Received: 16 March 2020 | Revised: 3 May 2020 | Accepted: 9 May 2020

DOI: 10.1111/coin.12352

SPECIAL ISSUE ARTICLE

Computational Intelligence WILEY

Application of computer information technology in college physical education using fuzzy evaluation theory

Shan-an Yu

Department of Physical Education, Shanghai University of Electric Power, Shanghai, China

Correspondence
Shan-an Yu, Department of Physical Education, Shanghai University of Electric Power, Shanghai, 200090, China.
Email: whereyu@126.com

Abstract

The educational sector faces a new dimension that is dominated by lifelong learning and is affected by the technical, social, and cultural changes. This pattern represents the need to improve the teaching methods for physical education and sports science. The use of computers and other information technology to increase the effectiveness of the teaching process is a modern method. This paper aims to illustrate the use of information and communication technologies (ICT) in physical education and sports. In our field, the gradual computerization results can be summed up in the following aspects: education software, design, and planning activities, recording outcomes, motion monitoring, video analysis, comparison of performance and synchronizing, measurements at distance and time and the evaluation of the activity. Although physical education and sports are practical activities, specialists can make use of modern teaching technologies. In this paper, the system of curriculum assessment for physical education has been analyzed and researched in computer assessment. The first section introduced the method of assessment of the physical education program. The second phase of the paper represents a teaching model of the physical education mathematical model utilizing the Comprehensive Adaptive Fuzzy Evaluation Theory has been proposed. A new level is the modernization of physics education with the artificial intelligence computer education system built in this paper. The experimental results have high performance in detecting the physical activity of college students.

KEYWORDS

computer information technology, fuzzy evaluation theory, ICT, physical education

1 | SIGNIFICANCE AND IMPORTANCE OF PHYSICAL EDUCATION

For good health and well-being, people are encouraged to engage in at least moderate intensity (MI) every day in physical activity (PA).[1] The current development of college physical education has to address the important issue of college physical education as a vital part of quality education, and how IT can be used in college sports to bring opportunities to be developed and speed up sports computerization.[2] With the growing use of computer networks and digital technologies in physical education, a large information network structure is created by various types of networks.[3] The relation between a robust college and campus administration system can more easily and reliably provide and produce a large amount of data, allowing office automation to be applied in practice and can make life much easier for individuals.[4] Computer-assisted management is constantly developing.[5] The funding of computer network technology will strengthen and advance different types of management, which is the only emerging trend in the management of the college's physical education.[6] Computer-based training will open up a new learning path to enhance their creative spirit and enhance their practical skill.[7] Classified statistics and data will allow teachers and administrators at PE college to monitor and upgrade their teaching content faster and enhance their teaching and management levels.[8] Most data must be evaluated when planning and making strategic decisions.[9] Such data can be processed faster and more accurately using the computer and the network.[10] In modern management, information technology is becoming more and more important when it comes to the storage and automated retrieval of sports information.[11] The modern computer-aided system of teaching and intelligent management should be used by colleges and universities to their full potential.[12] The physical education of college groups is directed toward being scientific, standard, and automated by research and development of software for sports management. Smart computer management in college education is unavoidable.[13] Figure 1 shows the benefits of PA.

In the field of physical education, the introduction of computer-assisted instruction (CAI) is a significant way of transition from the conventional paradigm to research and information and it is one of the key issues in physical education that needs reformation.[14] Artificial intelligence (AI) technology plays a crucial role in intelligent computer-assisted training and the combination of AI and CAI will improve the educational framework in a way that allows students to differentiate the teaching content of the module, the teaching subject, and the teaching method effectively.[15] The approach and content of physical education, which is focused on information input from the students' cognitive model, can be clearly distinguished in this way to accomplish the composition and reasoning of the AI system and ultimately to

