

Retraction

Retracted: Virtual Garment Piece Design and Stitching Algorithm Based on Virtual Simulation Technology

Security and Communication Networks

Received 21 November 2022; Accepted 21 November 2022; Published 11 December 2022

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Security and Communication Networks has retracted the article titled “Virtual Garment Piece Design and Stitching Algorithm Based on Virtual Simulation Technology” [1] due to concerns that the peer review process has been compromised.

Following an investigation conducted by the Hindawi Research Integrity team [2], significant concerns were identified with the peer reviewers assigned to this article; the investigation has concluded that the peer review process was compromised. We therefore can no longer trust the peer review process, and the article is being retracted with the agreement of the editorial board.

References

- [1] G. Li, “Virtual Garment Piece Design and Stitching Algorithm Based on Virtual Simulation Technology,” *Security and Communication Networks*, vol. 2022, Article ID 4393042, 9 pages, 2022.
- [2] L. Ferguson, “Advancing research integrity collaboratively and with vigour,” 2022, <https://www.hindawi.com/post/advancing-research-integrity-collaboratively-and-vigour/>.

Research Article

Virtual Garment Piece Design and Stitching Algorithm Based on Virtual Simulation Technology

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Received 25 January 2022; Revised 28 February 2022; Accepted 3 March 2022; Published 19 March 2022

Academic Editor: Muhammad Arif

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Modern computer-aided design (CAD) technology is widely used in the field of fashion design. Designers do not have to draw again every time they carry out template design, but can draw and change graphic design drawings directly on the computer using CAD technology. In this way, the designer can see the fitting effect of two-dimensional clothing on the three-dimensional human body in real time in the process of garment graphic design, and the three-dimensional fitting results can change in real time according to the change in two-dimensional clothing pieces. Then, the efficiency of garment design will be greatly improved, and the labor cost and resource time cost will be greatly reduced, and if the cloth of fitting can be highly simulated, the virtual fitting will have more real effect and higher value. Virtual clothing design has always played an important role in the clothing manufacturing industry. In recent years, there are more and more application scenarios of computer-aided design of clothing, and it has good engineering application value to study and realize a reasonable and efficient virtual sewing algorithm for clothing pieces. At home and abroad, the research on 3D clothing fitting technology has gradually deepened, and a series of research results have been achieved in the aspects of clothing piece modeling, clothing piece stitching, and collision detection. However, the traditional collision detection algorithm has an infinite loop in the establishment of the bounding box. At the same time, the time complexity of the collision detection algorithm is high. Based on the “personalized virtual clothing design system platform” independently developed by the research group, this study realizes the interactive design function of clothing pieces and researches and realizes the sewing and folding algorithm of clothing pieces. The clothing piece is triangulated, the generated triangular mesh is used to simulate clothing, finite element analysis is used to simulate the physical movement of clothing, and distance field technology is used to simulate the collision effect between the 3D human model and the clothing piece. To achieve the realistic folding effect of 3D virtual clothes, a seam folding algorithm is suggested, which puts extra bending force limits on patches near the seam, and it works well in the test environment. The stress state of the garment is recreated by assessing the internal and exterior pressures on the fabric. Second, using three-dimensional virtual stitching technology, the two-dimensional clothing is turned into a three-dimensional garment. Finally, the bounding box tree for the clothing and the human body is built. Finally, the bounding box detection algorithm detects and handles the collision between the fabric and the human body during sewing. Finally, texture mapping between fabric and bitmap is used to approximate the garment’s true texture effect. Finally, by investigating the application process of wind force on the fabric, the dynamic impact of cloth under wind is simulated. At present, this technology can simulate the dressing effect of conventional clothing categories, and it can obtain ideal dynamic simulation effect of cloth under the condition of wind blowing.

1. Introduction

Today’s society is a society with rapid development, full of competition, and the continuous emergence of new technologies. It is also a society in which the Internet begins to show its great influence in all fields of social life [1]. With the

continuous development of science and technology and the Internet, CAD technology is widely used in the field of fashion design and manufacturing [2]. The use of computer technology to assist the design of garment products is an important content in this field [3]. Compared with traditional fashion design methods, 3D fashion CAD system must

be able to solve some special problems [4]. Firstly, it can reduce the use of threshold. Compared with the traditional methods, the use of 3D garment CAD system needs to be simpler and more applicable to a wider range of people [5]. Secondly, the simulation effect is real and clear at a glance. Thirdly, it is convenient to edit and modify. Traditional fashion design requires two-dimensional CAD or manual drawing, punching, cutting, sewing, and trying on. Often, this process needs many times to achieve satisfactory results, while the three-dimensional fashion CAD system can efficiently complete the fashion design through modification [6].

