Virtual Fitting Based on 3D Human Body Measurement Software Research and Application

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ABSTRACT

This article expounds the barriers in the development of intelligent fitting system, which focuses on the correlation between body database and of intelligent fitting system. How can the system estimate the suitability based on the deformation under constraint of human body and clothing material. The data collection adopted a non-touching 3D anthropometric method by taking pictures of front, back and side of a human body in a background with scale, marking several feature points of important body parts, calculating and speculating these feature points to get the corresponding data of human body, and setting up an anthropometry database to simulate the corresponding virtual 3D body model in the software. And this article focuses the analysis and application of 3D anthropometric data in the intelligent fitting system of female skirt.

Keywords: 3D, Measuring, Fitting, Calibration, Dresses

INTRODUCTION

In many companies, clothing companies are epidemic strong enterprises, but also the most market potential. With the improvement of people's living standards, more and more people for the pursuit of higher clothing; With the popularity of mobile phones, computers and other communication tools, making faster and faster fashion, apparel and fashion cycles are getting shorter, the consumer who demands more and more. On the other hand, the rapid development of China's economy, the domestic consumer market growing apparel, potential consumer demand and superior economic environment has made China become the battleground garment enterprises at home and abroad. Nowadays, more and more foreign clothing companies into the Chinese market. This makes more and more companies realize that in order to stand out in the fierce competition, information management is indispensable. In information management, virtual fitting software emerge as the times require, virtual fitting software is an emerging concept, in foreign countries also belong to new things.

THE DIFFICULTIES OF THE FITTING INTELLIGENCE SOFTWARE

The process of Smart Dressing have more complicated and more difficulty. First, you must use a three-dimensional virtual reality technology three-dimensional fabric to synthesize three-dimensional garment, but the fabric is different from the common rigid, easy deformation; secondly, to build a three-dimensional model of the human body, but also need to provide the body regulating function. In addition to regulating the human body regulate all parts of the circumference, but also have an overall adjustment. These are three-dimensional fitting technique second

difficulty; third, three-dimensional garment is the most difficult problems to try three-dimensional virtual reality technology. Because the three-dimensional garment worn on the body after a three-dimensional human body, the human body must be deformed according to the bump, clothing and other material constraints, in order to determine the degree of comfort clothing, clothing for the purpose of trial.

In fitting, to obtain the data through the body to build people die, clothing selection and fitting results show. First must be obtained through certain methods of human data, these data to model the human body, after modeling done by the customer to choose their favorite costumes and accessories from the customers themselves with clothing, with completion of the need to watch the dressing effect, people die to rotate through 360 degrees of viewing, and can be viewed with some changes of clothing produced by human action deformation folds. When access to the data body, face two situations: 1) the data acquisition is not accurate, the acquisition process is simple; 2) accurate data acquisition, acquisition or acquisition process, but more complex equipment. This paper is mainly to solve is how to make to improve the collection of data through a simple collection process accuracy.

THE IMPORTANT OF HUMAN BODY DATA ACQUISITION

Currently obtaining human data with traditional manual methods anthropometric, non-contact 3D body measurement. The emergence and development of 3D body scanning technology, can be obtained in a relatively short period includes 3D scan data and three-dimensional model of the entire human body information. High-precision data acquisition speed. Measuring current online clothing, online clothing design, online clothing and other Internet-based dressing, you need remote access to critical dimensions of human three-dimensional dress as soon as possible. Therefore, the study of human size measurement based on 3D scanning technology is an important way of data acquisition. Non-contact three-dimensional body measurement stereoscopic photogrammetry, laser measurement, moire measurements, Loughborough shadow body scanning device, TC 2 tiered profile measurement method, C y beware body scanning system and the projection fringe phase measurement.

In this paper, the use of three-dimensional photographic measurement method, the method can make the customer can get the body's own data, does not require complex and expensive equipment. If you use this method, and to reduce the measurement error, it can effectively promote the development of the apparel market, not only solved the authenticity of people die, but to promote the development of e-commerce clothing. In the implementation process, each customer may be due to the shooting angle and methods and other issues, leading to the measurement results and the actual size of the human body have a certain error. The method first before you take pictures in the photo background put a graduated scale, so you can see photos and the actual proportion of the human body through the photographs, asking people to wear tights and then shoot the front and side of the picture, and then Calibration of each photo several important feature points, based on these feature points for estimating the location of the human skeleton, and then roughly adjusted according to the ratio, and general geometry of the human body model. Based on these characteristics points separating the body from the photos that come to the body's contours, and further adjusted using contour information mannequin. To make the model closer to people's real body, we use the principle of bone structure and skin structure principle, to produce the human skeleton and skin. Finally, color on the human body.

THREE-DIMENSIONAL PHOTOGRAPHIC MEASUREMENTS EMBODIMENTS

In collecting human data, the measurement must wear close-fitting underwear (but not tight), if the test person long hair, long hair tied behind its two bundles (Figure 3-1).