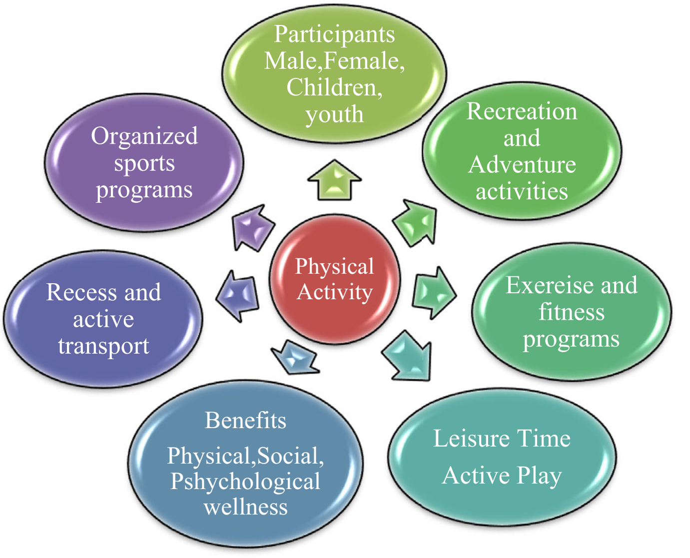

FIGURE 1 The benefits of physical activity [Color figure can be viewed at wileyonlinelibrary.com]

generate the physical teaching content and teaching approaches that lead to the individual distinctions.[16]

Fuzzy set theory and fuzzy logic[17] provide a highly appropriate and practical framework for designing PA knowledge-based systems for tasks such as sports selection, assessing various training methods, team-building, and the real-time monitoring of sports data. The theories of fuzzy have been used in this paper and fuzzy analysis is used in the ranking of football teams.[18] Based on certain rules, the proposed four parameters are used for determining the fuzzy similar matrix, obtaining a fuzzy equivalent matrix and the results of the rankings for our numerical example, and analyzing four sensitivity parameters.[19] The study shows that when a parameter changes in a certain range, our fuzzy logic approach is accurate and stable.[20] Devices such as accelerometers, in particular, the Actigraph Accelerometer, which has identified to be the most validated activity surveillance, are considered the "gold standard" for calculating free-living PA.[21] In the current study, this accelerometer has been used for measuring motion numbers during the test.[22] As such, comparisons between classical methods and fuzzy logic are somewhat difficult to attempt, which generally make a vicious cut[23] between intensity whereas fuzzy logic supports in addressing the consistency and graduation of intensity.[24] The simple categorization of various PA levels has conventional approaches, including pattern recognition and multimedia networks.[25]

The main contribution of the paper is,

- To propose the physical education mathematical model using a comprehensive adaptive fuzzy evaluation theory (CAFET) based on computer information technology.
- Designing the ranking algorithm based on fuzzy clustering analysis gives the scoring and ranking process for college students PA.
- The experimental results have been conducted based on the proposed algorithm with effective solutions and give the high-performance ratio.

The remainder of the paper decorated as follows: Sections 1 and 2 discuss the background and importance and existing methods of physical education. In Section 3 the teaching model of physical education mathematical model using a CAFET has been proposed. In

Section 4 the experimental results have been demonstrated. Finally, Section 5 concludes the research article.

2 LITERATURE SURVEY

Francesco Sgro et al[26] proposed the neuro-fuzzy approach (NFA) for the module of PA intelligent tutoring system (ITS) to describe an experimental ITS student module used to achieve an objective evaluation of the education in PA. The inputs used for activity measurement are the energy measured for the physical activities function, and the real energy expenditure is based on the same activity while the learning rating is based on an assessment with a specific sixth level. The student will test his potential for education as in other sciences, including physics or mathematics, without teacher intervention as well. An objective, non-invasive approach is used to measure PA and its accuracy may be considered more than appropriate.

Diego Castro et al[27] introduced the human activity recognition using the Internet of Things (HAR-IoT). They used machine learning algorithms to assess the behavior of four groups (longing, sitting, walking, and jogging). In the meantime, it can provide input through a remote monitoring feature with remote viewing and programmable alarms during and after activities. With a positive 95.83% success ratio, this system was implemented. The system is designed for each patient to follow a daily routine, exercise, and physical therapy during the recovery process. Although an IoT approach requires a security analysis, our approach to IoT does not rely on the wireless sensor network network, data information is not sensitive to external listeners, and the aim of the paper is, as previously indicated, to validate the proposed HAR-IoT system approach.