An important link in 3D garment generation technology is the generation and sewing of garment pieces [7]. In this process, the two-dimensional garment cutting pieces are stitched on the three-dimensional mannequin to form the initial shape of the three-dimensional garment [8]. The research of three-dimensional garment modeling technology began with the study of flexible fabrics. Physical-based modeling method can accurately describe fabrics and truly represent fabrics, so it is widely used. Its basic idea is to transform the movements of various parts of fabrics into particle movements under various forces by introducing physical quantities such as force and energy [9]. To simulate the spatial dynamics of the fabric, realistic simulation of the fabric is the premise of realizing 3D clothing modeling, but it is different from simple fabric simulation. 3D clothing is made up of many complicated 2D pieces of clothing, and the final shape of the clothing is closely related to the mannequin [10]. The sewing of virtual garments will involve the transformation of 2D-3D, the constraint control of 3D garment space movement and deformation, and the collision detection of 3D garments [11]. Because the impact of various clothes textures on the human body differs significantly from that of a two-dimensional graphic design drawing, the two-dimensional design effect cannot accurately depict the wrinkling sensation of clothing on the human body. As a result, fashion designers cut and sew the created two-dimensional pieces of clothing, test them on the model, observe the designed clothing try-on effect, and if they are not satisfied with the clothing try-on effect, they should draw and cut the two-dimensional pieces of clothing again. Such a design process is inefficient since it requires a lot of human resources and time. As a result, interactive fashion design is a mapping interaction from two to three dimensions. Designers have the ability to cut and alter future two-dimensional fashion designs. Simultaneously, the adjusted results are presented in real time on the three-dimensional virtual fitting, and the three-dimensional clothing changes following real-time modifications can be observed. This synchronous function improves the smoothness of interactive operations and provides a great user experience.

The elastic deformation model is used to discretize the clothing surface into a particle system. By solving the differential equation of the space motion of the particle system, the evolution of the system can be obtained from the time series. The research focus of this method is on the dynamic simulation of fabrics. The stitching of 2D garment pieces to 3D garments [12] is controlled. Using the energy method, the

two-dimensional garment piece is mapped onto the three-dimensional mannequin to form a joined rigid surface, and the mechanical characterization of the fabric is transformed into an energy equation [13]. This method takes the human model as the constraint, predicts the large deformation with the minimum energy of each point in space, and obtains the shape of the three-dimensional clothing in the equilibrium state, which is suitable for expressing the static effect of the three-dimensional clothing [14]. The description of the mechanical properties of the fabric is simple and clear, but the fabric is required to be divided into four-sided meshes according to the warp and weft directions, which brings certain difficulties to the sewing of complex garments. The sewing technology of virtual clothing will involve problems in mesh division, spatial geometric transformation, constraint control, numerical solution of motion equations, collision, etc. Among them, there are relatively mature solutions for spatial geometric transformation and numerical solution of motion equations. This study mainly studies the meshing of complex garments and the processing of stitching constraints, which are the keys to realize virtual sewing of complex garments [15].

2. Related Work

In MIRALab under the leadership of literature [16], they used the elastic deformation model to discretize the clothing surface into a particle system and obtained the evolution of the system from the time series by solving the differential equation of the space motion of the particle system. In the dynamic simulation of fabrics, external force constraints are introduced to control the stitching of 2D garments to 3D garments. Reference [17] uses the energy method to first map the 2D garments to the 3D mannequin to form a joined rigid surface. The mechanical characterization of the phantom is transformed into an energy equation. The phantom constrains the approach, which employs the minimal energy of each point in space to forecast massive deformations and derive the shape of 3D clothing in its equilibrium state. The attire of the virtual phantom has been examined in the literature [18]. The classic is used by the model with proton spring. The mechanical qualities of the fabric are described simply and clearly, but they need the fabric to be meshed on four sides in both the warp and weft directions, which complicates the stitching of complicated outfits. The fabric is represented as a rectangular grid in the literature [19], the semi-implicit integration technique is used to determine the cloth's location, and the elasticity theory is employed to simulate the cloth's movement. Literature [20] provided a new point of view, proposing a particle-based way to mimic fabric, and using many important data gathered from real life to join the simulation experiment, these parameters were calculated using a tool known as a measuring system. Their study focuses on creating static images. Reference [21] employed a particle system and an explicit Euler integration approach to provide a mass-spring system for sculpting fabric models. Reference [22] offers an adaptive mesh approach for replicating low-precision cloth meshes that employs the quad-tree method

