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Research Article

Application of Spatial Digital Information Fusion Technology in Information Processing of National Traditional Sports

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The rapid development of digital informatization has led to an increasing degree of reliance on informatization in various industries. Similarly, the development of national traditional sports is also inseparable from the support of information technology. In order to improve the informatization development of national traditional sports, this paper studies the fusion process of multisource vector image data and proposes an adjustment and merging algorithm based on topological relationship and shape correction for the mismatched points that constitute entities with the same name. The algorithm is based on topological relationship. The shape of the adjustment and merging algorithm is modified, and finally, a set of national traditional sports information processing system is constructed by combining the digital information fusion technology. Experiments have proved that the method of national traditional sports information processing based on digital information fusion technology proposed in this paper is effective and can play a good role in the digital development of national traditional sports.

1. Introduction

National traditional sports, as the carrier of China's excellent traditional culture, has been preserved in the state of a living fossil after changes in the times and social development. The 16th National Congress of the Communist Party of China regards the construction of socialist politics, economy, and culture with Chinese characteristics as the basic program of the primary stage of socialism and cultural prosperity as an important symbol of comprehensive national strength. Therefore, cultural construction will also be a focus of today's new urbanization process. If you want to achieve cultural development in urbanization, you need to use a medium, and traditional national sports is a good medium. Traditional national sports equipment is multifunctional, including fitness, entertainment, and education. Moreover, the content is rich, the forms are diversified, and the forms of sports are eclectic, regardless of age, suitable for men, women, and children. It can be said that traditional national sports activities are an indispensable part of people's lives.

An information platform is an environment created for the construction, application, and development of information technology, including the development and utilization of information resources, the construction of information networks, the promotion of information technology applications, the development of information technology and industries, the cultivation of information technology talents, and the formulation and improvement of information technology policy systems [1]. The network platform has the greatest impact and the best effect in the construction of the information platform. Therefore, it is necessary to make full use of network technology, communication technology, control technology, and information security technology to build a comprehensive and nonprofit information platform for the traditional Mongolian sports culture. The information platform includes organizations, regulatory documents, categories, inheritors, news updates, columns, performance videos, and protection forums. Moreover, it uses text, pictures, videos, etc., to clearly promote and display the unique ethnicity of Mongolian traditional sports culture in terms of clothing, event ceremonies, etiquette, techniques, customs, and historical inheritance. In addition, its display has been circulated and fused with ethnic imprints of different historical periods, regions, nations, and classes. The information platform can popularize relevant knowledge, push and forward messages, publish hot topics and comments, and enhance the interaction between users. Therefore, the platform has become a carrier for the public to obtain knowledge of Mongolian national traditional sports culture and a shortcut for consultation and communication [2].

The emergence and application of computer technology mark the beginning of a new digital era for human beings, which has greatly changed the existing way of life and the form of information circulation [3].

In-depth study of the main problems and obstacles in the development of digital sports in my country and active exploration of development paths and strategies will not only promote the rapid development of the sports performance market, the sports fitness market, and the sports goods market but also expand the space for sports development. Improving the physical fitness of the whole people, cultivating sports reserve talents, and enriching the sports and cultural life of the masses have a certain impact. At the same time, advanced sports culture, healthy sports lifestyle, and scientific exercise methods will be integrated into the daily life of the public, attracting more people to participate in sports activities, experience the vitality of sports, and enjoy the joy of sports. Eventually, realize the great idea of transforming a sports power into a sports power, and complete the leap-forward development of the nationwide fitness industry and the sports industry.

This article combines digital information fusion technology to construct the national traditional sports information processing system, so as to improve the development effect of national traditional sports in the information age.

2. Related Work

Integrating "digitalization" into sports can understand the concept of "digital sports" from both narrow and broad directions [4]. In a broad sense, digital sports is a new physical exercise method that combines computer information technology with scientific physical exercise content and methods. It can help exercisers improve their sports skills, enhance physical fitness, enrich social leisure life, and promote the purpose of spiritual civilization construction. In a narrow sense, digital sports is a related activity that combines traditional sports with modern digital means. Through advanced digital technology, traditional sports exercises are reformed and sublimated, so as to achieve the purpose of scientifically disseminating sports knowledge and effectively improving physical skills [5]. Digital sports is a brand-new concept. It realizes the perfect combination of digital game form with competitive fitness, physical exercise, and interactive entertainment through technical means such as the Internet, communications, and computers [6]. It comes from the combination of traditional sports and digital technology [7]. At the same time, digital sports also involves cross fields such as cultural content, computer information, and sports.

The emergence of digital sports has freed the public from the limitation of venues in traditional physical exercise. Volkswagen is no longer limited to wide and diversified sports venues and helps the public make best use of existing sports venues such as community open space, small squares, street roads, and parks to the fullest extent. For example, the Wii, a digital home game console sold by Nintendo of Japan, features an unprecedented use of a stick-shaped mobile controller "Wii Remote" and classic sports games. It uses Wii Remote's motion sensing and pointing positioning to detect three-dimensional space. Flip and complete the movement "somatosensory operation." Wii Remote is used as a fishing rod, baton, tennis racket, drum stick, and other tools in different games to help players complete exercise through somatosensory operations such as shooting, chopping, swinging, and spinning [8]. Undoubtedly, digital sports methods that get rid of the constraints of the geographical environment can not only increase the enthusiasm of all people to participate in sports but also expand the existing sports population. What is more important is that digital sports can break free from geographical constraints and no longer be restricted by past stadiums [9].

