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PHYSICAL EXERCISE BEHAVIOUR AND EFFECT OF PHOTOVOLTAIC ENTERPRISE EMPLOYEES

Jinghua LI

School of Physical Education, Xianyang Normal University, Xianyang, Shaanxi, 712000 China
E-mail: n8353881@sina.com

ABSTRACT

In order to improve the physical health of employees in high-pressure working environment, this paper investigates the behaviour and effects of physical exercise of photovoltaic companies. Firstly, the article expounds the physical health status of employees in China's photovoltaic enterprises, then enumerates the research results of the physical exercise behaviour and effects of employees at home and abroad, and uses the mixed Gaussian model to study the behaviour and effect of photovoltaic employees' physical exercise. Specific measures to promote active physical exercise for employees are proposed. Finally, the article uses the multi-level fuzzy comprehensive evaluation model to evaluate the rationality of the measures. The results of the evaluation show that the measures proposed in the paper have positive effects on the health of photovoltaic employees.

Keywords: photovoltaic enterprise, employees, physical exercise

1. INTRODUCTION

Photovoltaic lighting is a relatively popular industry in China at present, and both the industry's gross domestic product and industry-related practitioners have a large scale [1]. However, due to the imperfect development system of the industry, although the photovoltaic enterprises have developed very prosperously, the physical exercise of their employees has not received enough attention. The physical health of photovoltaic companies' employees is not satisfactory, which seriously restricts the further development of photovoltaic companies [2]. Only in-depth investigation and research on the behaviour and effects of photovoltaic employees can be used to develop practical solutions within the industry, so that targeted solutions can be developed [3]. Reasonable physical exercise can effectively maintain people's physical and mental health, promote blood circulation, improve blood supply to the brain, maintain normal brain function, and maintain efficient and clear thinking [4].

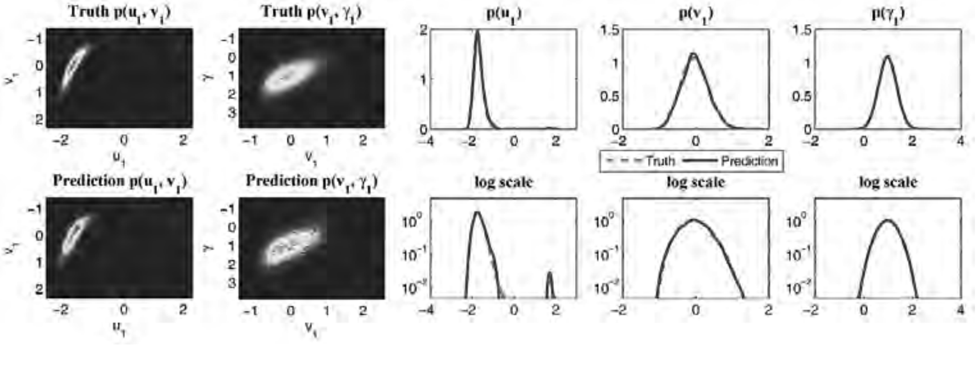

Fig.1. Fuzzy comprehensive evaluation mathematical model

In addition to maintaining the health of the body, the mentality of the person is also in a state of steady health and maintaining a healthy personality [5]. However, due to the existence of many deficiencies in the research on the physical exercise behaviour and effect of photovoltaic enterprise employees in China, the guidance exercise opinions cannot fully meet the actual exercise demand [6]. The backwardness of theoretical research will inevitably lead to the backwardness of physical exercise behaviour and effects of photovoltaic companies [7]. This is very detrimental to the healthy and sustainable development of the photovoltaic lighting industry, and is even more detrimental to the personal and physical development of the relevant practitioners. How to improve the physical and mental health of employees through better physical exercise planning has long been a research topic for relevant practitioners. The investigation and research on the physical exercise behaviours of photovoltaic employees and their effects are carried out, and the improvement direction is discussed [8].

2. STATE OF THE ART

In developed countries where the relevant employees of foreign companies are more perfect, they attach great importance to the physical exercise behaviour of employees, and regard it as a kind of human capital investment behaviour for employees. It is also an important method for enterprises to protect their own labour resources [9]. In the 1950s, with the development of the corporate system, enterprises have become more and more valued about their own labour resources, and began to protect through a variety of ways, strengthening the physical exercise of employees is one of the methods. After years of development, the relevant systems have been perfected and the coverage is very broad. For example, in the United States, more than 60 % of companies have their own physical exercise facilities and develop a very perfect sports club model. The Swedish National Sports Club is more affluent, with nearly 30,000 sports clubs, and an average of three residents will have one to participate in sports clubs. In China, due to the late start of the enterprise system, the research on the behaviour and effect of employees' physical exercise is lagging behind the developed countries, and more is still in the initial stage of establishment of the physical exercise system. Some scholars have studied the current situation of the employee sports management system of large enterprises in China, and proposed to implement the enterprise management of employee sports, and further enrich and complete it through the market mechanism.