to split the mesh and may automatically raise the mesh's accuracy as required. A quadrilateral domain meshing approach based on the regular grid method was presented in reference [23]. These approaches are all based on a physical model of the fabric, with physical variables such as force and energy included, and the motion of each section of the fabric is transformed into the motion of the particle under each force to imitate the fabric's spatial state. A unique magnetic-based point sampling approach connected to the garment's shape was suggested in reference [24]. The particle-like concept described by Povot is often employed in the manufacturing of springs. This method is simple in construction, suitable for triangular meshes, and widely used. Reference [25] solves the problem of interpenetration in multilayer clothing, and he proposes a clothing method based on bone matching for the same clothing to adapt to different human bodies. Reference [26] uses the method of particle simulating yarn for fiber modeling, which can well realize fiber cloth simulation. The literature [27, 28] reviewed the interactive clothing design technology. In the review, it was described that in the process of clothing design, the designer first modified the style of the 3D clothing, then cut the 3D clothing on a plane, and then cut the clothing. The latter two meshes are spliced into a two-dimensional mesh, which is converted into a two-dimensional garment pattern for later batch manufacturing.

It can be seen from the references that as the main operation in the 3D simulation, the entire framework should support the real-time placement of the garment pieces after generation. Since the stitching effect and the simulation effect depend on the initial position, for example, some garment pieces need to be placed on the opposite side, which must be realized. Various operations include dragging and rotating. Otherwise, some simulation effects cannot be achieved. At the same time, it should be noted that to display the rendering effect and grid constraints in real time, it is necessary to adjust the data information to the interface in real time. At the same time, considering that the user's operating environment may be limited, different quality needs to be provided for the details of the display part. So based on this, display effect of the whole system needs to realize a variety of display effects for users to refer to and choose.

3. Research on 3D Virtual Garment Sewing Technology

3.1. Virtual Sewing of Garment Pieces. Cloth stitching is actually the process of stacking one or more pairs of two-dimensional clothing pieces, or using front lines to sew adjacent clothing pieces, so that the clothing pieces are folded through the stitching lines. The virtual stitching used in virtual fitting is to correspond the grids in the clothing pieces to establish a corresponding relationship, and the effect of force and the change in elastic coefficient are not considered in the stitching process. Pairs of panel meshes are joined together by stitching. The elastic modulus varies in actual stitching owing to the overlapping of the cloth's borders, which thickens the stitched region. The Lagrangian

approach and the method of applying penalty force are two popular virtual stitching methods. Following a comparison of the two virtual suture approaches, the method of applying a set penalty force for virtual suture is chosen. Figure 1 depicts the virtual garment sewing process.

Virtual stitching with the Lagrangian multipliers allows precise constraints during virtual fitting simulations without the need to set spring rates at the outset. Although such a virtual stitching approach may conduct high-precision cloth simulation, the cloth convergence speed will decrease throughout the virtual fitting process due to the higher computing complexity. Because there are fewer restrictions and less computation when using a set penalty force to execute virtual stitching, this technique may enhance the convergence speed of textiles in the virtual fitting process, and it is ideal for the virtual fitting in this article. The stiffness of the penalty force must be established ahead of time in the virtual stitching process. The stiffness of the penalty force may be chosen during the first clothing simulation, and it is vital to guarantee that the penalty force is applied during the whole process of virtual sewing of the clothing components. The employment of a set penalty force to do virtual stitching may keep the system stable, and the boundary locations that need to be stitched can be calculated using matrix operations, resulting in a modest total computation amount and a straightforward calculation. The flow chart of the 3D fitting system is shown in Figure 2.

After comparing the advantages and disadvantages of the two virtual suture methods, the suture method that is more suitable for this system is selected; that is, a fixed penalty force is applied to perform virtual suture. To sew two pairs of garment parts together, their borders are discovered, and several hook springs on the garment pieces' seamed borders are made and joined. Because the sizes of the two pieces that normally need to be sewed vary, the length of the parts' borders will also change. After sewing, this will result in creases. However, once the two portions are sewn together, there is often a gap between the stitched borders. To avoid such a situation, it is necessary to add a high-stiffness spring to the stitching and set it to twice the extension spring. Therefore, two linear systems with strong stiffness and weak stiffness are generated in the stitching process, which can be solved using the semi-implicit numerical and straight integral solution method mentioned in the second chapter. This solution method has very good requirements for the arrangement of the matrix. Usually, in the numerical integration solution, the equation with relatively large coefficients is placed in the upper left position of the matrix. The less sparse equations are placed at the bottom right of the matrix. In the virtual suture, it can be seen that the elastic spring with the suture connection has the highest stiffness, so it should occupy the dominant position.