Digital sports are conducive to meeting the sports participation needs of different groups of people. For companies that develop digital sports, whoever first captures the digital sports market of special groups such as middle-aged and elderly, children, and women will occupy the commanding heights on the battlefield of digital sports [10]. The emergence of digital sports brings advanced and scientific sports training methods and exercise content to ordinary sports enthusiasts, changing the disadvantages of the past biased research on young people and more satisfying the needs of different groups such as children, the elderly, and women. At the same time, its appearance can also help different sports hobby groups set multilevel exercise goals, find the best exercise plan, and form a serialized and intelligent digital sports service system [11]. Regardless of the age of the participants, high or moderate weight, and female or male, digital sports methods will provide them with the most suitable activity method to help different sports enthusiasts complete exercise and demonstrate the charm of sports [12]. Digital sports deeply analyzes the activity habits or exercise methods of the elderly, women, children, and other special groups and provides more suitable sports services for every sports enthusiast [13]. Through local computing, digital sports accurately locates and perceives the personalized and unstructured data of different audience groups and conducts comprehensive analysis and processing of various data information in a short period of time, forming a portable mobile device for each sports group. In order to find out the real needs of more sports audiences, put forward effective exercise suggestions to help different exercise groups reach the best exercise state [14]. Through the connection of the bracelet and the digital sports terminal, the public can also see the comparison chart of the comprehensive sports data of different participating groups more intuitively, assist the public to set personalized sports goals, and urge each athlete to complete their own exercise volume. In the end, every exerciser's exercise method and exercise effect will be improved scientifically and reasonably over time [15].

3. Space Digital Fusion Technology

This article applies spatial digital fusion technology to the national sports information processing. Combining the reality and needs of national sports, this article analyzes the spatial digital integration technology. First, the digital coordinate system is established.

The mathematical formula for transforming digital coordinates to spatial rectangular coordinates is shown in formula (1) [16].

$$\begin{cases} X = (N + H) \cos B \cos L, \\ Y = (N + H) \cos B \sin L, \\ Z = \left[N\left(1 - e^2\right) + H\right] \sin B. \end{cases} \quad (1)$$

Among them, B is the latitude of the earth, L is the longitude of the earth, H is the height of the earth, (X, Y, Z) is the rectangular coordinates of the space, $N = a/\sqrt{1 - e^2 \sin^2 B}$ is the radius of curvature of the ellipsoid, and $e = \sqrt{(a^2 - b^2)/a^2}$ is the eccentricity of the ellipse (a and b represent the long and short radii of the ellipse, respectively) [17].

When converting from spatial rectangular coordinates to digital coordinates, the geodetic longitude can be obtained directly. However, the calculation of the geodetic latitude B and the geodetic height H is more complicated, and it is often necessary to use an iterative method to solve the problem. From formula (1), the iterative formula can be solved as

$$\begin{cases} L = \arctan \dfrac{Y}{X}, \\ \tan B = \dfrac{1}{\sqrt{X^2 + Y^2}} \left(Z + \dfrac{a e^2 \tan B}{\sqrt{1 + \left(1 - e^2\right) \tan^2 B}} \right), \\ H = \dfrac{\sqrt{X^2 + Y^2}}{\cos B} - N. \end{cases} \quad (2)$$

In the iterative process, the initial value is $\tan B_0 = (Z/\sqrt{X^2 + Y^2})(1 + e^2)$. According to formula (2), B can be obtained by approximately four generations, and then, H can be obtained.

Figure 1 shows two spatial rectangular coordinate systems $O_1 - X_1 Y_1 Z_1$ and $O_2 - X_2 Y_2 Z_2$. Among them, the same point in the two rectangular coordinate systems has the following correspondence [18]:

$$\begin{bmatrix} X_2 \\ Y_2 \\ Z_2 \end{bmatrix} = \begin{bmatrix} \Delta X \\ \Delta Y \\ \Delta Z \end{bmatrix} + (1 + k) \cdot R_1(\varepsilon_x) \cdot R_2\left(\varepsilon_y\right) \cdot R_3(\varepsilon_z) \begin{bmatrix} X_1 \\ Y_1 \\ Z_1 \end{bmatrix}. \quad (3)$$

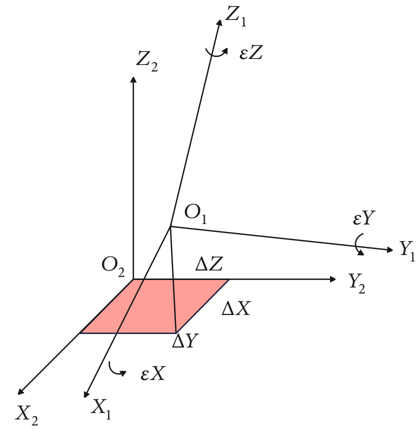

Figure 1: Conversion between two spatial rectangular coordinate systems.