Figure 3-1 human Dress

When taking pictures, measuring around who want to put a graduated scale, and on the human body front, side and back to take pictures, photographs should choose a higher pixel camera or mobile phone. Anthropometric criteria must be standing posture: measured in feet should be measured shoulder width apart, upright, arms straight, two arms slightly open, fingers close together to keep a fist and thigh (Figure 3 -2).

Figure 3-2 anthropometric standard posture

Get those measured in the photos, for each photo in the body of the feature point calibration, feature points including shoulders, waist, hip and arm circumference in different clothing requirements, back length, back width, thigh, etc. The main skeleton position estimate based on these feature points, combined with the general geometry of the mannequin be adjusted so that those who want to measure and being consistent. Secondly, according to the feature points in the body separated from the background, i.e., to obtain the body contours, the contour information and further adjusted by the geometry of the shaped body (Figure 3-3). Finally, the photo image of the human body texture mapping.

THE APPLICATION

The applications of dress data measurement

Through the application of dresses for women to introduce concrete steps of the method, we extracted human characteristic data for the establishment of the personalized service of mannequins, mannequins when establishing the height of each section and section Width Thickness is important, therefore generated according to the individual characteristics of the body, lower body, the body feature extraction article data including the waist line, the projection line and the ventral line of the hips. We want to find the waist, buttocks and abdomen convex height, width and thickness, based on the extracted information by matching algorithm automatically calculates the remaining feature data, to construct the body of the lower body.
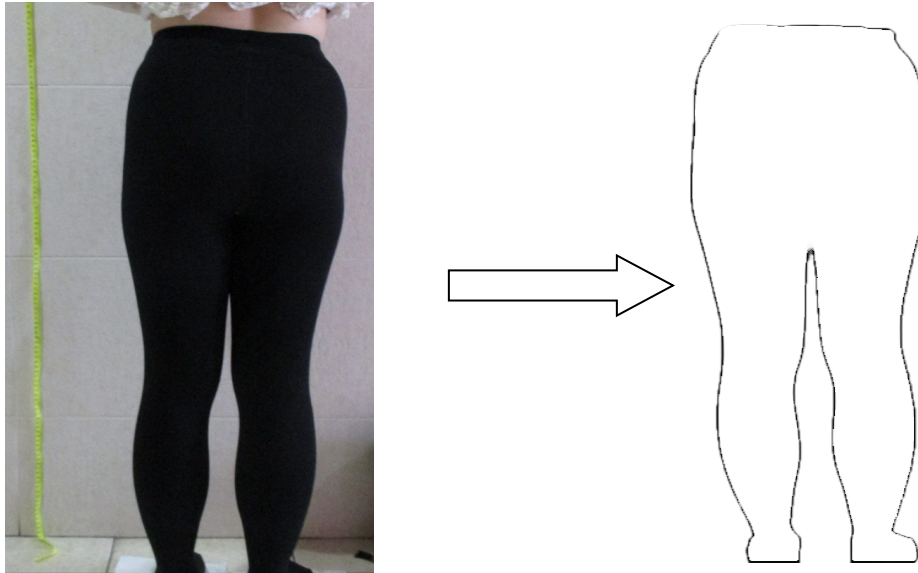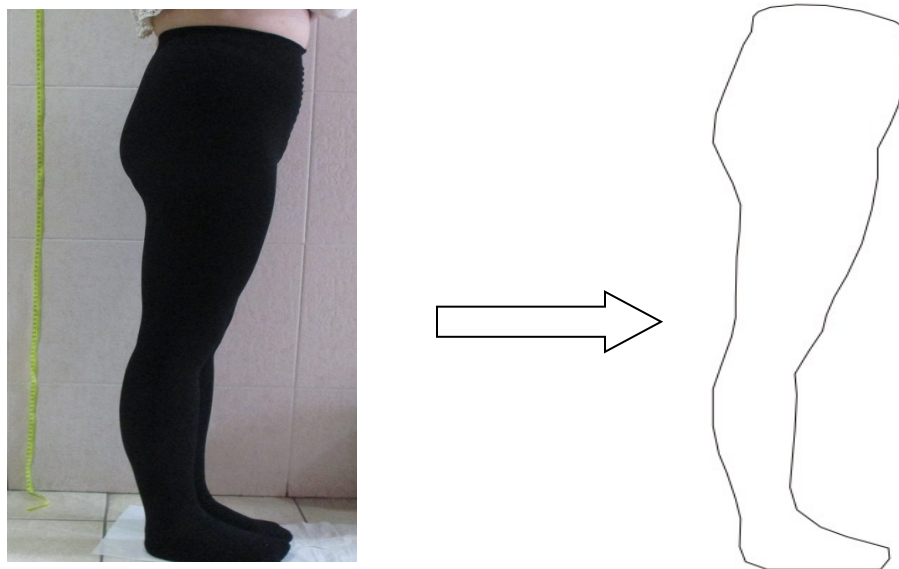
Figure 4-1 body contours back
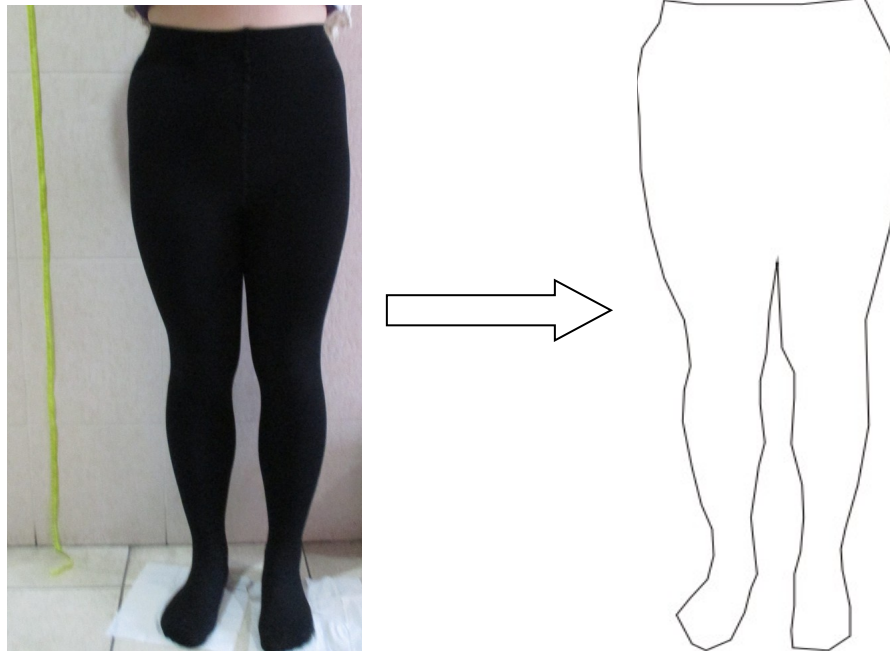