3.2. Suture Processing and Folding Algorithm. With the popularity of computer-aided design, more and more industrial fields can see the figure of computer-aided design. In the modern clothing production industry, clothing design is an important part of the process. In the initial clothing

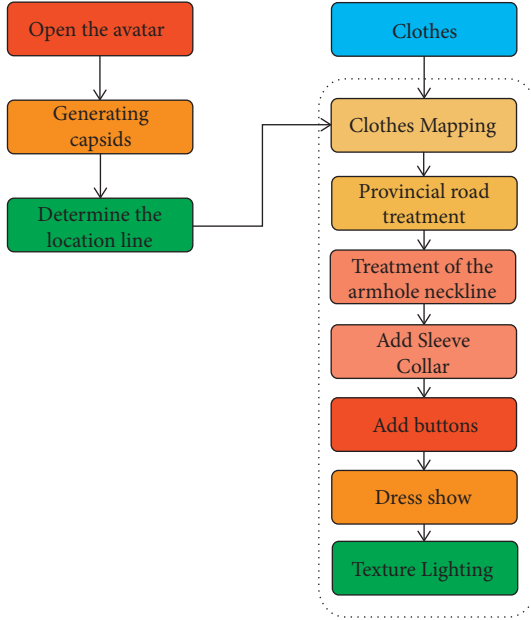


FIGURE 1: Virtual garment sewing process.

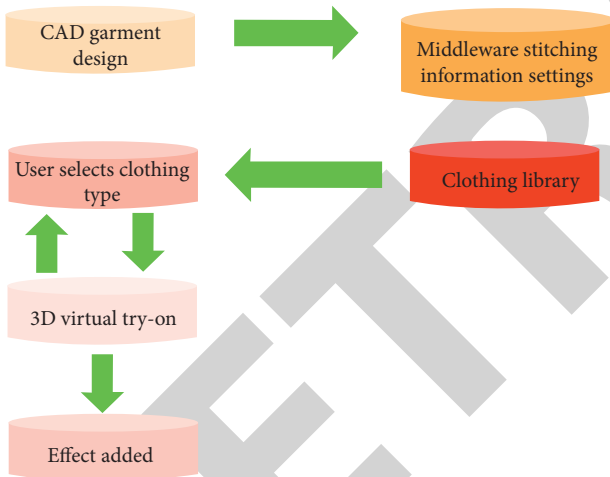


FIGURE 2: 3D fitting system flow.

design process, the designer mainly provides the initial outline drawing and then selects the appropriate method to make the garment. According to different ways, there are plane cutting method and stereo cutting method. The former is suitable for most mature clothing styles, while the latter requires designers to have an excellent sense of space and imagination, which is also time-consuming. With the introduction of computer-aided design, the garment pushing process that needs repeated experiments can be assisted by computer, which can greatly improve the efficiency of design. At present, among many garment editing software packages, many software packages only have partial two-dimensional functions, that is, two-dimensional plane garment design mode. Because of the tedious process and the inability to know the actual clothes dressing situation in time, most of the software can only provide CAD drawing

for subsequent machine plate making, so with the design of clothes, the importance of 3D virtual clothes dressing system is becoming more and more prominent.

Based on the platform we developed, we have realized the 2D clothing CAD design framework and 3D scene physical simulation effects that can be used in practice. However, there is a certain gap between these and the actual needs of the clothing design industry. In actual work, we will encounter various problems, such as the flipping effect of the neckline, the stitching effect of multiple pieces of clothing, and the folding effect of the stitched edge. The existing platform cannot support these features very well. This part of the operation type needs to be redesigned and integrated into the original framework system. The original seam stitching logic is mainly to specify the corresponding seam relationship according to the edge, and this part requires the force between the edges in implementation. The general practice is to stitch the two sides with the same number of vertices and then calculate the force relationship between the corresponding vertices. However, in practice, it is generally difficult to ensure that there are corresponding vertices on both sides of the suture, and even the same number of vertices cannot be guaranteed due to different side lengths. As a result, the force between points is ignored when computing the real force. The model is replaced with the connection between the points and edges. In reality, there are still numerous difficulties to address for particular instances. To begin, we overcome these challenges by beginning with the suture logic that has been described. A pair of active edges and the suture direction is usually mentioned when defining a suture. As a key problem in multilayer clothing collision processing, the collision processing between moving points and moving triangles takes the moving triangles as the reference when analyzing the force situation, and the moving points move a certain distance relative to the triangles. The trajectory line of the moving point is a line segment that intersects with the triangle. Through the primitive intersection detection, the centroid coordinates of the collision point can be obtained. It is the impulse of the collision point acting on the moving point positively, which can be obtained from the momentum conservation equation:

$$\vec{I} = \frac{2I}{I + w_1^2 + w_2^2 + w_3^2}, \quad (1)$$

$$\vec{V}_i^{\text{new}} = \vec{V}_i + w_i \left(\frac{\vec{I}}{m} \right), \quad i = 1, 2, 3, \quad (2)$$

$$\vec{V}_p^{\text{new}} = \vec{V}_p - \left(\frac{\vec{I}}{m} \right). \quad (3)$$

Equations (1)–(3) reveal the distribution of the force acting on the motion point and the motion triangle.