Among them, there are

$$R_1(\varepsilon_X) = \begin{pmatrix} 1 & 0 & 0 \\ 0 & \cos \varepsilon_X & \sin \varepsilon_X \\ 0 & -\sin \varepsilon_X & \cos \varepsilon_X \end{pmatrix},$$
$$R_2(\varepsilon_Y) = \begin{pmatrix} \cos \varepsilon_Y & 0 & -\sin \varepsilon_Y \\ 0 & 1 & 0 \\ \sin \varepsilon_Y & 0 & \cos \varepsilon_Y \end{pmatrix}, \quad (4)$$
$$R_3(\varepsilon_z) = \begin{pmatrix} \cos \varepsilon_z & \sin \varepsilon_z & 0 \\ -\sin \varepsilon_z & \cos \varepsilon_z & 0 \\ 0 & 0 & 1 \end{pmatrix}.$$

$(\Delta X, \Delta Y, \Delta Z)^T$ is the coordinate translation parameter, $\varepsilon_X, \varepsilon_Y, \varepsilon_Z$ is the coordinate rotation parameter, and k is the coordinate scale coefficient. In practical applications, the determination of the conversion parameters in the above-mentioned two Cartesian coordinate conversion relations can be determined by using the least squares method of the common point coordinates.

In mathematics, projection refers to the establishment of a one-to-one mapping relationship between two point sets. Image projection is to express the graticule on the sphere of the earth onto a plane in accordance with a certain mathematical law. A one-to-one correspondence function is established between the digital coordinates (B, L) of a point on the ellipsoid and the rectangular coordinates (x, y) of the corresponding point on the image. The general projection formula can be expressed as [19]

$$\begin{cases} x = F_1(B, L), \\ y = F_2(B, L). \end{cases} \quad (5)$$

In the formula, (B, L) is the digitized coordinates (longitude, latitude) of a point on the ellipsoid, and (x, y) is the rectangular coordinates of the point projected on the plane.

The transformation of the positive solution of Gaussian projection is as follows: given the digitized coordinates (B, L), the plane rectangular coordinates (x, y) under the Gaussian projection are solved. The formula is shown in

$$\begin{aligned} x &= X + \frac{N}{2} \sin B \cos B l^2 + \frac{N}{24} \sin B \cos^3 B\left(5 - t^2 + 9\eta^2 + 4\eta^4\right) l^4, \\ y &= N \cos B L + \frac{N}{6} \cos^3 B\left(1 - t^2 + \eta^2\right) l^3 + \frac{N}{120} \cos^5 B\left(5 - 18t^2 + t^4\right) l^5. \end{aligned} \tag{6}$$

In the formula, X represents the arc length of the meridian from the equator to latitude B, $N = a^2/b\sqrt{1+\eta^2}$ represents the radius of curvature of the circle, L_0 represents the longitude of the origin, $l = L - L_0$ represents the difference between the longitude of the ellipsoid point and the corresponding central meridian, and the auxiliary variables $\eta^2 = e^2 \cos^2 B$, $t = \tan B$, a, b, and e, respectively, represent the long radius, short radius, and second eccentricity of the reference ellipsoid.

The inverse solution transformation of the Gaussian projection is as follows: the plane rectangular coordinates (x, y) under the Gaussian projection are known, and the digitized coordinates (B, L) are solved. The calculation formula is shown in [20]

$$\begin{aligned} B &= B_f - \frac{1}{2} V_f^2 t_f \left(\frac{y}{N_f}\right)^2 + \frac{1}{24}\left(5 + 3t_f^2 + \eta_f^2 - 9t_f^2\eta_f^2\right) V_f^2 t_f \left(\frac{y}{N_f}\right)^4 \\ &\quad - \frac{1}{720}\left(61 + 90t_f^2 + 45\eta_f^4\right) V_f^2 t_f \left(\frac{y}{N_f}\right)^4, \\ L &= L_0 + \frac{1}{\cos B_f}\left(\frac{y}{N_f}\right) - \frac{1}{6}\left(1 + 2t_f^2 + \eta_f^2\right)\left(\frac{1}{\cos B_f}\right)\left(\frac{y}{N_f}\right)^2 \\ &\quad + \frac{1}{120}\left(5 + 28t_f^2 + 24t_f^4 + 6\eta_f^2 + 8\eta_f^2 t_f^2\right)\left(\frac{1}{\cos B_f}\right)\left(\frac{y}{N_f}\right)^2. \end{aligned} \tag{7}$$

Among them, the variable $V_f = \sqrt{1+\eta_f^2}$; B_f represents the latitude of the location, that is, the latitude value corresponding to the meridian calculated from the equator. The longitude and latitude values obtained by the inverse Gaussian transformation method are actually a relative quantity, which is the difference between the longitude and latitude relative to the lower left corner of the figure. Therefore, to get the final correct digitized coordinates, the longitude and latitude values of the lower left corner point need to be added.