Figure 4-2 human silhouette figure

Figure 4-3 front body contours

Table 4-1 based on photographs of human data extracted from the lower body

Parts (CM)	Height	Width	Thickness
Waistline	104.7	26.6	15.8
Belly bump	94	29.4	18.3
Hips	83.5	34.6	21.2

Table 4-2 manual measurement based on human data

Parts (CM)	Height	Width	Thickness
Waistline	103.5	27	16
Belly bump	95	30	18
Hips	83	34	21

As can be seen from the data show that the use of multi-angle photograph of method error small, high-precision three-dimensional measuring instrument, although no body, but the customer through a simple tape measure and camera can operate. This experiment is really normal light, the photographer taking pictures without any experienced person to operate.

The application of intelligent fitting system

Above through stereo photogrammetry system of data through the network terminal input parameter values specify the face and form, custom clothing categories according to the customer request, simulation generated 3d human body, the simulation of the human body has a custom sense simulation, contains all express custom characteristic values of the human body with vivid visual images at the same time, show the stereo effect, meet the needs of

customers achieve true the fitting effect. On this basis, based on the clothing entity of revolving visual reconstruction method is used to wearing clothing of 3d virtual model, according to the online information provided by the customer, through personalized 3d human body model generation system, and then through the human body and clothing corresponding control points and (curvature) between 3d model based on spline template matching and 3d virtual in elastic deformation algorithm. Its Internet browsing is implemented for the B/S mode, namely all processing on the server, the client browser just to send and receive commands, but realize embedded web pages (such as flash, etc.), in order to reduce the amount of data at the same time, realize real-time interaction, this system for 3d reconstruction by the backend server virtual rendering of a panoramic view of clothing after the optimal sampling interval images, in the network transmission and real-time 3d effect showed lifelike. The material of the bump at the same time, according to the human body, clothing and other constraints caused by deformation of clothing comfort.

INSUFFICIENT AND FUTURE DEVELOPMENT TREND

Body measurements and costume design is the first step in the purchase, if there is no accurate measurement data, no matter how good design cannot make customers wear fit. In online shopping, the body measurement is even more important because the number of garment enterprises are widely used in the production of the distribution, size classification is based on a large range of different ages using traditional measurement tools, different gender anthropometric and the method of statistical analysis to come, but there will certainly be differences between the human body, is now used in the production of shapes consumer attitudes cannot meet today's customers.

Although this method eliminates the need for tedious and manual measurement error due to different measurement methods, but the method can only provide human data cannot reflect the physical characteristics of the human face, and some other reality, you cannot model with the customer's own temperament combine , the future direction of the virtual fitting simulation software development is the body of this piece, you can use the customer temperament, appearance features and other aspects of the human body model expression.

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