If it is detected that a certain part of the clothing has self-collision during the collision detection process of the clothing, the position of the collision point needs to be calculated first:

$$\vec{P}_c = w_1 * \vec{P}_1 + w_2 * \vec{P}_2 + w_3 * \vec{P}_3. \quad (4)$$

Using a similar method, the velocity of the impact point is as follows:

$$\vec{V}_c = w_1 * \vec{V}_1 + w_2 * \vec{V}_2 + w_3 * \vec{V}_3. \quad (5)$$

The patch mechanical model based on patch angle to calculate potential energy can calculate the folding constraint effect on a single patch grid. What we have done is to make the two side pieces of the suture fold based on the original suture calculation. For fast fitting, we set the termination angle θ_0 . When θ approaches θ_0 , it can be considered that the simulation end point and the elastic folding force equation of the original patch will be deformed as follows:

$$F_i^e = k^e \frac{|E|^2}{|N_1| + |N_2|} \sin\left(\frac{\theta}{2}\right) u_i, \quad (6)$$

$$F_i^e = k^e \frac{|E|^2}{|N_1| + |N_2|} \left(\sin\left(\frac{\theta}{2}\right) - \sin\left(\frac{\theta_0}{2}\right) \right) u_i.$$

In this way, a special fitting effect can be achieved at the force level, but this only works when specifying the end angle of an edge in the mesh, and its effect is limited to a single piece. We need a way for this confinement effect to be calculated across both mesh topologies. In the garment stitching logic, we can only specify the patch pairs on both sides of the two seams as reference objects. At the same time, we need to apply folding constraints when the stitching effect ends dynamically for the stitching effect. It is generally considered both ends of the seam. If the distance is less than a given scale, the suture is considered to be over, and if the suture is torn, the folding effect is not calculated.

4. Result Analysis and Discussion

When simulating the human body to try on 3D virtual clothing, a large number of collision phenomena will be formed. Therefore, it is only by effectively dealing with the collision problem that the simulation of virtual dressing can be realized. The OBB tree approach is utilized in this work to consider the tropic bounding box as the object's bounding box and create an OBB tree for collision detection. The "segment axis" approach is used to determine whether two bounding boxes intersect and to guarantee that the bounding boxes are tightly associated with objects, improving bounding box detection hit rates. An OBB is a cuboid bounding box in an arbitrary direction in three-dimensional space, and the hierarchical structure of multiple OBBs is an OBB tree. The simulation realization process of human virtual clothing is to realize the transformation process of 2D clothing template to 3D clothing. It can be seen from this that the transformation process realizes the transformation from flat garments to three-dimensional garments, which truly simulates the natural drape of garments, and can accurately analyze the rationality of garment design. BP prediction model prediction is shown in Figure 3.

The garment parts, whether cut by hand, read by a digitizer, or created by a CAD system, have only two-dimensional qualities and cannot be sewed or dynamically shown directly on the three-dimensional virtual human platform. Therefore, to realize virtual sample garment stitching, we must first carry out two-dimensional garment piece three-dimensional processing, that is, garment piece attribute conversion. The so-called garment piece attribute refers to the information describing the shape and geometric structure of the garment piece, such as the name of the garment piece, the location of the dart, the coordinates of the start point and end point of the edge, and the name of the edge. After attribute conversion, the garment piece has a series of information about positioning and stitching, which makes preparations for the mapping from garment piece to platform. The prediction of OBB tree algorithm is shown in Figure 4.

A garment usually contains several parts, which need to be sewn together to form a whole. Let us call the edge to be stitched the stitched edge and the point to be stitched the stitched point. A seam edge contains several seam points. The precondition that two corresponding stitched edges can be merged is that the edges contain the same number of points, and the precondition that two corresponding stitched points can be merged is that the distance between the two points is close enough. The stitching operation is to merge two corresponding stitched edges into one edge and two corresponding stitched points into one point. The comparison of the test results is shown in Figure 5.

The curve of Cascade AdaBoost is always better than the experimental results of SVM. In actual monitoring, it is generally hoped to effectively avoid missed detection of targets; that is, the missed detection rate should be as low as possible.