3. METHODOLOGY

3.1. Multi-Level Fuzzy Comprehensive Evaluation Model

The multi-level fuzzy comprehensive evaluation model is an evaluation model based on fuzzy mathematics. Based on the qualitative evaluation theory, the fuzzy mathematics comprehensive evaluation method uses fuzzy mathematics to quantitatively evaluate various factors of things or objects, and then comprehensively evaluates them [10]. The mathematical model is shown in Fig. 1. The multi-level fuzzy comprehensive evaluation model has certain advantages in solving some nonlinear fuzzy problems. If this evaluation method is used to evaluate, the clear results can be gotten. Therefore, it is widely used and expresses the uncertainty of things. The basic implementation principle of the fuzzy comprehensive risk assessment method is as follows:

Let $V=\{v_1,v_2,\cdots,v_m\}$ be the factor of the research object, called the factor set. $V=\{v_1,v_2,\cdots,v_m\}$ are the set of judgments composed of m factors of various factors, and their number and name can be subjectively determined according to the needs of actual problems and decision makers. In real life, most of the criteria for consideration have no clear criteria, so the comprehensive judgment should be a fuzzy subset $B=(b_1,b_2,\cdots,b_m)\in F(V)$ on V.

b_k is the degree of membership of the v_k on fuzzy subset B: $\mu_B(v_k)=b_k(k=1,2,\cdots,m)$, which reflects the role of the k-th evaluation v_k in the comprehensive evaluation. The comprehensive evaluation B depends on the weight of each factor, i.e. it should be a fuzzy subset $A=(a_1,a_2,\cdots,a_n)\in F(U)$ on U, and $\sum_{i=1}^{n} a_i=1$, where a_i represents the weight of the i^{th} factor.

Thus, when the weight A is given, a comprehensive evaluation B can be given accordingly. The ba-

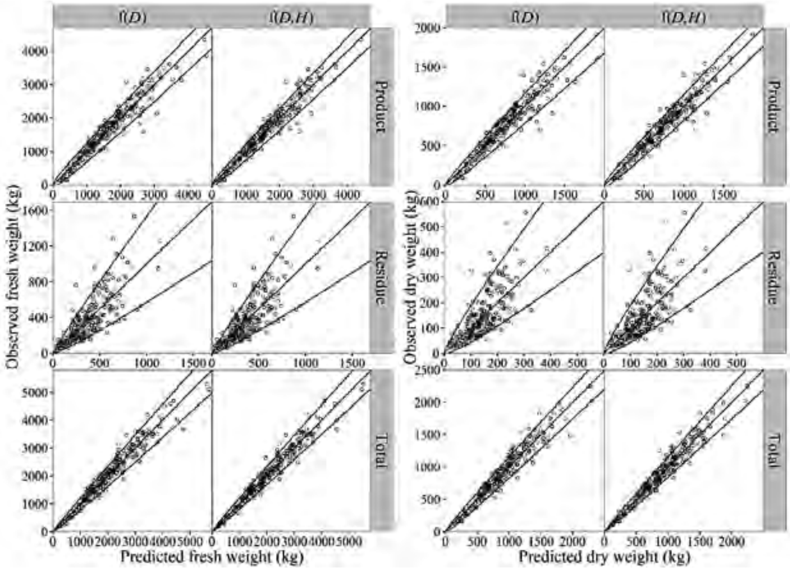

Fig.2. Truncation error represents linear operator function

sic steps are as follows: (1) determine the factor set $U=\{u_1,u_2,\cdots,u_n\}$; (2) determine the evaluation set $V=\{v_1,v_2,\cdots,v_m\}$; (3) determine the fuzzy evaluation matrix $R=(r_{ij})_{n\times m}$.

First, by making a judgment $f(u_i)\ (i=1,2,\cdots,n)$ for each factor u_i, a fuzzy map f from U to V can be gotten, i.e.:

$$\begin{aligned} &f: U\to F(U)\\ &u_i\mapsto f(u_i)=(r_{i1},r_{i2},\cdots,r_{im})\in F(V). \end{aligned} \tag{1}$$

Then, the fuzzy relation $R_f\in F(U\times V)$ can be induced by the fuzzy map f, i.e.:

$$\begin{aligned} &R_f(u_i,v_j)=f(u_i)(v_j)=\\ &=r_{ij}(i=1,2,\cdots,n;\ j=1,2,\cdots,m). \end{aligned} \tag{2}$$

Therefore, the fuzzy evaluation matrix $R=(r_{ij})_{n\times m}$ can be determined. Moreover, (U,V,R) is called fuzzy comprehensive evaluation model, and (U,V,R) is called the three elements of the model.

(4) Comprehensive evaluation: For the weight $A=(a_1,a_2,\cdots,a_n)\in F(U)$, the maximum-minimum synthesis operation can be obtained by using the model $M(\wedge,\vee)$, and a comprehensive evaluation can be obtained:

$$B=A\circ R\quad (\Leftrightarrow b_j=\bigvee_{i=1}^{n}(a_i\wedge r_{ij}),\ j=1,2,\cdots,m). \tag{3}$$

At this time, it is assumed that the fuzzy comprehensive evaluation model is the (U,V,R). For the weight $A=(a_1,a_2,\cdots,a_n)\in F(U)$, the fuzzy evaluation matrix is the $R=(r_{ij})_{n\times m}$, and the comprehensive evaluation of the model $M(\wedge,\vee)$ is $B=A\circ R=(b_1,b_2,\cdots,b_m)\in F(V)$, and $b_j=\vee_{i=1}^{n}(a_i\wedge r_{ij})\ \ (j=1,2,\cdots,m)$. In fact, due to $\sum_{i=1}^{n}a_i=1$, $a_i\le r_{ij}$ may appear for some cases, i.e. $a_i\wedge r_{ij}=a_i$. The result of doing so will make it possible to let many of the information in the fuzzy evaluation matrix R be lost, that is to say, the judgment information made by some factors u_i cannot be effectively used in the decision making.

