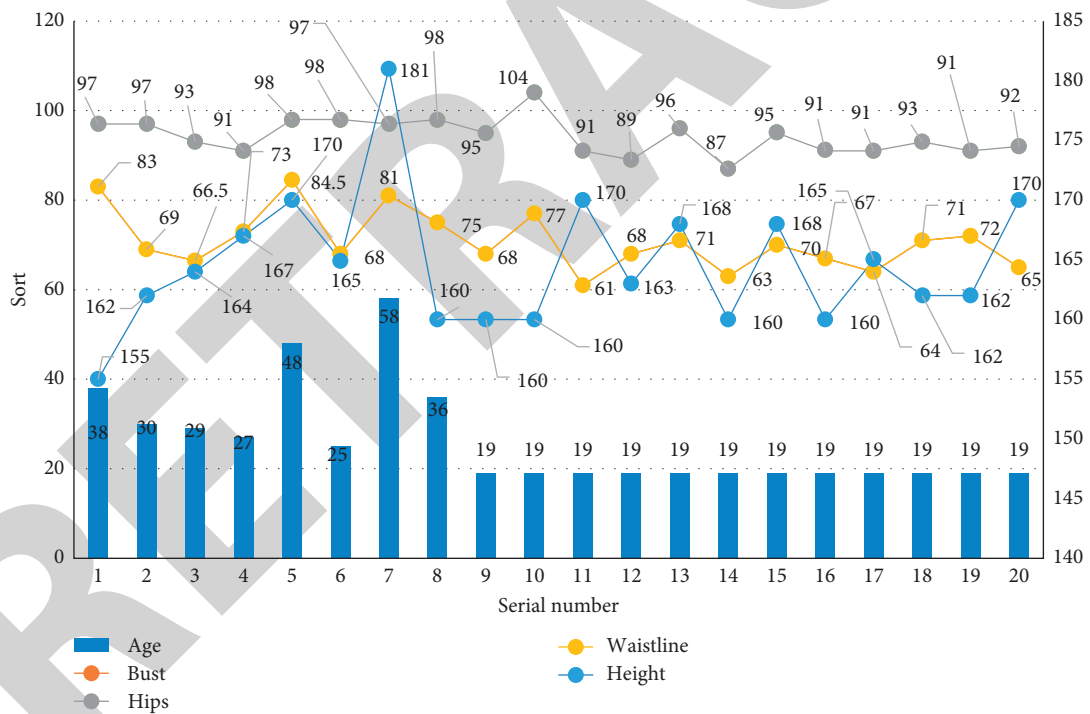
FIGURE 2: Body type test data.

1–10 points). See Table 2 and Figure 3 for specific data information.

It can be seen from Table 2 and Figure 3 that in this online shopping, the users in the 2G group had a total purchase time of 55 minutes. They purchased 3 products and 3 types of products. The average shopping time per item was 18.33 minutes, and the satisfaction was only 1 point. In this online shopping, users in the 3G group had a total purchase time of 43 minutes. They purchased a total of

6 products and 5 types of products. The average shopping time per item was 7.17 minutes, and the satisfaction score was 2 points. In this online shopping, users in the 4G group had a total purchase time of 31 minutes. They purchased a total of 11 products and 9 types of products. The average shopping time per item was 2.82 minutes, and the satisfaction score was 7 points. In this online shopping, users in the 5G group had a total purchase time of 16 minutes. They purchased a total of 18 products and 15 types of products.

TABLE 2: Comparison of online shopping data of different networks.