Jun Qi et al[28] suggested the sensor-based PA recognition and monitoring (PARM) using the IoT. The advancement of IoT technology transformed PARM studies through the interaction of heterogeneous wearable apps and wearable devices in unregulated, open, and linked environments. They used conventional PARM technology can address the new challenges of IoT environments and how these technologies can be successfully used and enhanced. The paper will provide a structural analysis of PARM studies from a traditional IoT-level perspective to clarify the use of IoT technology. It will firstly review the state-of-the-art approaches used in medical services, such as visual, extraction, and identification procedures, in conventional PARM methodologies. In the paper, new research patterns and challenges within PARM study in IoT environments are identified and some relevant techniques for their approach are addressed. Finally, this paper looks at some of the successful cases in the field and the possible future industrial applications of PARM in the field of intelligent health care.

Martyn Standage et al[29] initialized the self-determination theory (SDT) for the student's motivational operation and their relationship to teacher ratings in school physical education (PE). Through structural equation modeling analyses latent factors, the hypothesized relationships among the study parameters were examined. Excellent fit for the data have been shown by the findings of the highest probability study by the bootstrapping process. In particular, the model has shown that students who experience an autonomous supportive environment have higher autonomy, competence and communication, and a greater self-determination index. Levels of autonomous motivation reported by the students have positively predicted PE effort and persistence levels for teachers. The results are explored in PE settings in terms of improving student motivation.

Amin et al[30] introduced the group activity recognition and situation analysis as a service (GARSAaaS). In cases where sensor data are aggregated via a protocol for the information share of the various devices, which is collected using smartphone sensors, smartwatch sensors, and embedded sensors in stuff as specified by GARSA. They highlighted their approach by offering services in a bushwalking group activity for bushwalking members and bushwalkers. The feasibility of our model and the expressivity of our proposed model are demonstrated. The continuous GAR system uses mobile device embedded sensors to define the GA or situation as client services. For demonstration and evaluation, our sensor data generator modeled and implemented a range of situations within the framework of the bushwalking group activities.

To overcome these issues, in this paper, the mathematical model of PE in college the CAFET has been proposed. The use of fuzzy logic and, in particular, linguistic variables can help capture the inaccuracy of intensities. The scale of real value to the concept of linguistic vagueness of PA intensities has been depicted. Fuzzy numbers are an appropriate measure of difficulty and can provide a better translation of Zone of Possible Misclassification into PA.

3 | COMPREHENSIVE ADAPTIVE FUZZY EVALUATION THEORY

In this paper, the CAFET has been proposed based on computer information technology for college physical education and sport science. In this analysis, the MI of the PA among college students should be better described by applying fuzzy logic to a better analytical method. The new education reform, student-centered teaching idea, becomes important to the idea of teachers during the teaching process. Each student must value the student-centered concept. The teaching method will incorporate real-time contact between teachers and students. It is only in this way that teachers can consider the assessment of PE education. This paper developed the computer evaluation system for evaluating the curriculum in physical education according to this idea. Figure 2 shows the browser server and client-server architecture of the PE and assessment system.

The main function of the program is the teacher curriculum assessment, online analysis, correction of the maintenance reports, the student review and the evaluation. The program will run by the administrator during the assessment process. The new education reform requires the student to be treated as the center in the teaching process. Teachers and students must keep the teaching process interactive in real-time. The standard C/S application mode is the classic computer teaching evaluation system, which is a closed mode for assessment of teaching and cannot achieve real-time instructor and student interaction. This paper developed a computer assessment system teaching assessment system controlled by browser server and client-server in keeping with the aims of the new education reform. The system allows the students to see and compare the assessment results and the teacher's teaching performance. Teachers can see students "input in real-time and achieve teachers" and students' real-time engagement. Figure 2 is the evaluation system for computer physical education, utilizing the browser server and client-server common framework type. This method not only allows for the real interaction between teachers and students and decreases client-server closed-loop data redundancy and increases the performance of computer WEB maintenance. It is a better and more trustworthy machine assessment framework. Figure 3 represents a schematic diagram of the PE computer evaluation process. The figure shows that the students who submit the teaching assessment produced a series of results. Such tests can be analyzed utilizing the CAFET, complex analysis employing the computer evaluation system and the final evaluation results measured.

