BP Neural Network Model-based Urbanization Process Traditional Sports Cultural Development Exploration

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Abstract: World economy is in the trend of globalization while Chinese urbanization construction has also constantly developed. Nation has paid more and more attention to spiritual cultural construction and sports cultural construction. Nowadays, people sports consciousness strengthens, however it cannot speed up traditional sports events development, which attracts masses attention. The paper takes stilt race such traditional folk custom sports event as an example, starts from female performance and male performance the two aspects, utilizes BP neural network model to evaluate traditional folk custom sports event development conditions. Regard Guangdong, Hubei, Liaoning, Hebei and other eight provinces and cities data as sample data, make evaluation targeted at Shanghai, Chongqing, Tianjin and Chengdu four regions, the evaluation result shows that Shanghai, Chongqing traditional folk custom sports events are well developed.

Keywords: BP neural network, sports culture, stilt race, traditional sports, urbanization process.

1. INTRODUCTION

Urbanization process can improve people's living quality; international degree is also constantly growing. National people's interests on traditional sports are not so high while foreign sports events receive massive praises. Traditional sports cultural development is at the dilemma [1].

In 2011, Zhang Jia-Lin in the article " Poyang Lake surrounding area folk custom sports cultural investigation research", took Poyang Lake area folk custom sports development as research objects, regarded common civilian sports culture as starting point, applied multiple research methods, made research targeted at other regions characteristics, cultural concept, construction achievement and existing problems as well as other aspects [2], result showed that all levels' government personnel and common people still had shortage in cultural self-awareness aspect; Under the great background of market economy, due to people excessive pursuit of economy profits, traditional sports social value became deficient [3]. From the perspective of nation, government guiding on traditional folk custom sports was not enough; improper local policy document led to traditional folk custom sports development space to become little and little. With regard to this, the writer pointed out to take government as orientation, masses proactive cooperate and learn. Government should foster relative professionals so that explore helpful traditional folk custom cultural development management mode, positive guide masses to set up correct traditional sports cultural protection consciousness, proactive excavate traditional sports cultural resources on the premise

not destroying others development and let its social values to be promoted. On the premise that respect and protect historical culture, took fully consideration of current sports culture, strived to combine the two so as to let people to better accept traditional sports [4, 5].

In 2013, Zhang Miao in the article " Jiangsu province folk custom sports development status, problem and situation research", emphasized Jiangsu province economic civilization belonged to leading level in the nation, however, in the aspect of traditional folk custom sports, its development status showed numerous contradictions [6-9]. The article comprehensive applied multiple research methods, made research targeted at traditional sports participation conditions, government organization, business joint performance and others multiple conditions, the result showed that from the aspect of gender, female participation conditions were better than that of male; from the perspective of age, old people participation degree was higher; from the perspective of participation purposes, building a strong body and mind was the important purpose. At present, traditional folk custom management mode was charged by government and coordinated by civil organization. Jiangsu province occupied certain advantages in folk custom sports athletics performance, but single development path still restricted its development [8]. With regard to this, the writer presented that government as main leading force; it should expand multiple development paths. Beyond that, Jiangsu province traditional sports development needed efforts from all classes in society, and formed into industry, agriculture, business, government joint cooperative mode.

In 2008, Pan Yi-He in the article " Small town residents participating in traditional festivals folk custom sports activities investigation and reflection", on the premise referencing

Table 1.   Stilt race 200m man performance.

Unit	Name	200m	Rank
Performance(s)			
Guangdong1	Tian Shi-Fen	22.95	1
Hubei2	Yang Wei	23.29	2
Hubei3	Yang Ming-Feng	23.32	3
Liao ning4	Yang De-Quan	24.06	4
Hebei5	Peng Li-Ming	24.23	5
Hunan6	Qin Hao-Bo	24.42	6
Guangdong7	Zhang Jia-Wu	24.54	7
Guangxi 8	Pan Shao-Jing	25.23	8

Table 2.   Stilt race 200m woman performance.