The result of this is that the result of the judgment is no longer accurate, Fig. 2. Therefore, the model $M(\wedge,\vee)$ can be improved in practice. To this end, the following four computational models are proposed: (1) Multi-level fuzzy comprehensive evaluation model Non-Local Means (NLM) calculation method; (2) Multi-level fuzzy comprehensive evaluation model Transmission-Line Matrix Method (TLM) calculation method; (3) Multi-level fuzzy comprehensive evaluation model Reads Per Kilobase of exon model (RPM) calculation method; (4) Multi-level fuzzy comprehensive evaluation mo-

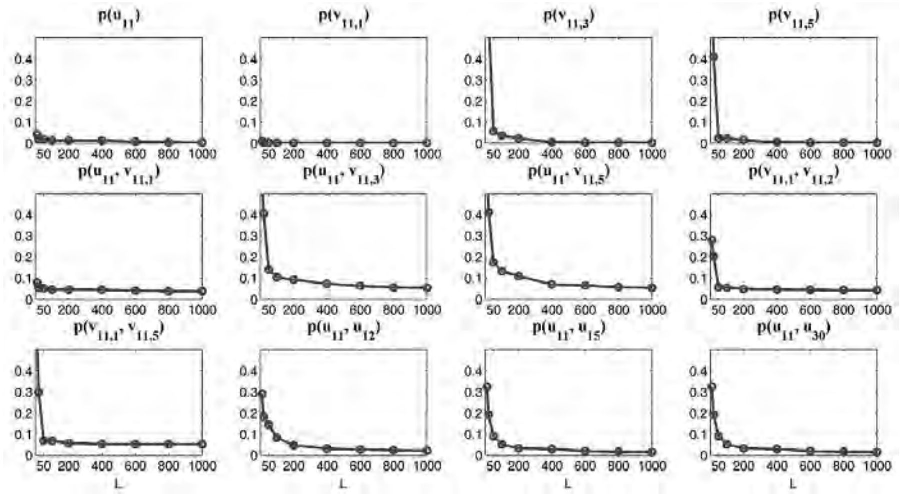

Fig.3. The mathematical function of membrane control equation of ROMS (Regional Ocean Modelling System) ocean model

del is the new adaptive delta modulation (ADM) calculation method.

These four different types of computational models can effectively solve the various problems encountered in the multi-level fuzzy comprehensive evaluation model in the operation process. The combined use of these models can also effectively solve some complex real-world problems. The multi-level fuzzy comprehensive evaluation model mainly includes the intimate control equation and the outer membrane control equation Fig.3. The intimate control equation of the multi-level fuzzy comprehensive evaluation model is as follows:

$$\begin{aligned}&\frac{\partial(H_z u)}{\partial \mathrm{t}}+\frac{\partial(uH_z u)}{\partial x}+\frac{\partial(vH_z u)}{\partial y}+\\&+\frac{\partial(\Omega H_z u)}{\partial s}-fH_z v=-\frac{H_z}{\rho_0}\frac{\partial p}{\partial x}-\\&-H_z \mathrm{g}\frac{\partial \eta}{\partial x}-\frac{\partial}{\partial s}\left(\overline{u'w'}-\frac{v}{H_z}\frac{\partial u}{\partial s}\right)-\\&-\frac{\partial\left(H_z S_{xx}\right)}{\partial x}-\frac{\partial\left(H_z S_{xy}\right)}{\partial y}+\frac{\partial S_{px}}{\partial s}.\end{aligned} \tag{4}$$

$$\begin{aligned}&\frac{\partial(H_z v)}{\partial \mathrm{t}}+\frac{\partial(vH_z v)}{\partial x}+\frac{\partial(vH_z v)}{\partial y}+\\&+\frac{\partial(\Omega H_z v)}{\partial s}-fH_z u=-\frac{H_z}{\rho_0}\frac{\partial p}{\partial y}-\\&-H_z \mathrm{g}\frac{\partial \eta}{\partial y}-\frac{\partial}{\partial s}\left(\overline{v'w'}-\frac{v}{H_z}\frac{\partial v}{\partial s}\right)-\\&-\frac{\partial\left(H_z S_{yx}\right)}{\partial x}-\frac{\partial\left(H_z S_{yy}\right)}{\partial y}+\frac{\partial S_{py}}{\partial s}.\end{aligned} \tag{5}$$

$$0=-\frac{1}{\rho_0}\frac{\partial p}{\partial s}-\frac{\mathrm{g}}{\rho_0}H_z\rho. \tag{6}$$

$$\frac{\partial \eta}{\partial t}+\frac{\partial(H_z u)}{\partial x}+\frac{\partial(H_z v)}{\partial y}+\frac{\partial(H_z\Omega)}{\partial s}=0. \tag{7}$$

$$\begin{aligned}&\frac{\partial(H_z C)}{\partial t}+\frac{\partial(uH_z C)}{\partial x}+\frac{\partial(vH_z C)}{\partial y}+\\&+\frac{\partial(\Omega H_z C)}{\partial s}=-\frac{\partial}{\partial s}\left(\overline{c'w'}-\frac{v_\theta}{H_z}\frac{\partial C}{\partial s}\right)+\\&+C_{source}.\end{aligned} \tag{8}$$