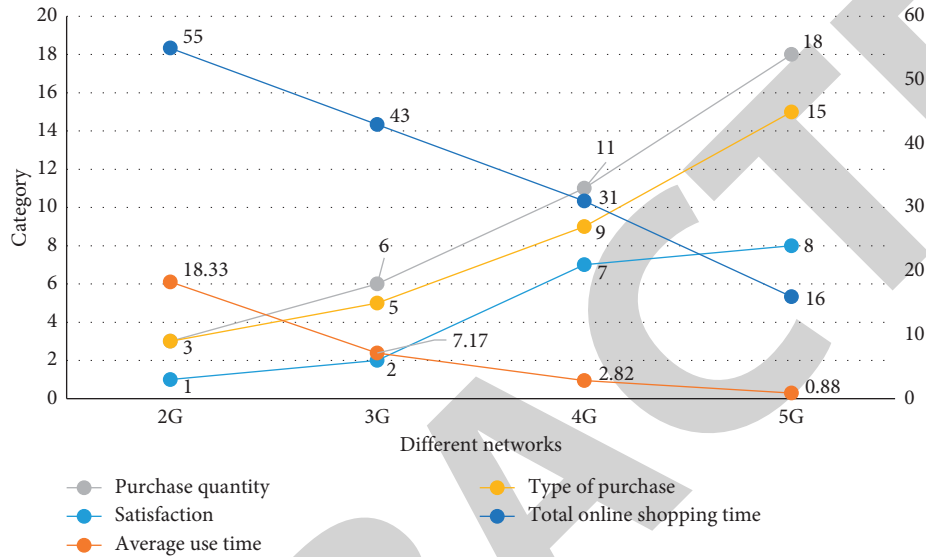|	Total online shopping time	Average use time	Purchase quantity	Type of purchase	Satisfaction
2G	55	18.33	3	3	1
3G	43	7.17	6	5	2
4G	31	2.82	11	9	7
5G	16	0.88	18	15	8

FIGURE 3: Comparison of online shopping data of different networks.

The average shopping time per item was 0.88 minutes, and the satisfaction score was 8 points. Among them, the longest time spent on online shopping is 55 minutes for the 2G user group, while the time required for the 5G user group is 16 minutes, and the time spent by the 2G user group is 3.44 times that of the 5G user group; the length of time spent on online shopping order is 2G, 3G, 4G, and 5G. The online shopping experience of 2G user group, 3G user group, and 4G user group and 5G user group is very polarized, and the ranking of satisfaction is 5G, 4G, 3G, and 2G. In summary, in the online shopping experience, the speed of different networks has a greater impact on the shopping experience. As a newly developed network mobile communication technology, 5G has a great impact on the consumer experience due to its ultra-high speed advantage.

4.3. Comparison of Traditional Operation Mode and Combination of Online and Offline Operation Mode

4.3.1. One-Week Revenue Comparison. In order to further compare the difference between the traditional marketing operation model and the new retail operation model, this experiment uses a combination of online and offline operations of a Hui supermarket (A1) and an ordinary traditional supermarket (A2) to compare the weekly revenue. Both in a superior geographical location, the tested data include total traffic, daily average traffic, purchase times,

replenishment times, total revenue, and weekend revenue. See Table 3 and Figure 4 for details.

From Table 3 and Figure 4, it can be seen that A1 has 136,657 people in a week, with an average of 1042 people per day, 17 times of restocking, 11 times of replenishment, weekend revenue of 176,300 yuan, online revenue of 131,800 yuan, and total revenue of 419,700 yuan. A2 has 153,364 people in a week, with an average of 1283 people per day, 13 times of restocking and 5 times of replenishment, weekend revenue of 152,200 yuan, online revenue of only 34,400 yuan, and total revenue of 335,600 yuan. It can be seen from the above data that although A1 has relatively less total traffic and daily average traffic than A2, the ratio of weekend revenue and online revenue is much higher than that of A2, of which online revenue is equivalent 5.1 times of A2, the number of replenishments is 2.2 times of A2. A1 revenue under the new retail model is higher than A2 revenue under the traditional model. Generally speaking, with the improvement of people's consumption level and the change of consumption concept, the traditional marketing model is far from being able to meet the needs of people nowadays, and new retail is catering to the consumption needs of people in the new era.