200m			
Unit	Name	Performance(s)	Rank
Hubei 1	Zhang Min	27.54	1
Hubei2	Ren Yan-Ling	27.94	2
Hebei3	He Chun-Hua	28.45	3
Ningxia4	Na Dong-Mei	28.54	4
Beijing5	Chen Ju-Ming	28.68	5
Guangdong6	Tang Na	28.77	6
Hu Nan7	Zhang Yan-Qing	29.04	7
Beijing8	Zhang Qiao-Si	29.04	8

lots of document literature, took small town residents as research objects, started investigation on situations of their engagement in traditional folk custom sports, went deeper into exploration of the aspects that affected small town sports development, the result showed that female participation degree was obviously higher than that of male, differences in job nature, economic income could lead to traditional sports participation degrees differences [9]; All levels of people in the town basically came to terms in the thoughts of traditional sports and economy as well as spiritual construction relationships. Insufficient government support, deficient propaganda, insufficient capital investment, fewer sites and not high effectiveness of organizational activities as well as other issues restricted traditional sports development.
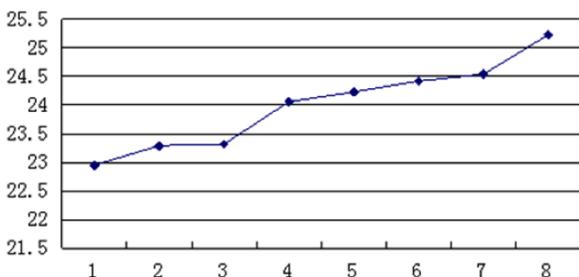
Fig. (1). Men's 200m tall horse syerformance comparison chart.

The paper will select stilt race as the representative of traditional folk custom sports events, comprehensive consider multiple aspects and make evaluation and researches on multiple provinces and cities.

2. MODEL ESTABLISHMENT

2.1. Data Collection

Tables **1** and **2** is original data table that comes from "Western Hubei circle folk custom sports inheritance and sustainable development research".

From Table **1**, it is clear for us that Guangdong, Hubei and Liaoning three provinces have better stilt race single performance, and Hubei province two players' performances have no big differences. Eight athletes performances comparison is as Fig. (**1**).

From Fig. (**1**), We can see that mark number "4", "5""6""7" are Liaoning, Hunan, Hebei, Guangdong four provinces men athletes performances rather approximate.

From Table **2**, it is clear for us that in the aspect of woman stilt race, Hubei province, Hebei province, and Ningxia province performances are good, and Hubei province two athletes' performances have no big differences. Comparison figure is as Fig. (**2**).
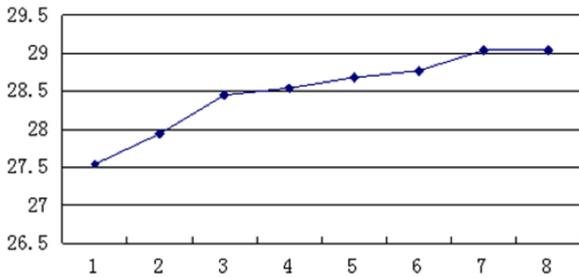
Fig. (2). Women's 200m tall horse performance comparison chart.

From Fig. (**2**), we can see that woman performance is obviously poorer than that of man. Mark number "3" , "4" , "5" , "6"are Hebei, Ningxia, Beijing, Guangdong performances that are rather approximate.

2.2. Data Reduction

Due to we make evaluation on provinces, sort out provinces same man and woman performances together, in case that man and woman stilt race performances don't exist at the same time, value them (30s), regard the data after sorting as sample data.

Data in Table **3**, for the same province occurred twice performances, all take average value. In order to clearly express sample data condition, draw Fig. (**3**).

From Fig. (**3**), we can see that Ningxia and Beijing the two cities man and woman performances have no big differences, other six provinces' man and woman performances' differences are bigger.

2.3. Neural Network Model

Neural network model is originated from neurobiology. Its computation process is similar to biology nerve cell reaction process, as Fig. (**4**).