The transformation of the positive solution of the Mercator projection is as follows: given the digitized coordinates (B, L), the plane rectangular coordinates (x, y) under the Mercator projection are calculated, and the formula is as shown in [21]

$$\begin{cases} x = r_0\left[\ln \tan\left(45^\circ + \dfrac{B}{2}\right) - \dfrac{e}{2} \ln \dfrac{1 + e \sin B}{1 - e \sin B}\right], \\ y = r_0(L - L_0). \end{cases} \tag{8}$$

In the formula, L_0 is the longitude of the origin, $r_0 = a \cos B_0/\sqrt{1 - e^2 \sin^2 B_0}$, and B_0 is called the reference latitude. When $B = 0$, the cylinder is tangent to the earth ellipsoid, and the radius of the tangent cylinder is a.

The inverse solution transformation of the Mercator projection is as follows: given the plane rectangular coordinates (x, y) under the Mercator projection, the digitized coordinates (B, L) are calculated, and the formula is shown in

$$\begin{aligned} B &= \frac{\pi}{2} - 2 \arctan\left(\exp^{(-X_N/K)} \times \exp^{(e/2) \ln (1 - \sin B_1/1 + \sin B)}\right), \\ L &= \frac{Y_E}{K} + L_0. \end{aligned} \tag{9}$$

In the formula, exp is the natural logarithm base, and the latitude B is quickly closed by iterative calculation.

For the geometric matching method of point entities, the commonly used matching similarity index is Euclidean distance. The algorithm compares the calculated Euclidean distance between the two with a threshold, and the one within the threshold is determined to be an entity with the same name or may be an entity with the same name. If multiple entities with the same name are obtained by matching, then repeated matching can be performed by reducing the threshold or reverse matching. If the entity with the same name cannot be matched, it can be adjusted by appropriately increasing the threshold until the entity with the same name is matched. The calculation formula of Euclidean distance is shown in

$$D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}. \tag{10}$$

where D is the Euclidean distance between two point entities $P_1(x_1, y_1)$ and $P_1(x_2, y_2)$.

For the geometric matching method of line entities, the total length L of the line, the direction θ of the line, the maximum chord $L_{\max}$ of the line, etc., are usually used as the matching similarity index. Its definition and calculation formula are as follows:

3.1. The Total Length of the Line. The total length of the line is defined as the sum of the lengths of the subline segments that make up the line segment. We assume that the points that make up the line are $P_i(x_i, y_i)$, as shown in Figure 2. The total length of the line is calculated as

$$L = \sum_{i=0}^{n-1} \sqrt{(x_{i+1} - x_i)^2 + (y_{i+1} - y_i)^2}. \tag{11}$$

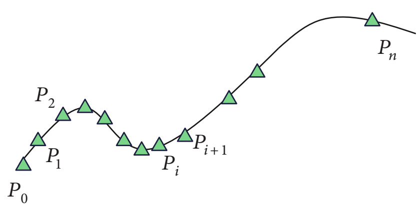

Figure 2: The direction of the line.

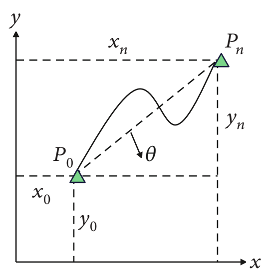

Figure 3: The direction of the line.

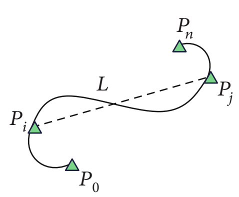

Figure 4: Maximum chord of line.

3.2. The Direction of the Line. The direction of the line is defined as the angle between the line between the first end point and the end point and the x-axis. It is specified that clockwise is positive and counterclockwise is negative, as shown in Figure 3. We assume that the first end point of the line is $P_0(x_0, y_0)$, and the end point is $P_n(x_n, y_n)$, and then, the calculation formula for the direction of the line is shown in formula (11).

3.3. The Maximum Chord of the Line. The maximum chord of a line is defined as the distance between the two furthest points that make up the line, as shown in Figure 4, and the calculation formula is shown in

$$L_{\max} = \max_{\substack{1\leq i\leq \\ 1\leq j\leq n}} \left(\sqrt{\left(x_j - x_i\right)^2 + \left(y_j - y_i\right)^2} \right). \tag{12}$$

The main idea of the graph data adjustment and merging algorithm based on the same-name point triangulation is as follows: in the "reference map" and "adjustment map," a topologically isomorphic Delaunay triangulation is constructed with the matched points of the same name as the starting point. After the corresponding regions in the two figures are divided into small triangles, the coordinate conversion relationship is established through the three vertices of each small triangle, and the other points falling into the triangle undergo coordinate conversion according to this relationship.

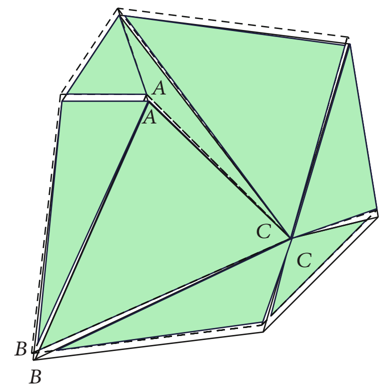

Figure 5: Example of partial division of triangulation.