4.3.2. Comparison of Revenue Structure. In the above data analysis, the comparison between A1 and A2 is the comparison between total revenue, which shows that the new marketing model is more suitable for people's consumption

TABLE 3: Comparison of supermarket data of different models in a week.

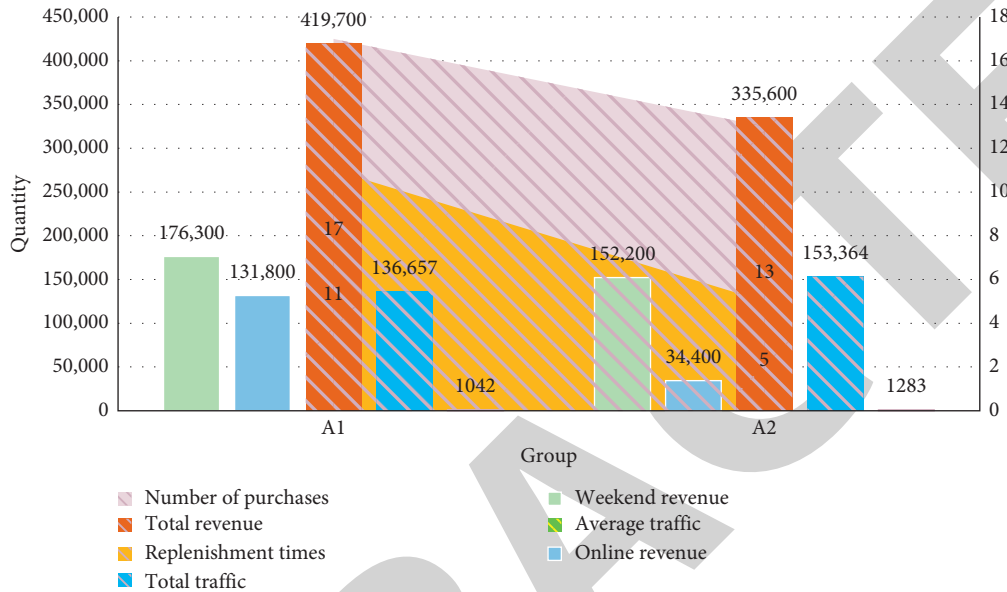|	Total traffic	Average traffic	Number of purchases	Replenishment times	Weekend revenue (ten thousand)	Online revenue (ten thousand)	Total revenue (ten thousand)
A1	136657	1042	17	11	17.63	13.18	41.97
A2	153364	1283	13	5	15.22	3.44	33.56

FIGURE 4: Comparison of supermarket data of different models in a week.

needs. In order to further understand the revenue structure of the new retail marketing model and the differences between it and the traditional model, the weekly revenue of the two models is divided in detail. See Table 4 and Figure 5 for details.

From Table 4 and Figure 5, it can be seen that A1's total revenue is 419,700 yuan, of which online revenue is 131,800 yuan, accounting for 31.4% of total revenue; offline revenue is 287,900 yuan, accounting for 68.6% of total revenue; and weekend revenue is 176,300 Yuan, accounting for 42% of total revenue. A2's total revenue is 335,600 yuan, of which online revenue is 34,400 yuan, accounting for 10.3% of total revenue; offline revenue is 301,200 yuan, accounting for 89.7% of total revenue; and weekend revenue is 152,200 yuan, accounting for 45.3% of total revenue. It can be seen that A1's revenue structure is relatively balanced, with online revenue, offline revenue, and weekend revenue, accounting for 31.4%, 68.6%, and 42% of total revenue, respectively. However, A2's revenue structure is uneven, with online revenue accounting for only 10.3%, but offline revenue accounting for 89.7%, basically focusing on offline. Through the above analysis and comparison, the revenue structure of the new retail model is different from that of the traditional model. The main business income under the new retail model no longer focuses on offline revenue, but is

TABLE 4: Comparison of weekly revenue structure (unit: ten thousand).