In neural network, lots of different nerve cells included axon end can enter into the same nerve cell Dendron and form into a large number of synapses. All synapses of differ-

Table 3.   **Each province sample data.**

Province	Man	Woman
Guangdong1	23.745	29.385
Hubei2	23.305	27.74
Niaoning3	24.06	30
Hebei 4	24.23	28.45
Hunan5	24.42	29.04
Guangxi6	25.23	30
Ningxia7	30	28.54
Beijing8	28.86	30
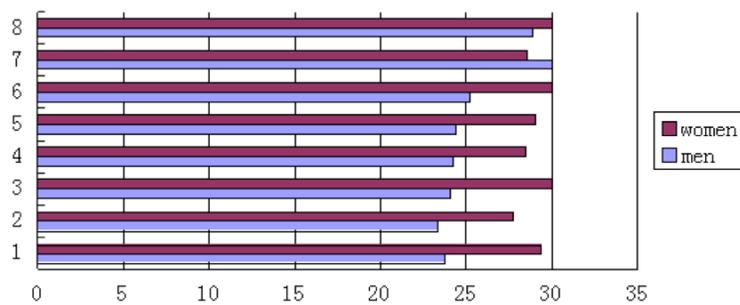
Fig. (3). Sample data case diagram.
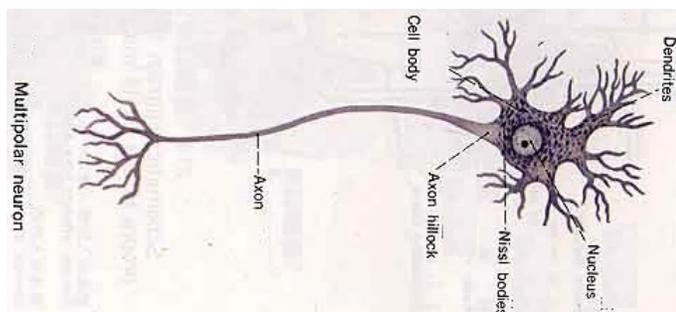
Fig. (4). The structure of neurons.

ent origins released neurotransmitters can exert on same nerve cells' membrane potential changes. Thereupon, nerve cells space comprehensive information ability that is nerve cell can integrate input information of different origins in Dendron. Base on the ability, people simulate nerve cell reaction process and create artificial nerve cell model, as Fig. (**5**) shows, symbols definition in figure is as Table **4** shows.
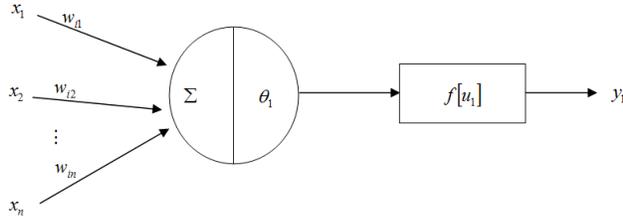
Fig. (5). The schematic of mathematical models of neurons.

Table 4.   Mathematical model's symbol definition.

Symbol	Definition
$x_1, x_2, \cdots, x_n$	Nerve cell input part that is information released by previous level
θ_i	Nerve cell threshold value
y_i	Nerve cell output
$f[u_1]$	Excitation function

$f[u_1]$ Decides that output form that arrives at threshold value θ_i under common effects of inputting $x_1, x_2, \cdots, x_n$. Fig. (**6**) shows two kinds of excitation functions images. The paper adopted models use the second kind excitation function.
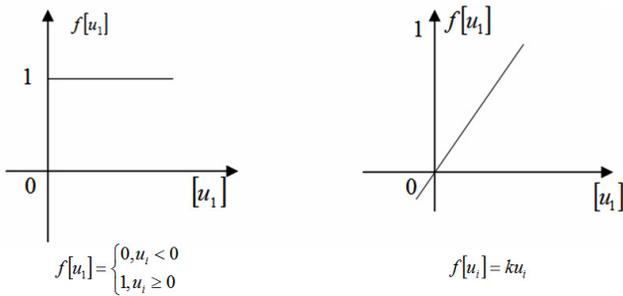
Fig. (6). Typical excitation functions.