Figure 5 is a part of the triangulation network constructed according to the above method in the two vector diagrams, where ΔABC and $\Delta A'B'C'$ are, respectively, triangles formed by pairs of points with the same name in the two vector diagrams.

The linear transformation relationship between $\triangle ABC$ and $\triangle A'B'C'$ is shown

$$F: \begin{cases} X' = a_0 + a_1 X + a_2 Y, \\ Y' = b_0 + b_1 X + b_2 Y. \end{cases} \tag{13}$$

Among them, (X, Y) and (X', Y') are the vertex coordinates of $\triangle ABC$ and $\triangle A'B'C'$, respectively. Bring the coordinates of the three vertices of the triangle into formula (13), then the coefficients in F can be obtained, and the transformation formula can be obtained.

The basic idea of the graph adjustment merging algorithm based on the principle of adjustment is as follows: The algorithm takes the coordinate adjustment values of the points that constitute the entity as the parameter to be solved, that is, the adjustment value correction number. Various error formulas, such as displacement formula, shape formula, relative displacement formula, area formula, parallel line formula, line segment length formula, and distance formula of adjacent entities, are established according to actual application needs. Finally, the calculation is carried out according to the principle of least squares method of interrogation adjustment, and the calculation formula is shown

$$\begin{aligned} f(x_1, y_1, \cdots, x_n, y_n) &= c_{11} \cdot \Delta x_1 + c_{12} \cdot \Delta y_1 + \cdots + c_{n1} \cdot \Delta x_1 + c_{n2} \cdot \Delta y_1 \\ &= \text{constraint}_k, \end{aligned} \tag{14}$$

$$v = Ax - 1. \tag{15}$$

In the formula, constraint_k is the limit value of the k factor, $(\Delta x_i, \Delta y_i)$ is the adjustment of the i-th entity coordinate point, and n is the total number of entity coordinate points.

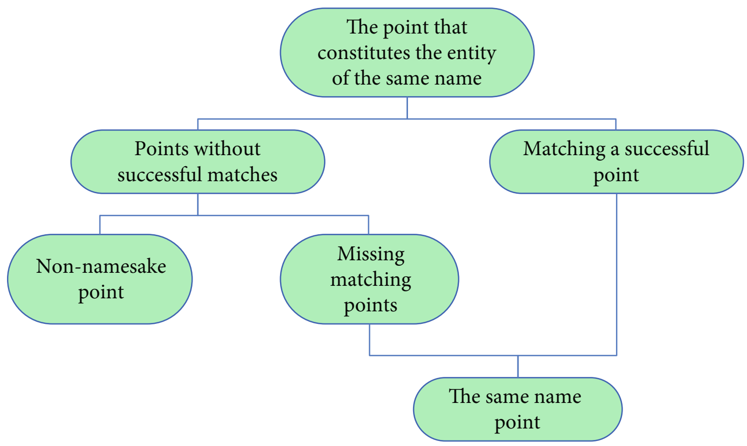

Figure 6: Classification of points constituting entities with the same name.

A is the coefficient matrix of the adjustment model, and v, x, and l are the corresponding residual value, parameter vector, and constant vector, respectively.

The adjustment and merging algorithm based on topological relations is mainly used to adjust the geometric positions of unmatched points in entities with the same name. The basic idea is as follows: first, the algorithm determines that the unmatched points that need to be adjusted are affected by the matched points with the same name. Secondly, the algorithm analyzes and calculates the geometric position adjustment of each matched point with the same name. Finally, the algorithm uses the weighted average method to calculate the total geometric position adjustment of the unmatched points.

We assume that the position adjustment of the last matched point P is affected by N matched points with the same name $Q_i (i = 1,\cdots,N)$, and the distance from P$ to each matched point Q_i with the same name is $L_i (i = 1,\cdots,N)$. We assume that the coordinate adjustment amount of the matched point Q_i to the point P is $(\Delta X_Q, \Delta Y_Q)$, and then, the total adjustment amount of the coordinate of the P point is calculated as

$$\begin{cases} \Delta X_P = \sum_{i=1}^{N} \Delta X_{Q_i} \dfrac{W_i}{\sum_{j=1}^{N} W}, \\ \Delta Y_P = \sum_{i=1}^{N} \Delta Y_{Q_i} \dfrac{W_i}{\sum_{j=1}^{N} W_j}. \end{cases} \tag{16}$$

Among them, the weight $W_i = 1/L_i$.

3.4. Adjust and Merge Algorithm Based on Multiple Evaluation Factors. This article divides the points that constitute entities with the same name into two categories: points with the same name that are successfully matched and points that are not successfully matched. The point with the same name refers to the description of the same point on the entity with the same name in different vector images. The point of the same name that is successfully matched means that the point of the same name that constitutes the entity of the same name on one of the vector images can find the matching point of the same name on the corresponding entity of the same name in the other vector image. The unmatched point means that the point that constitutes the entity with the same name on one of the vector images cannot find a matching point on the corresponding entity with the same name on the other vector image. Because the points that constitute the entities with the same name inevitably have positioning errors, it is inevitable that there will be missing matches during the matching process of the points with the same name. Therefore, there are two situations for the unmatched points; one is the point with the same name, but the match is missed; the other is the point with the same name. The classification of the points constituting the entity with the same name is shown in Figure 6.