Collision processing is relatively simple compared with collision detection. The method of specular emission similar to light can be used, as shown in the figure, to modify the position and speed of the clothing particles, and then, the energy loss during the collision process can be considered. After a collision, the tangential and normal velocities are lowered. The simpler it is for the clothing to get stable, the greater the energy loss. The size of the tangential and normal velocity losses varies, which has an effect on the drape of the garment and may be improved. A appropriate loss factor may be determined by research and repeated trials to create a comparably excellent display effect. The amount of time it takes from the start of the simulation to the end of the simulation is the major measure during the experiment. Generally, we think that when the sum of the kinetic energy of the nodes is less than a threshold, the simulation can be considered to have reached the stable end point of the simulation. If this time is too long, it will affect the use, especially in the process of complex clothing piece simulation, and to achieve a good effect, the clothing piece needs to be adjusted many times. An efficient algorithm is more important in the design process. The simulation time statistics of various clothes are shown in Figure 6.

It can be seen that the simulation of complex clothing pieces needs more time to achieve the simulation effect. Each

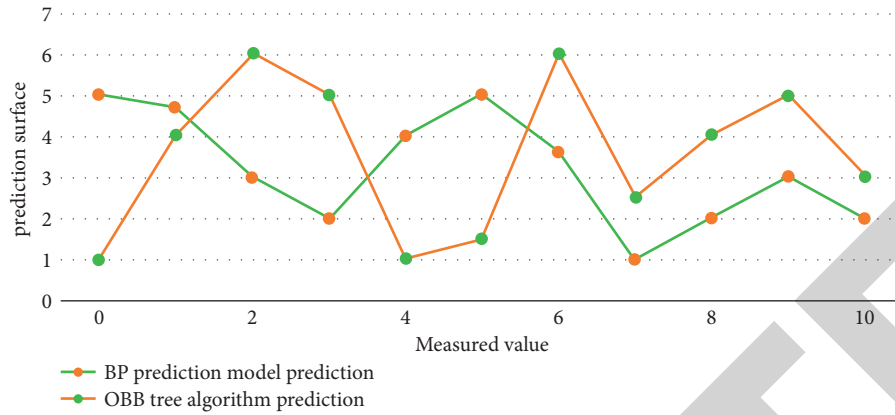


FIGURE 3: Prediction model of neural network algorithm.

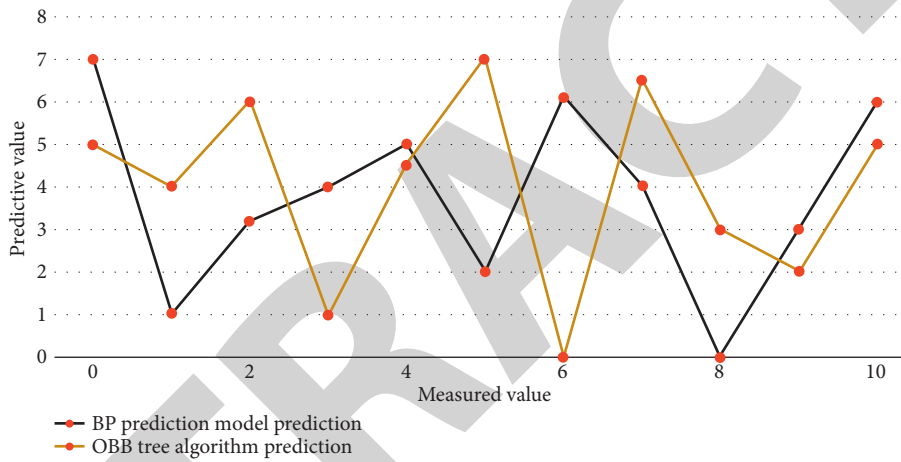


FIGURE 4: OBB tree algorithm prediction.

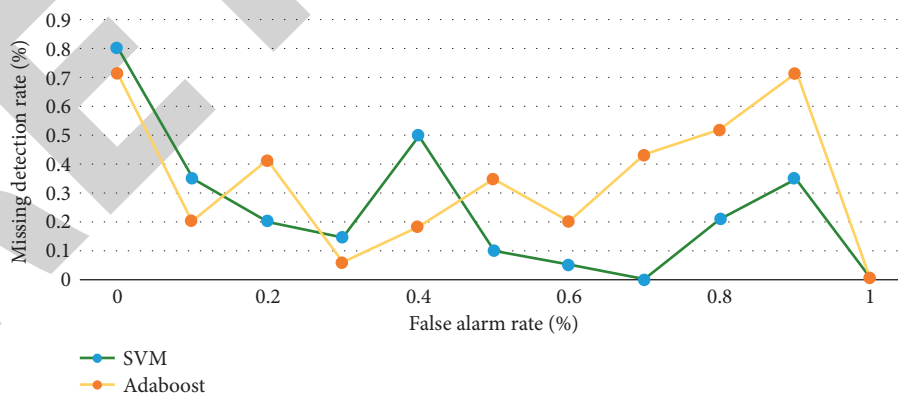


FIGURE 5: Comparison of test and inspection results.

simulation can reach the simulation end point in a short time to meet the needs of algorithm efficiency and practical use. The human body model collision detection is shown in Figure 7.