Among them ,

$$u_i = \sum_j w_{ij} x_i - \theta_i \tag{1}$$

So

$$y_i = f[u_i] = f\left(\sum_j w_{ij} - \theta_i\right) \tag{2}$$

Formula (2) is individual nerve cell full mathematical model expression.

Neural network is a kind of multiple layer forward network, adopts minimum mean square error computational way. When apply counter propagation algorithm into feed forward multiple network, utilize *Sigmoid* as excitation function , use following steps to make recursion solving on w_{ij} that is network weight coefficient. In case every layer has n pieces of nerve cells , for the k layer the i nerve cell , then it has n pieces of weight coefficients $w_{i1}, w_{i2}, \cdots, w_{jn}$. In addition, select one more w_{jn+1} to express θ_i. When input sample x , take $x = (x_1, x_2, \cdots, x_n, 1)$.

1) Align value to w_{ij}. To every layer w_{ij}, align a very little nonzero random number, and meanwhile $w_{jn+1} = -\theta_i$。 Due to the model utilizes Matlab to operate, the alignment process is computer's random process, and just because of that, same programming codes in different running processes, the results may appear differences.

2) Input sample value $x = (x_1, x_2, \cdots, x_n, 1)$, and corresponding expected output $y = (y_1, y_2, \cdots, y_n, 1)$.

3) Calculate each layer output, for the k layer the i nerve cell output x_{ik} , it has

$$y_i^k = f[u_i^k] \tag{3}$$

Among them,

$$u_i^k = \sum_j w_{ij} x_j^{k-1} - \theta_i^k \tag{4}$$

In formula，$x_{n+1}^{k-1} = 1$, $w_{i(n+1)} = -\theta$

4) Solve each layer computation error d_i^k , for output layer, it has $k = m$, then it has

$$d_i^m = x_i^m (1 - x_i^m)(x_i^m - y_i^m) \tag{5}$$

For other layer, it has

$$d_i^k = x_i^k (1 - x_i^k)\left(\sum_j w_{ij} x_j^{k-1} - \theta_i^k\right) \tag{6}$$

5) Correct w_{ij} and θ_i , it has

$$w_{ij}(t+1) = w_{ij}(t) - \eta d_i^k x_j^{k-1} \tag{7}$$

6) After solving each layer each weight coefficient, it can judge whether it conforms to requirements according to established criterion. If it don't conform, then return to the step 3, on the contrary, end computing.

2.4. Computing and Computed Result

In latlab running program codes, regard the program running selective training error being 10^{-2} as stop calculation

Table 5. **Evaluation objects data.**

City	Man	Woman
Shanghai	23.45	27.96
Chongqing	23.86	28.35
Tianjin	27.85	29.78
Chengdu	29.32	28.87

condition. Due to stilt race performances are between 20 and 30, selected stop calculation conditions are proper. In following schematic figure, "*" represents stilt race worse performances areas, "o" represents stilt race better performances areas.
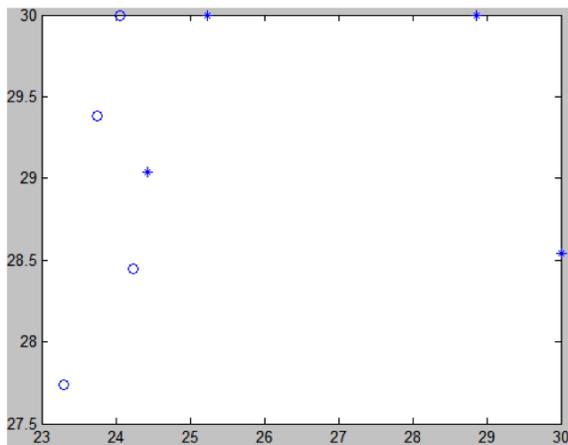
Fig. (7). Distribution of work results in two regions.

From Fig. (**7**), we can see that good performance area and poor performance area have boundary, according to the distribution conditions, we can define discriminate straight line $(24.3, 27.5)$, $(24.6, 31)$.