	Total revenue	Average revenue	Online revenue	Offline revenue	Weekend revenue
A1	41.97	5.99	13.18	28.79	17.63
A2	33.56	4.8	3.44	30.12	15.22

more evenly distributed to online and weekend promotions. In terms of revenue, the main business revenue under the traditional model still focuses on offline revenue. Online revenue is minimal, and the revenue structure is uneven and needs to be optimized.

4.4. Mobile APP Usage of 5G Users. This chapter is mainly to explore users' preferences for online shopping. For this purpose, 50 5G mobile phone users are investigated for mobile APP usage. See Table 5 and Figure 6 for details.

From Table 5 and Figure 6, it can be seen that, first of all, from the perspective of user selection, the total number of selections reached 943, with an average of nearly 7 selections per capita. This shows that users have higher and higher demand for APP, and APP use is very active; then, judging from the frequent use of apps by users, WeChat and QQ
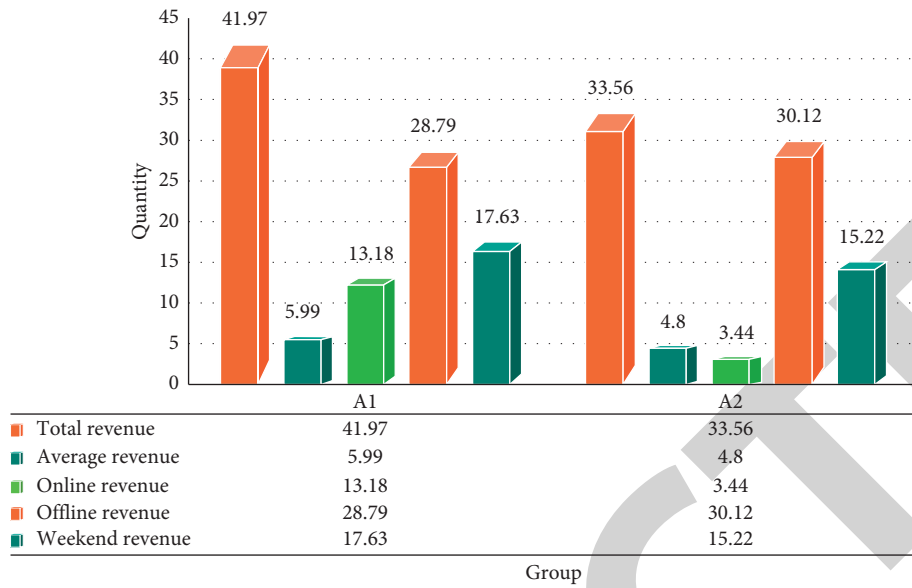
FIGURE 5: Comparison of weekly revenue structure (unit: ten thousand).

TABLE 5: 5G users' mobile APP usage.