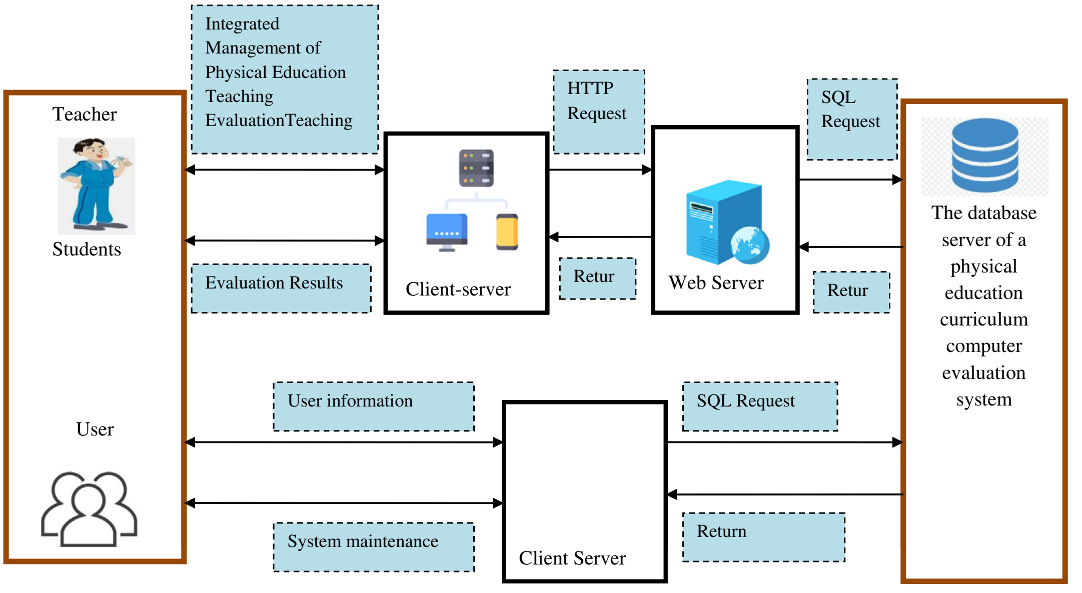

FIGURE 2 Browser server and client-server framework of PE curriculum evaluation [Color figure can be viewed at wileyonlinelibrary.com]

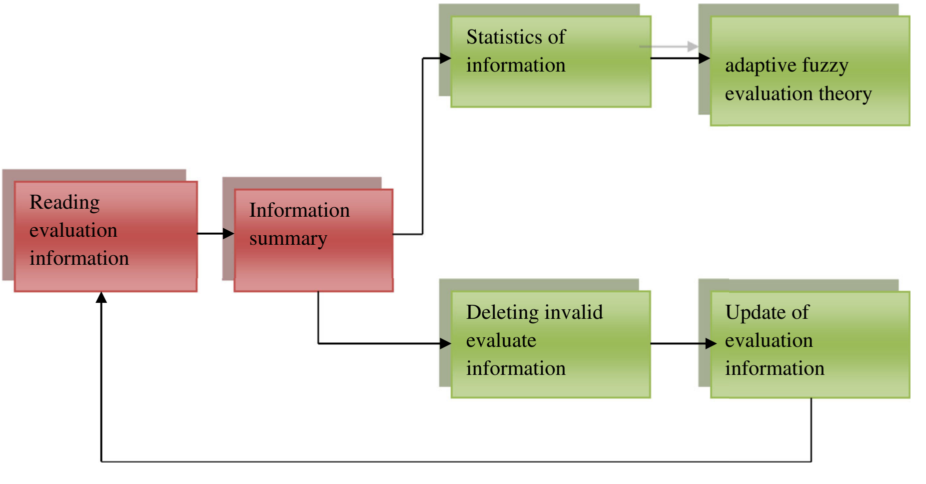

FIGURE 3 The diagram of the physical education curriculum computer assessment process [Color figure can be viewed at wileyonlinelibrary.com]