Objects under evaluation are Shanghai, Chongqing, Tianjin and Chengdu. In Table **5**, it lists out data after sorting so that detail research on the process.

Use Matlab software to program data in Table **5**, it can get result as Fig. (**8**).
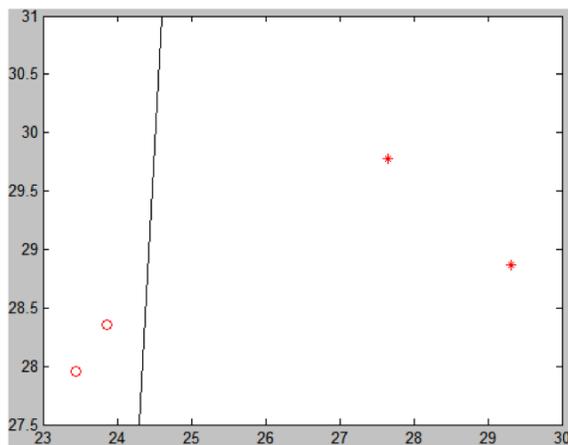
Fig. (8). The schematic of discrimination results.

From Fig. (**8**), it is known for us that Shanghai and Chongqing two cities' are excellent cities in stilt race sports event, Tianjin and Chengdu are cities of poor development in stilt race sports event.

CONCLUSION

Neural network implements reflection process from input information to output result. Neural network has ability of handling with multiple kinds of input information; it lets complicated problems to be simple and easier operating in solving process. However, if there is a large number of data to be analyzed, neural network may not truly reflect practical status due to too much computation process. In addition, neural network should reasonable estimate training errors, once the error estimation is improper, it may occur to computed result incorrect.

The paper applies neural network model in researching on stilt race sports event development degrees issue, by established model computing, it is clear that Shanghai and Chongqing two cities' are cities of better development in stilt race sports event, Tianjin and Chengdu are cities of worse development in stilt race sports event. Combine with practical conditions; it is easier to find that obtained conclusions conform to practice. Shanghai and Chongqing are direct-controlled municipalities, spiritual civilization construction is rather perfect, and emphasis on traditional culture is higher, which is helpful for stilt race sports event development.

CONFLICT OF INTEREST

The authors confirm that this article content has no conflict of interest.

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REFERENCES

[1] L.U. Xu-tao, and H. Hong, "Survival and development of national traditional sports major under the background of globalization", *Journal of Chengdu Physical Education Institute,* vol. 37, no. 9, pp. 78-80, 2011.

[2] J. Zhao, "On the modernization dispute of national traditional sports", *Sports Sciences Researches*, vol. 15, no. 3, pp. 14-17, 2011.

[3]   X-W. YE, "The cultural ecological perspective of heritage of national traditional sports", *Bulletin of Sport Science & Technology*, vol. 19, no. 1, pp. 112-113, 2011.

[4]   J. Zhao, and J. Wang, "Exploration of the way to the inheritance and development of traditional national sports", *Journal of Physical Education*, vol. 16, no. 8, pp. 93-95, 2009.

[5]   R. Li, and C. Yu, "Sports globalization and descent of China traditional sports, *Sports Culture Guide*, vol. 4, pp. 84-86, 2007.

[6]   L. Chen, "The research status and prospects of sport globalization at home and abroad", *Sports & Science*, vol. 30, no. 4, pp. 54-56, 2009.

[7]   L. Guo, "Studies of the ways of inheriting and passing on of the ethnic traditional sports in China", *Journal of Southwest China Normal University (Natural Science),* vol. 33, no. 6, pp. 157-160, 2008.

[8]   Y. Hu, "Cultural confusion and coping mechanism of martial arts in context of globalization", *Journal of Shenyang Sport University*, vol. 28, no. 4, pp. 110-113, 2009.

[9]   G. Wang, "Concerns of national traditional sports: current status, problems and reflections", *Journal of Capital College of Physical Education*, vol. 20, no. 2, pp. 1-4, 2008.