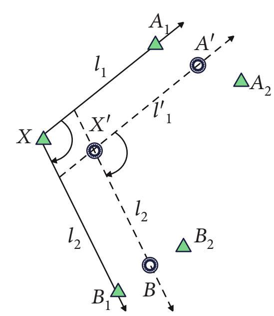

Figure 7: Schematic diagram of shape correction.

The average angle difference refers to the absolute average value of the change of each turning angle of the entity before and after the entity is adjusted, and its calculation formula is shown in formula (17). The average angle difference can quantitatively describe the degree of change in the shape of the entity before and after adjustment. The larger the average angle difference, the greater the change in the shape of the graph before and after the adjustment, and vice versa, and the smaller the change in the shape of the graph before and after the adjustment.

$$\psi = \frac{\sum_{i=1}^{r} \left| \theta_{i\text{after}} - \theta_{i\text{front}} \right|}{r}. \tag{17}$$

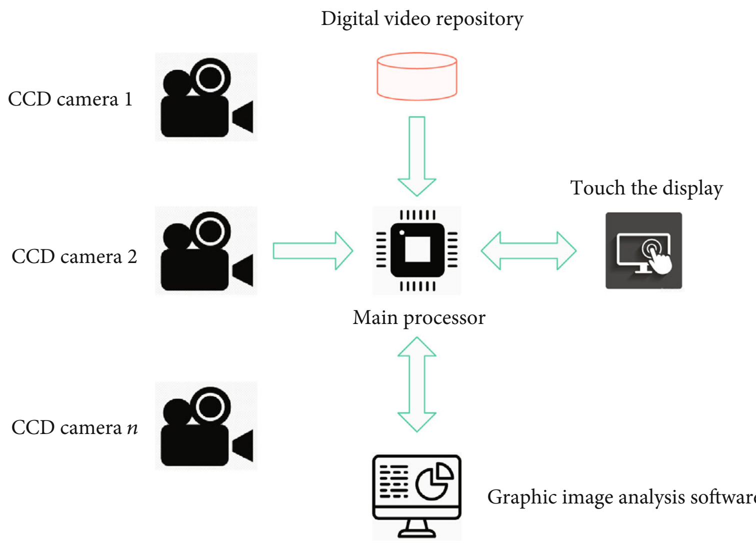

Figure 8: National traditional sports training system based on spatial digital information fusion.

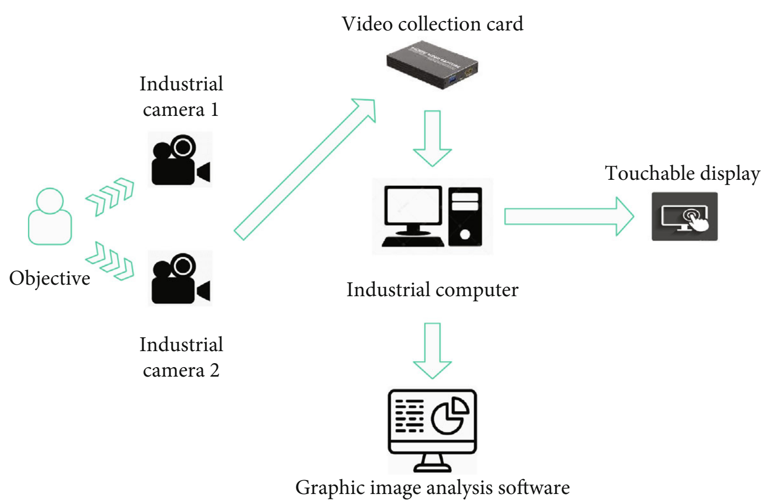

Figure 9: System hardware structure diagram.

In the formula, $\theta_{i\text{front}}$ and $\theta_{i\text{after}}$, respectively, represent the angle value before and after the adjustment of the i-th turning angle that constitutes the entity, and r represents the total number of turning angles that constitute the entity.

In order to enable the entity adjustment and merging algorithm based on topological relations to maintain the consistency of the shape of irregular entities before and after the adjustment and merging, the wood text is an indicator of the size of the shape change; that is, starting from the average angle difference, an adjustment and merging algorithm based on topological relations and shape correction is proposed for the points that are not successfully matched on the entities with the same name. The detailed steps of the algorithm are as follows:

(1) The algorithm first calculates the point that is not matched successfully according to the adjustment and merging algorithm based on the topological relationship; that is, the adjusted position coordinates (x_1, y_1) are calculated by formula (16)