In the above formula, the variable u and the variable v represent the mean median of the Cartesian coordinates of the x-axis and the y-axis, respectively, and the variable U mainly represents a constant. The outer membrane governing equation of the multi-level fuzzy comprehensive evaluation model is as follows:

$$\begin{aligned}&\frac{\partial(\mathrm{D}\bar{u})}{\partial \mathrm{t}}+\frac{\partial(\bar{u}\mathrm{D}\bar{u})}{\partial x}+\frac{\partial(\bar{v}\mathrm{D}\bar{v})}{\partial y}-f\mathrm{D}\bar{v}=\\&-\mathrm{D}\frac{\partial \mathrm{p}}{\partial x}+\tau_{sx}-\tau_{bx}-\frac{\partial\overline{S_{xx}}}{\partial x}-\frac{\partial\overline{S_{xy}}}{\partial y}.\end{aligned} \tag{9}$$

$$\begin{aligned}&\frac{\partial(\mathrm{D}\bar{v})}{\partial \mathrm{t}}+\frac{\partial(\bar{v}\mathrm{D}\bar{u})}{\partial x}+\frac{\partial(\bar{v}\mathrm{D}\bar{v})}{\partial y}-f\mathrm{D}\bar{u}=\\&-\mathrm{D}\frac{\partial \mathrm{p}}{\partial y}+\tau_{sy}-\tau_{by}-\frac{\partial\overline{S_{xy}}}{\partial x}-\frac{\partial\overline{S_{yy}}}{\partial y}.\end{aligned} \tag{10}$$

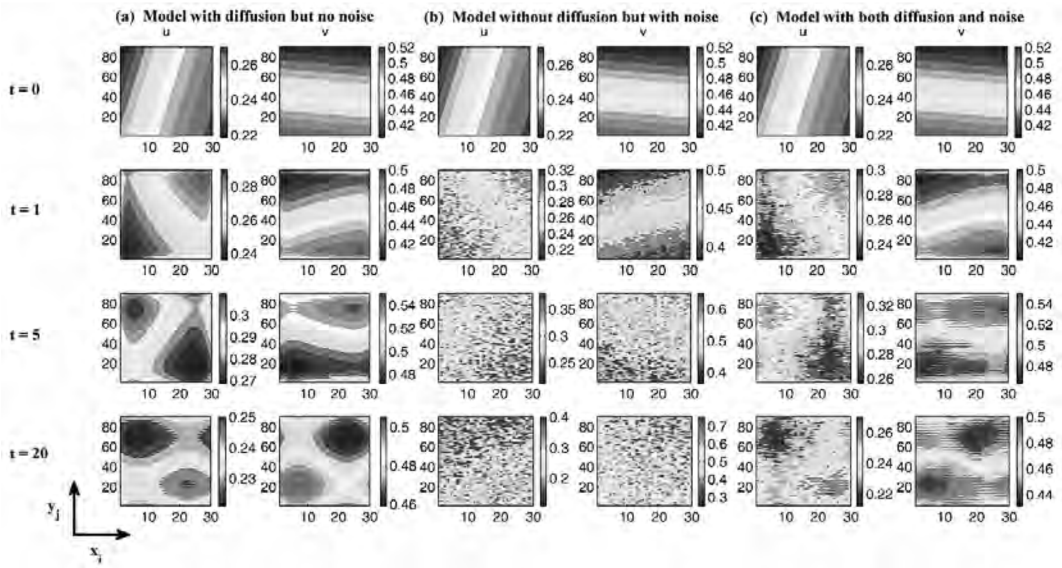

Fig.4. Second order fuzzy mapping set

$$\overline{S_{xx}} = E\frac{c_g}{c}\frac{k_x k_x}{k^2} + E\left(\frac{c_g}{c} - \frac{1}{2}\right) + \frac{k_x k_x}{k^2}\frac{c^2 A_R}{L}. \quad (11)$$

$$\overline{S_{xy}} = \overline{S_{yx}} = E\frac{c_g}{c}\frac{k_x k_y}{k^2} + \frac{k_x k_y}{k^2}\frac{c^2 A_R}{L}. \quad (12)$$

$$\overline{S_{yy}} = E\frac{c_g}{c}\frac{k_y k_y}{k^2} + E\left(\frac{c_g}{c} - \frac{1}{2}\right) + \frac{k_y k_y}{k^2}\frac{c^2 A_R}{L}. \quad (13)$$

$$c_g = \frac{\partial \sigma}{\partial k} = \frac{c}{2}\left(1 + \frac{2kD}{\sinh(2kD)}\right). \quad (14)$$

$$\frac{\partial ç}{\partial t} + \frac{\partial (D\bar{u})}{\partial x} + \frac{\partial (D\bar{v})}{\partial y} = 0. \quad (15)$$

The multi-level fuzzy comprehensive evaluation model often uses the ADSEN function to constrain different functions in the process of operation. The ADSEN function is divided into two types, one is a strong constraint type S4DVAR (Strong 4DVAR) function, and the other is a weak constraint type W4DVAR (Weak 4DVAR) function. The strong constraint function mainly focuses on the strong constraints on the initialization conditions of the function and the variable factors of the function to ensure that the finally obtained operation solves the requirements. The weak constraint function, on the other hand, is mainly to perturb the final result of the function along the most unstable direction of the state space. The combined use of the S4DVAR (Strong 4DVAR) function and the W4DVAR (Weak 4DVAR) function can effectively improve the operational precision of the multi-level fuzzy comprehensive evaluation model. The simplification process of the intimate control equation of the multi-level fuzzy comprehensive evaluation model is as follows:

$$\begin{aligned}&\frac{\partial (H_z u)}{\partial t} + \frac{\partial (uH_z u)}{\partial x} + \frac{\partial (vH_z u)}{\partial y} + \\ &+ \frac{\partial (\Omega H_z u)}{\partial s} - fH_z v = -\frac{H_z}{\rho_0}\frac{\partial p}{\partial x} - \\ &-H_z g\frac{\partial \eta}{\partial x} - \frac{\partial}{\partial s}\left(\overline{uw} - \frac{v}{H_z}\frac{\partial u}{\partial s}\right) - \\ &-\frac{\partial (H_z S_{xx})}{\partial x} - \frac{\partial (H_z S_{xy})}{\partial y} + \frac{\partial S_{px}}{\partial s}.\end{aligned} \quad (16)$$

In the above formula, the variables parameters $D_{T,ij}$, G_{ij}, φ_{ij}, ε_{ij} need to establish the corresponding mode to close the aspect, and the variables $-C_{ij}$, $D_{L,ij}$, P_{ij}, F_{ij} do not need to be closed.