To simplify the human body model before and after the distance field calculation, the time consumed by the distance

field calculation is compared. It can be seen here that when the human body model mesh is simplified, the distance field calculation time can be significantly reduced, and when the human body model is simplified, it can be seen that the adaptive distance field is many times faster than before the simplification. It can be concluded that the simplification of

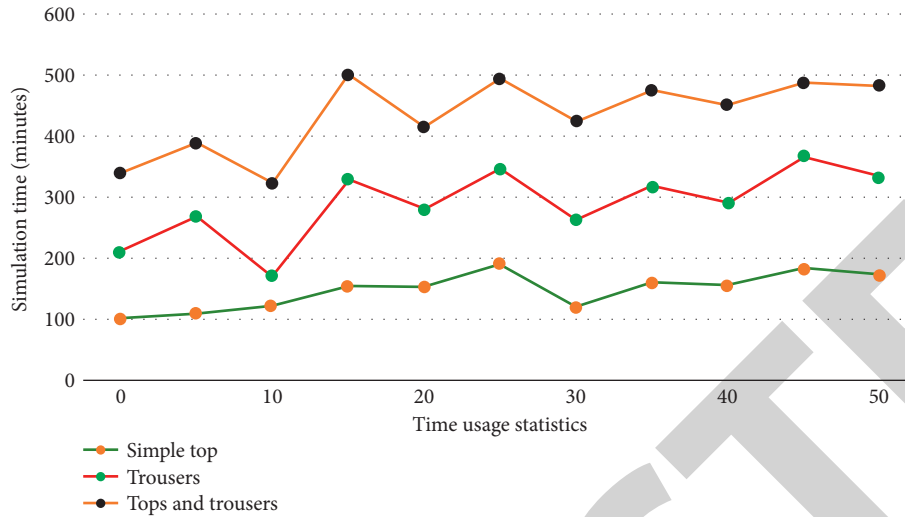


FIGURE 6: Simulation time statistics of various clothes.

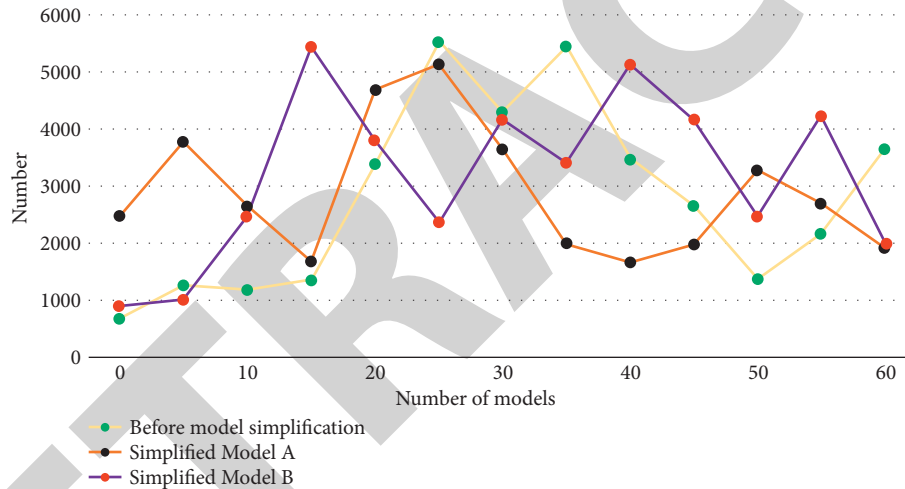


FIGURE 7: Human body model collision detection diagram.

the human body model can greatly speed up the calculation of the distance field and reduce the calculation time. In this way, the computational pressure of the system can be reduced, and the garment convergence process of virtual fitting can be accelerated.