(2) Based on the adjustment and merging algorithm of the topological relationship, the shape correction is performed. According to the principle that the last matched point on the entity with the same name before and after the adjustment should maintain the same angle as the two nearest matched points with the same name, the adjusted position coordinates (x_2, y_2) are calculated. As in Figure 7, we assume that A_1, B_1, A_2, and B_2 are the point pairs with the same name that are successfully matched on the entities with the same name in vector image 1 and vector image 2, where A_1 matches A_2 and B_1 matches B_2. They are adjusted to A', B' after being processed by the entity adjustment and merging algorithm. In the figure, X is the last matched point

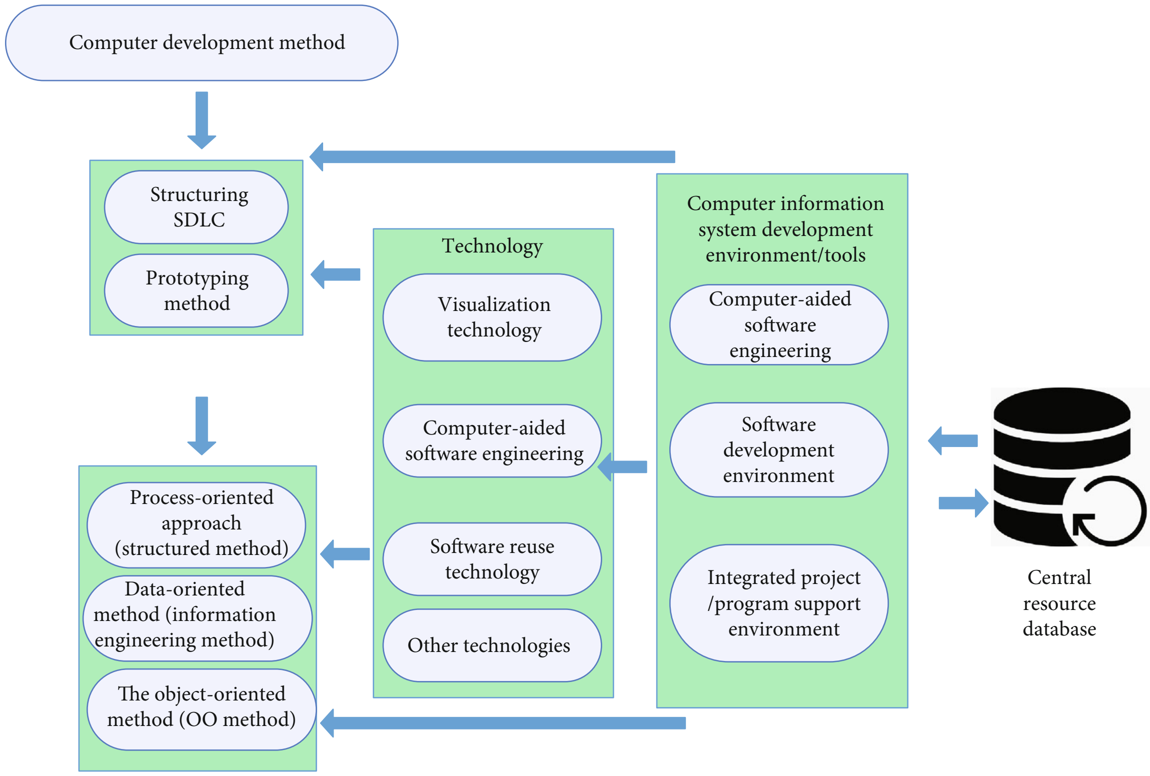

Figure 10: System development method.

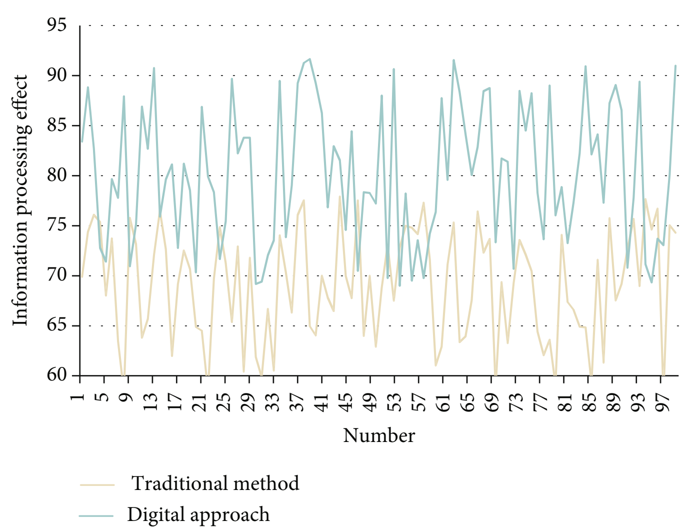

Figure 11: Verification of the effectiveness of the information processing of traditional national sports based on digital information fusion.

in vector image 1, and the two matched points closest to X in this figure are A_1 and B_1, respectively. Now, the algorithm adjusts and merges the point X that is not successfully matched and finds its adjusted position $X'(x_2, y_2)$. Before the adjustment and merger, the angle between X, A_1, and B_1 is $\angle A_1XB_1$. In order to ensure that the included angle remains unchanged before and after the adjustment and merger, the adjusted and merged included angle $\angle A'X'B'$ should be equal to $\angle A_1XB_1$. Therefore, make the parallel lines of l_1 and l_2 through A' and B', respectively, and the intersection point of the two straight lines $l_1{}'$ and $l_2{}'$ obtained is the desired $X'(x_2, y_2)$

It should be noted that before the entity is adjusted and merged, if A_1, B_1, and x are on the same straight line, then the shape, the mausoleum, and the next step of this step can be omitted, and we only need to adjust the merged result and directly take the result in formula (1).