In addition to the above mentioned problems, the multi-level fuzzy comprehensive evaluation model also has the intersection of the model and many factors in the actual operation process, but the weight distribution of each factor is not balanced. At this time, these factors can be divided into several levels to analyze them. The first is to judge each factor separately, and then make a comprehensive judgment on all factors. The detailed operation is as follows:

The factor set $U = \{u_1, u_2, \cdots, u_n\}$ is divided into several groups $U_1, U_2, \cdots, U_K$ $(1 \le k \le n)$ such that $U=\bigcup_{i=1}^{k}U_i$, and $U_i \cap U_j = \Phi(i \neq j)$, called $U=\{U_1,U_2,\cdots,U_k\}$ is the set of first order factors. Let's set

$$U_i=\left\{u_1^{(i)},u_2^{(i)},\cdots,u_{n_i}^{(i)}\right\}\ (i=1,2,\cdots,k;\sum_{i=1}^{k}n_i=n),$$

which is called the secondary factor set.

Set the judgment $V=\{v_1,v_2,\cdots,v_m\}$, and make a single factor evaluation on the n_i factors of the second factor set $U_i=\left\{u_1^{(i)},u_2^{(i)},\cdots,u_{n_i}^{(i)}\right\}$, that is, establish a fuzzy map, as shown in Fig. 4.

$$\begin{aligned} &f_i:U_i \to F(V)u_j^{(i)} \mapsto f_i(u_j^{(i)})= \\ &=(r_{j1}^{(i)},r_{j2}^{(i)},\cdots,r_{jm}^{(i)})(j=1,2,\cdots,n_i) \end{aligned}. \quad (17)$$

Then the evaluation matrix is:

$$R_i=\begin{bmatrix} r_{11}^{(i)} & r_{12}^{(i)} & \cdots & r_{1m}^{(i)} \\ r_{21}^{(i)} & r_{22}^{(i)} & \cdots & r_{2m}^{(i)} \\ \cdots & \cdots & \cdots & \cdots \\ r_{n_i1}^{(i)} & r_{n_i2}^{(i)} & \cdots & r_{n_im}^{(i)} \end{bmatrix}. \quad (18)$$

Let the weight of $U_i=\left\{u_1^{(i)},u_2^{(i)},\cdots,u_{n_i}^{(i)}\right\}$ is $A=(a_1^{(i)},a_2^{(i)},\cdots,a_{n_i}^{(i)})$, and the comprehensive evaluation can be obtained as:

$$B_i=A_i \circ R_i=(b_1^{(i)},b_2^{(i)},\cdots,b_m^{(i)})(i=1,2,\cdots,k)\ . \quad (19)$$

$b_j^{(i)}$ is determined by the model $M(\wedge,\vee)$, or $M(\bullet,\vee)$, $M(\wedge,+)$, $M(\bullet,+)$.

For the comprehensive evaluation of the first-order factor set $U=\{U_1,U_2,\cdots,U_k\}$, it is possible to set its weight $A=(a_1,a_2,\cdots,a_k)$, and the total evaluation matrix is $R=[B_1,B_2,\cdots,B_k]^T$. According to the models $M(\wedge,\vee)$, $M(\bullet,\vee)$, $M(\wedge,+)$, $M(\bullet,+)$

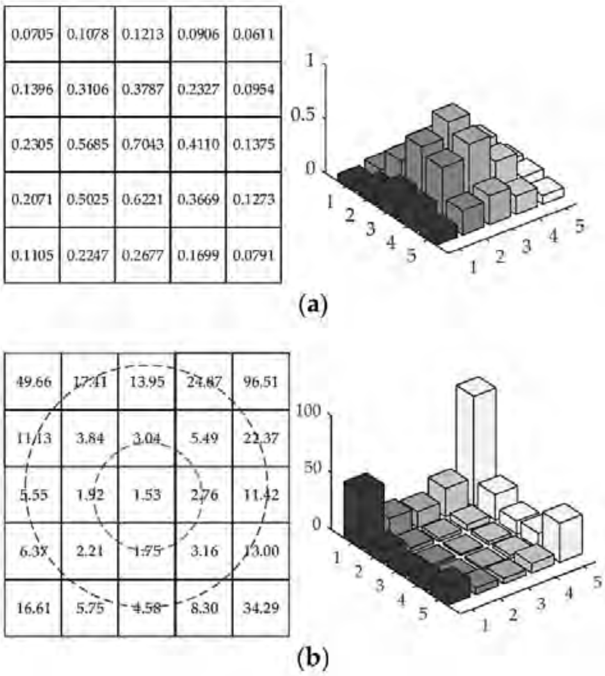

Fig.5. Mathematical model of discrete differential arithmetic

and operation, the comprehensive evaluation model is obtained.

$$B=A\bullet R=(b_1,b_2,\cdots,b_m)\in F(V). \quad (20)$$

3.2. Mixed Gaussian Model

The mixed Gaussian model is mainly to convert the high-order equation into multiple Gaussian equations, and then use the Gaussian equation to calculate the equation results to achieve the purpose of simplifying the calculation. The mathematical model is shown in Fig. 5. The solution process is generally divided into two parts: first, by establishing a function that is related to the approximation, it produces an approximation, its derivative, and the use or application of the algorithm will eventually release the associated value. The most straightforward method of the Gaussian equation is to construct a functional differential equation using the derivative of the finite difference approximation instead of the differential equation. After the discretization is completed, an appropriate calculation method can be constructed to solve the functional differential equation. This is a challenging problem, and it may indeed have a significant impact on the discretization of the derivative. In the numerical solution process for solving differential equations, a numerical solution is needed to judge the accuracy. Also, it needs to be tested and evaluated by better calculation methods and other new parallel algorithms. The detailed implementation steps are as follows in the Fig. 5:

The derivative of a function f is generally obtained by quadratic polynomial:

$$p_2(x) = a_0 + a_1 x^1 + a_2 x^2. \tag{21}$$

The difference f is at points x_0, x_1 and x_2, i.e., using a local coordinate system, let $x_i = 0, x_{i+1} = h$ and $x_{i+2} = 2h$, then,

$$f(x_i) = a_0 + a_1 x_i + a_2 x_i^2 = a_0. \tag{22}$$

$$f(x_{i+1}) = a_0 + a_1 x_{i+1} + a_2 x_{i+1}^2 = a_0 + a_1 h + a_2 h^2. \tag{23}$$

$$f(x_{i+2}) = a_0 + a_1 x_{i+2} + a_2 x_{i+2}^2 = = a_0 + a_1(2h) + a_2(2h)^2. \tag{24}$$

This three equations with three unknowns can be turned into:

$$a_0 = f(x_i) = f(0). \tag{25}$$

$$a_1 = \frac{-f(x_{i+2}) + 4f(x_{i+1}) - 3f(x_i)}{2h} = + \frac{-f(2h) + 4f(h) - 3f(0)}{2h}. \tag{26}$$

$$a_2 = \frac{f(x_{i+2}) - 2f(x_{i+1}) + f(x_i)}{2h^2} = = \frac{f(2h) - 2f(h) + f(0)}{2h^2}. \tag{27}$$

Solve $a_i, i = 1,2,3$ and derive the formula (1):

$$f'(x) = a_1 + 2a_2 x,. \tag{28}$$

Then calculate the expression in $x_i = 0$,

$$f'(x) = \frac{-f(x_{i+2}) + 4f(x_{i+1}) - 3f(x_i)}{2h}. \tag{29}$$

Regarding the point x, f is sufficiently smooth, then the Taylor series expansion of f can be expressed as:

$$f(x+h) = f(x) + h\frac{d}{dx}f(x) + + \frac{h^2}{2!}\frac{d^2}{dx^2}f(x) + \frac{h^3}{3!}\frac{d^3}{dx^3} + \ldots \ . \tag{30}$$

Move the function $f(x)$ on the right side of (28) to the left and then divide by h to get the standard deviation quotient:

$$\frac{f(x+h) - f(x)}{h} = \frac{df(x)}{dx} + + \left\{ \frac{h}{2!}\frac{d^2 f(x)}{dx^2} + \frac{h^2}{3!}\frac{d^3 f(x)}{dx^3} + \ldots \right\}. \tag{31}$$

Let $h \to 0$, the item in the braces disappear, defined by the derivative:

$$f'(x) \approx \frac{f(x+h) - f(x)}{h}. \tag{32}$$

At this point, the difference quotient $\left(f(x+h) - f(x)\right)/h$ is used instead of $f'(x)$:

$$\left| f'(x) - \frac{f(x+h) - f(x)}{h} \right| = = \left| \frac{h}{2!}\frac{d^2 f(x)}{dx^2} + \frac{h^2}{3!}\frac{d^3 f(x)}{dx^3} + \ldots \right|. \tag{33}$$

Extract a linear operator from equation (31):

$$T(f) = \left(\frac{h}{2!}\frac{d^2}{dx^2} + \frac{h^2}{3!}\frac{d^3}{dx^3} + \ldots \right) f(x). \tag{34}$$

The error between the corresponding differential operator $\mathrm{D}f = df / dx$ and the approximate linear operator $D_h f = \left(f(x+h) - f(x)\right)/h$ is constructed

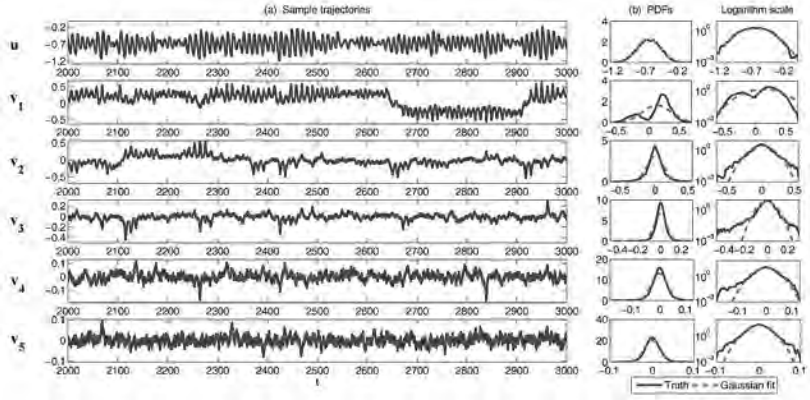

Fig.6. Truncation error of linear differential operators

according to different representatives. The truncation error can be found according to the formula (32), and the truncation error obtained at this time represents the error in the linear operator L.

Let L_h be a discrete approximation h on the neighbourhood with the largest value defined by the linear differential operator L; If there are constant $C>0, p>0$ and w, then:

$$T(\varphi)=\left|(L-L_h)\varphi\right|\leq Ch^p, \forall\varphi\in C^m,\ \forall h<h_0. \quad (35)$$

Then L_h has a truncation error of $O\left(h^p\right)$.