Fashion design encompasses a wide range of topics and requires adherence to a variety of concepts, making the process more tough and complicated. Many good benefits may be achieved via the use of 3D virtual simulation technology, which necessitates the formation of understanding among garment designers. Three factors contribute to the good impact of 3D virtual simulation technology on fashion design: ① design intuition is improved. Three-dimensional virtual simulation technology has three-dimensional properties as compared to conventional graphic design. It can demonstrate the influence of garment design in a three-dimensional environment while carrying out garment design, making it easier to intuitively determine the applicability of design scheme. ② The production cost of sample clothes is reduced. In the garment industry, the

production of sample clothes is also involved from garment design to production; that is, after the preliminary design is completed, the sample clothes are made first, and the effect is confirmed by trying on the sample clothes. Often, fashion design cannot meet the standard at one time and needs to be modified many times, which requires making sample clothes many times, with high cost. The use of three-dimensional virtual simulation technology allows the test to be completed in the program without the need for sample clothing, saving time and money. ③ The efficiency of the fashion design process is enhanced. Many universal models or scenarios may be created using 3D virtual simulation technology. These models or scenarios may be utilized immediately in later designs without the need for further design. As a result, the efficiency of succeeding fashion design has greatly increased.

This chapter explains the traditional configuration and improvement techniques in the area of clothing simulation, as well as the numerous algorithms and overall processes of clothing items in the field of physical simulation. A software

framework for virtual apparel creation has been created based on the simulation architecture. This platform takes into account the running effect and speed and achieves a good balance between the simulation effect and user experience. In this section, the actual implementation and calculation method of general sutures in the current interactive system are also introduced, and the special free suture exchange and cutting method are described, and good results are achieved. At the same time, for the special needs in suture, we also provide a suture folding algorithm based on the folding relationship of the suture. A new force constraint is added between the two sides of the seam. Through the improvement of the original physical simulation process, the expected effect is achieved, and it is realized in the virtual human body fitting platform.

5. Conclusions

Nowadays, modern computer technology is a very effective way to improve work efficiency and quality of life. At present, computer technology is used to simplify fashion design using design software. Fashion design is a very comprehensive work, including many aspects of work. In the process of fashion design, we need to make use of some advanced technologies, such as three-dimensional virtual simulation technology. This technology can play a positive role in many aspects of garment design and improve the design effect, which requires garment design practitioners to apply the three-dimensional virtual simulation technology in their work practice. The simulation algorithm in the implementation platform is applied to some finite element analysis-related problems. This study describes some classical physical models, selects more reasonable triangular patches to simulate the physical movement of clothing in practice, introduces some basic dynamic knowledge in the field of clothing simulation, and analyzes and applies the methods. A physical simulation module based on distance field technology is built. This module is used in the platform to achieve the effect of physical simulation, and the display module is responsible for displaying. At the same time, to consider the platform's operating impact and speed, we did certain simulation effect and user experience adjustments and reached a balance in efficiency and experience. After that, we introduced the data interaction mode related to suture and discussed the situation of multi-section suture. On the basis of the original CAD platform, we added the free suture interaction method and solved the problem that the traditional platform could not solve free suture using divide-and-conquer algorithm. For the special needs of suture, we also provide a suture folding algorithm based on the folding relationship of suture, establish an improved suture force constraint model, simulate the special force constraint effect of suture in practice, and test it on the system, and the effect is good. Three-dimensional virtual fitting system is a very powerful and complete system, which needs to provide different clothing fitting for mannequins of different genders and ages. This study only achieves part of the dressing effect of women.

The virtual dress method introduced in this study cannot realize some clothes with special styles, such as fluttering waistband and embellishment of chest flowers. When writing the program, all possible errors have not been taken into account, so the robustness of the program needs to be further strengthened. 3D virtual clothing technology is a big research topic. The fitting process includes the mixing of several subalgorithms. Considering how to flexibly combine all the subalgorithms of motion, each subalgorithm has a certain impact on the final result, and there are many possibilities for their mutual call order. How to flexibly combine motion and reasonably combine optimization is an urgent problem to be considered. With the rapid development of computer simulation technology and computer hardware performance, the research results in the field of 3D virtual clothing technology will continue to be updated, the technical scheme will be more mature, and the application field will continue to expand.

Data Availability

The data used to support the findings of this study are included within the article.

Conflicts of Interest

The author declares that there are no conflicts of interest.

Acknowledgments

The research in this study was supported by Hunan Provincial Social Science Achievement Appraisal Committee Project: Research on Protection and Inheritance of Intangible Cultural Heritage of North-West Hunan Taoyuan Embroidery (No. XSP21YBC140), 2021 Education Reform Project of Education Department of Hunan Province: Research on the Reform of Online-and-Offline Mixed Teaching Mode of Flipped Classroom "Design Fundamentation" (No. HNJG-2021-0817), and National Innovation and Entrepreneurship Training Program for College Students Project: Research on Product Development of Tie-Dye Intangible Cultural Heritage (No. 202110549011).

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