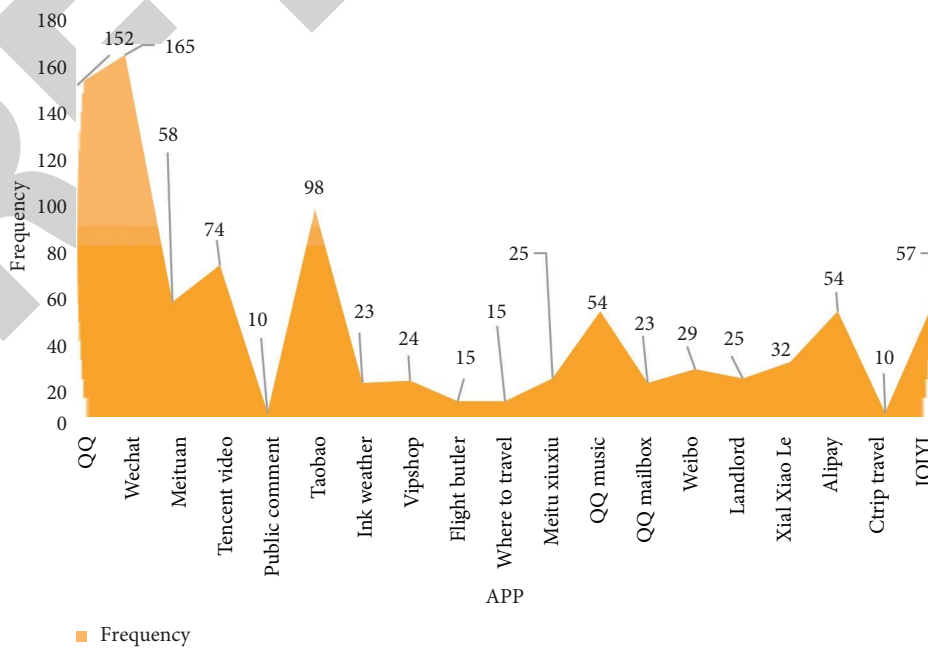| APP	Frequency	Percentage	APP	Frequency	Percentage
QQ	152	16.1	Meitu Xiuxiu	25	2.7
WeChat	165	17.5	QQ Music	54	5.7
Meituan	58	6.2	QQ mailbox	23	2.4
Tencent Video	74	7.8	Weibo	29	3.1
Public comment	10	1.1	Landlord	25	2.7
Taobao	98	10.4	Xiao Xiao Le	32	3.4
Ink weather	23	2.4	Alipay	54	5.7
Vipshop	24	2.5	Ctrip Travel	10	1.1
Flight Butler	15	1.6	IQIYI	57	6.0
Where to travel	15	1.6	Total	943	100

FIGURE 6: Commonly used apps by users.

accounted for 17.5% and 16.1%, respectively, indicating that customers have strong demand for instant messaging software, followed by mobile phone Taobao, which accounted for 10.4%, indicating that customers use mobile phones. Shopping demand is strong; once again Tencent Video accounted for 7.8%, and then functional apps, such as Meituan, QQ Music, and Alipay, accounted for 6.2%, 5.7%, and 5.7%, respectively. In summary, the main user needs instant messaging and life service apps. Therefore, the marketing strategy of the new retail model also needs to focus on the development and research of shopping apps on the mobile phone, which is not only in line with the consumer's already-developed "buy without leaving home." The consumption habits of the required items can also promote the growth of total revenue under the new retail model through online marketing.

5. Conclusion

Under the technology of digital network, people's life style has undergone earth-shaking changes. The expensive and large digital devices such as desktop computers and digital cameras are gradually being replaced by smart phones in their pockets, and the areas where people rely on smart phones are gradually expanding, and e-commerce platforms are also shifting to smart phones. It is an inevitable trend for virtual fittings to gradually shift to the convenient platform of smart phones to make more efficient use of people's fragmented time.

This paper proposes a new network fitting concept, which divides people into several body types according to their body characteristics, calls the corresponding human body model according to the data parameters input by the user, and displays the user's selected clothing according to the body shape characteristics of the human body model. Finally, the clothing wearing effect of the characteristic body shape is displayed on the interface of the mobile terminal. This idea not only conforms to the actual situation of current mobile data traffic but also can display the clothing style on the three-dimensional human body model to meet the user's requirements for the matching degree of the clothing style and the body type.

With the rapid development of Internet technology, more new application scenarios have emerged in the retail industry. Retailers have changed a lot in this regard. Together with existing offline retailers, online retailers' improved customer experience is at the core of the retail transformation that combines today's online and offline retailers. Only with the help of advanced technology and various sales channels to enhance the user's willingness to buy by improving the satisfaction and viscosity of the customer experience can the company's work efficiency be effectively improved. Therefore, retailers must adopt extensive experimental marketing strategies to enhance consumers' purchasing motivation and enhance their competitiveness in the market.

Data Availability

No data were used to support this study.

Conflicts of Interest

The author declares no conflicts of interest.

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