Find the limit values for any smooth f and sufficiently small h in equation (35):

$$\lim_{h\to 0}T(f)=h\left|\frac{f''}{2}\right|. \quad (36)$$

Because of this, the truncation error $T(f)$, when the variable h infinitely approaches zero, $O(h)$ can be defined by the method given by (36), as shown in Fig. 6.

When $h^3 f^{(4)}/6+...$ is much smaller than $hf''/2$. At this point, the f' calculation is approximated. If the second derivative of the function f is far less than the other derivatives in the effective range, when,

$$0<\left|f''(x)\right|\ll\left|f^{(n)}(x)\right|, n>2. \quad (37)$$

Solving the Taylor series of the function f at point x:

$$f(x+h)=f(x)+hf'(x)+\frac{h^2}{2!}f''(x)+ +\frac{h^3}{3!}f'''(x)+\frac{h^4}{4!}f^{(4)}(x)+... . \quad (38)$$

At this point, re-provide a forward difference approximation for f', that is:

$$f'(x)=\frac{f(x+h)-f(x)}{h}-\frac{h^2}{2!}f''(x)- -\frac{h^3}{3!}f'''(x)-\frac{h^4}{4!}f^{(4)}(x)+... . \quad (39)$$

A forward difference approximation formula for $f'(x)$ is obtained from the truncation error of the command h, that is:

$$f'(x)=\frac{f(x+h)-f(x)}{h}+O(h). \quad (40)$$

Similarly, the Taylor series of f can be expanded around the point x in the -h direction, that is:

$$f(x-h)=f(x)-hf'(x)+ +\frac{h^2}{2!}f''(x)-\frac{h^3}{3!}f'''(x)+... . \quad (41)$$

The backward differential approximation of f' at point x:

Fig.7. Physical exercise chart of photovoltaic employees

$$f'(x)=\frac{f(x)-f(x-h)}{h}+O(h). \quad (42)$$

Subtracting the formula (40) from the formula (42):

$$f(x+h)-f(x-h)= \\ =0+2hf'(x)+0+2\frac{h^3}{3!}f'''(x)+\ldots . \quad (43)$$

Solving the centre difference approximation of $f'(x)$:

$$f'(x)=\frac{f(x+h)-f(x-h)}{2h}+O(h^2). \quad (44)$$

After the approximate solution is completed, the average of the forward and backward differential approximations can be found, which the final result is.

$$f'(x)=\frac{1}{2}\left(\frac{f(x+h)-f(x)}{h}+ \\ +\frac{f(x)-f(x-h)}{h}\right)+O(h^2). \quad (45)$$

4. RESULT ANALYSIS AND DISCUSSION

At present, the health conditions of the employees in the photovoltaic industry are not satisfactory, which seriously restricts the further development of the industry. In order to further explore the specific reasons for the lack of physical exercise for photovoltaic companies, the questionnaire survey method was used to explore 450 front-line employees working in photovoltaic companies. Finally, 288 copies were recovered, of which 268 were valid questionnaires. Among the 268 valid questionnaires, there were 114 questionnaires for female employees and 154 questionnaires for male employees.

According to the contents reflected in the questionnaire, it is not difficult to know that there are two major factors that cause the lack of exercise for photovoltaic companies:

– The competitive pressure in the industry market has led to the employees of photovoltaic companies having a greater sense of exhaustion both physically and psychologically after work. Physically exhausted employees lack the motivation to exercise;

– Employees of photovoltaic companies lack a clear and clear understanding of physical exercise, and also lack the necessary technical guidance for physical exercise. This also makes the photovoltaic company's employees less motivated to exercise.

In this survey, less than 5 % of photovoltaic company employees said they were completely uninterested in physical exercise and did not want to waste time on exercise. It is not difficult to know that, in fact, most of the photovoltaic company employees are still willing to exercise. It was only because of the lack of certain conditions that they eventually failed to do so.

Based on the above reasons, China's photovoltaic enterprises will be used as a research example, and the mixed Gaussian model will be used to conduct in-depth research and analysis on the behaviour and effects of photovoltaic employees' physical exercise. The research results show that photovoltaic companies can take effective measures to promote employees' active physical training from the following aspects. The specific measures are as follows:

– Photovoltaic enterprises should regularly carry out corresponding training courses in physical exercise, actively help their employees to establish a sound physical education knowledge system and improve their interest in physical exercise, Fig. 7;

– Photovoltaic enterprises should also increase investment in sports funds, improve the internal sports facilities, and provide an excellent physical exercise environment for employees to meet the fitness needs of employees.

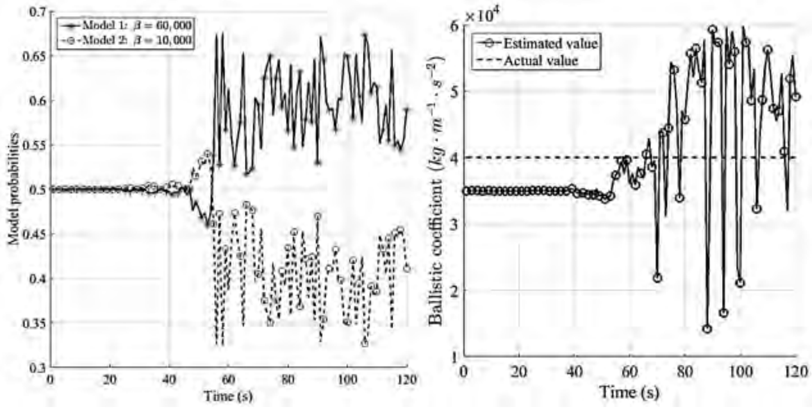

Fig.8. Square root summation method of multilevel fuzzy comprehensive evaluation model

After the corresponding development measures are drawn, the multi-level fuzzy comprehensive evaluation model is used to evaluate its rationality. The multi-level fuzzy comprehensive evaluation model is an evaluation method based on cognitive science and fuzzy mathematics. The specific form is as follows:

$$\begin{pmatrix} a_{1,1} & a_{1,2} & \cdots & a_{1,n} \\ a_{2,1} & a_{2,2} & \cdots & a_{2,n} \\ \cdot & \cdot & \cdot & \cdot \\ a_{n,1} & a_{n,1} & & a_{n,n} \end{pmatrix}. \quad (46)$$

In the formula, $a_{i,j}$ represents the relative weight of the indicator a_i relative to the indicator a_j.