Table 1: Evaluation of the spatial digital processing effect of the national traditional sports information processing method based on digital information fusion.

Number	Digital effect	Number	Digital effect	Number	Digital effect
1	87.54	23	86.55	45	86.56
2	88.11	24	88.81	46	91.47
3	93.22	25	89.53	47	88.05
4	92.99	26	88.00	48	87.30
5	89.74	27	86.75	49	93.32
6	87.11	28	88.87	50	88.40
7	86.24	29	88.66	51	92.70
8	91.30	30	86.26	52	91.14
9	88.40	31	86.80	53	89.77
10	86.92	32	86.03	54	89.12
11	92.18	33	89.42	55	88.36
12	88.95	34	87.65	56	93.39
13	92.52	35	88.80	57	91.97
14	90.00	36	90.60	58	87.88
15	90.23	37	88.12	59	86.76
16	86.97	38	89.69	60	91.24
17	88.55	39	91.62	61	93.62
18	90.56	40	89.35	62	90.12
19	87.73	41	88.46	63	93.59
20	86.26	42	91.01	64	92.30
21	89.78	43	87.52	65	92.50
22	93.69	44	89.18	66	88.78

(3) Using the weighted average method, the algorithm calculates the final adjusted and merged position coordinates (X, Y), as shown in formulas (6)–(18). In this way, the adjustment and merging algorithm based on the topological relationship realizes the correction of the entity shape.

$$(x, y) = a_1(x_1, y_1) + a_2(x_2, y_2). \tag{18}$$

In the formula, a_1 and a_2 are weights, respectively, and their values are determined according to specific data, applications, and experience

4. Information Processing of National Traditional Sports Based on Spatial Digital Information Fusion

The software function of the national sports digital training system is to collect the athlete's action video, upload it to the computer, and process the video through the software, as shown in Figure 8.

The hardware part of the national sports digital information system includes video capture cards, industrial computers, industrial cameras, touch screens, and racks, as shown in Figure 9.

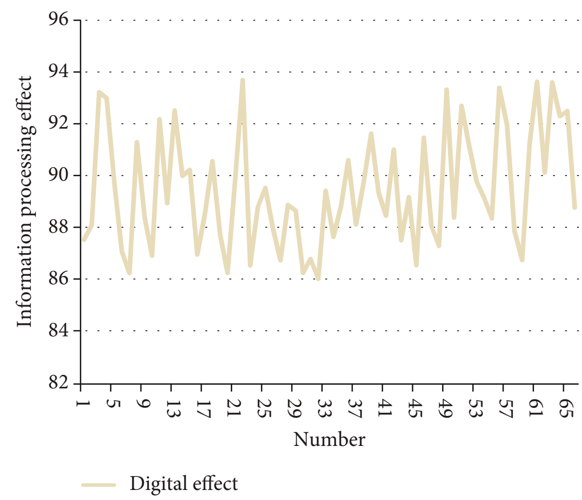

Figure 12: Statistical diagram of the spatial digital processing effect of the national traditional sports information processing method based on digital information fusion.

The main development method of the system in this paper is shown in Figure 10.

After constructing the system of this paper, the model of this paper is tested and verified, and the system model is verified through simulation design. Through simulation research, the national traditional sports information processing system based on digital information fusion proposed in this paper is studied, and the effectiveness of the method proposed in this paper and the traditional method is compared, and the results are shown in Figure 11.

It can be seen from the above that the effect of the traditional national sports information processing method based on digital information fusion proposed in this article is relatively significant. On this basis, the spatial digital processing of this method is evaluated, and the results shown in Table 1 and Figure 12 are obtained.

From the above research, it can be seen that the national traditional sports information processing method based on digital information fusion proposed in this article also has a good effect in the digital processing of the national traditional sports space.

5. Conclusion

Information technology has emerged in the field of sports, and brand-new sports activities such as sports digitalization and sports resource informationization have emerged. Unlike traditional online games and e-sports, which involve finger movements and eye-moving relatively static activities, digital sports put more emphasis on "sweating" body movements. Moreover, it uses digital technologies such as motion capture devices and motion sensors to transform and upgrade traditional sports to achieve interaction and entertainment among humans, machines, and the Internet. Digital sports will also play a particularly important role in social criticism and cultural value orientation. This article combines digital information fusion technology to construct the national traditional sports information processing system and improve the development effect of national traditional sports in the information age. The research results show that the national traditional sports information processing method based on digital information fusion proposed in this paper has a good effect in the digital processing of the national traditional sports space.

Data Availability

The labeled dataset used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare no competing interests.

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