In view of the fact that the weight of the multi-level fuzzy comprehensive evaluation model has a great influence on the overall accuracy of the results obtained by the scoring calculation, it is necessary to analyze the weight of the multi-level fuzzy comprehensive evaluation model, which can be understood as the analysis of the largest eigen value in the judgment matrix. The most widely used calculation method is the square root method, as shown in Fig. 8. The calculation steps are as follows:

Calculate the product of each row element of the judgment matrix R,

$$M_i = \prod_{j=1}^{n} B_{ij}, i = 1,2,\ldots,n. \quad (47)$$

Calculate the M_i root of n,

$$\overline{w_i} = (M_i)^{\frac{1}{n}}, i = 1,2,\ldots,n. \quad (48)$$

Normalize $\overline{w_i}$, i.e.

$$w_i = \frac{\overline{w_i}}{\sum_{i=1}^{n} \overline{w_i}}, i = 1,2,\ldots,n. \quad (49)$$

Then the weight vector is,

$$w = [w_1, w_2, \ldots, w_4]^T. \quad (50)$$

Let the target criterion layer weight vector obtained according to the above method be:

$$W = (w_1, w_2, w_3, \ldots, w_k). \quad (51)$$

w_i is the relative weight of the criterion layer indicator i in the criteria layer.

For the k-th criterion level indicators, the weights of the measures level indicators under each criterion are:

$$W_k = (w_{k1}, w_{k2}, w_{k3}, \ldots, w_{kp}). \quad (52)$$

In the hierarchical structure, the comprehensive weight calculation operator of the measure j indicator under criterion i is:

$$w_{i,j} = w_i \cdot w_j. \quad (53)$$

Finally, sort by each indicator, and the results are calculated. After obtaining the weights of the respective indicators, the evaluation score can be finally calculated by multiplying the evaluation values. The calculation operator is:

$$Ea = (w_{p,1}, w_{p,2}, \ldots, w_{p,n})(v_{p,1}, v_{p,2}, \ldots v_{p,n})^T. \quad (54)$$

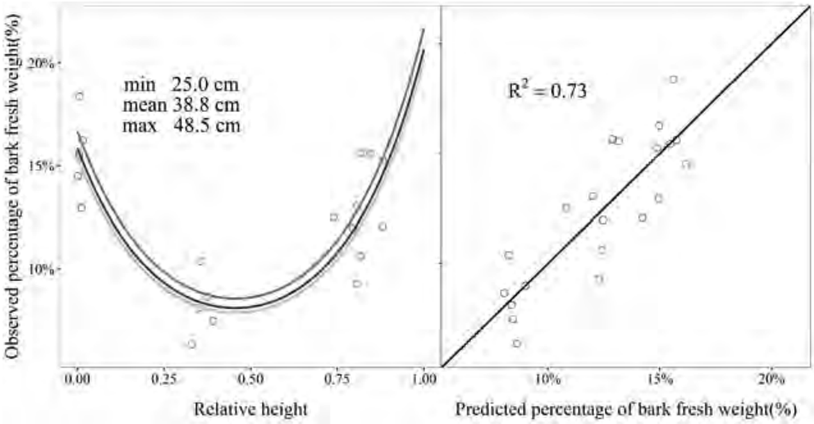

Fig.9. The program evaluation results of ocean folk sports function and development dynamic mechanism

$w_{p,i}$ is the combined weight of the lowest level indicator i, and $w_{p,i}$ is its evaluation score.

According to the content represented by the formula (54), the collected related data is substituted and the evaluation result is obtained, as shown in Fig 9. It is not difficult to see from the results that the above measures have positive effects on the physical exercise behaviour of photovoltaic company employees.

5. CONCLUSION

At present, the health conditions of the employees in the photovoltaic industry are not satisfactory, which seriously restricts the further development of the industry. The main reason is that industry scholars have many shortcomings in the research on the physical exercise behaviour and effect of photovoltaic enterprise employees, which leads to their guidance and exercise opinion cannot fully meet the actual exercise demand. Based on the above reasons, the hybrid Gaussian model is used to study the behaviour and effect of photovoltaic employees' physical exercise, and two main factors are obtained:

– Employees work under competitive pressure and lack the motivation to exercise;

– Employees lack the necessary technical guidance for physical exercise, and in view of the above reasons, the following solutions are proposed: the first is that company regularly conducts training courses on physical exercise to improve employees' interest in physical exercise and the second is that enterprises should also increase investment in sports funding and improve the corporate fitness environment.

At the end of the paper, the multi-level fuzzy comprehensive evaluation model is used to evaluate the rationality of the measures, and the conclusions are drawn that the proposed measures can positively promote the physical exercise behaviour of photovoltaic employees.

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Jinghua LI,
graduated from the school of physical education of Shaanxi normal university in 2004. He currently works at the institute of physical education of Xianyang normal university in Shaanxi province. Master’s degree, associate professor. Research Orientation: School Physical Education