3.1 | Preposition 1: Fuzzy set and fuzzy number

To ensure the relevant fuzzy logic application to collected data and certain important points involves the definition of fuzzy numbers, fuzzy set, the linguistic variable, and modifications, and it is necessary to take full account. Unlike inferential statistics, the calculation of power is not a prerequirement for using fuzzy logic, even if current data are executed in the primary examination.

To create the fuzzy set and fuzzy number let us consider a reference set D, a fuzzy subset B from D is stated by a membership function μ_B in $\mathbb{R}$ such that $\mu_B \in [0, 1]$. It can be written for a given fuzzy subset:

$$\mu_B(y) = \begin{cases} 0 \; if\, y \notin [b - \beta, a + \alpha] \\ 1 \; if\, y \in [b, a] \\ 1 + \frac{y-b}{\beta} \; if\, y \in [b - \beta, b], \\ 1 + \frac{a-y}{\alpha} \; if\, y \in [a, a + \alpha] \end{cases} \tag{1}$$

with core (B) such that $\mu_B(y) = 1$ if $y \in [b, a]$.

and

$$\text{support}(B) : \mu_B(y) \neq 0 \; if\, y \in [b - \beta, a + \alpha].$$

As shown in Equation (1) where $b \to \beta$ is the lowest extreme value of fuzzy number and $a + \alpha$ the highest one.

Essentially, in their respective set variables only take a value. In comparison, linguistic variables provide the modeling of imprecise valuables such as “this person is tall” or “the water is hot.” These distinctly more natural-minded definitions are difficult to assess using the conventional metric. In the context of fuzzy logic, they can be computed are ready. Any given linguistic variable is represented as triplets (U, Y, R_u).

U is the name of the variable (height, weight, etc), Y is the universe of the values taken by U ($\mathbb{R}$, $\mathbb{N}$, …) and $R_u = \{B_1, B_2, ..\}$ set of fuzzy subsets Y_u utilized to define U ($R_{stature} = \{Small, Tall, intermediate\}$).

The linguistic modifier is an operator n that transforms the fuzzy subset B to the subset $n(B)$ with the membership function of $\mu_n(B) = r_n(\mu_b)$ and “ R “ is a transformation of computational processing. An interest in using a linguistic modifier is that it can easily create fuzzy sets that are adjacent gradually. Then, if successful in creating a “stature” linguistic variable, represented by the fuzzy subset “medium,” the following gradual change will allow the creation of the fuzzy set “small” and “high”:

$$\mu_{\text{small}(y)} = 1 - \mu_{\text{medium }(y)} \; with\, y < \text{core(medium)},$$

and

$$\mu_{\text{high }(y)} = 1 - \mu_{\text{medium }(y)} \text{ with } y < \text{core (medium)}. \tag{2}$$

The “movement count” linguistic variable has established (U, Y, R_u) to the extent that, where U is the movement count, $Y \in \mathbb{R}_+$ and $R_u = \{L\text{ight intensity, moderate intensity, vigorous} - \text{intensity}\}$.

Let us consider fuzzy subset MI can be expressed by,

$$\mu_{\text{moderate intensity}}(y) = 1 \; if\, y \in [\overline{Y} - \rho, \overline{Y} + \rho],$$

andsupport (MI)

$$\mu_{\text{moderate intensity}}(y) \neq 1 \; if\, y \in [\overline{Y} - 2\rho, \overline{Y} + 2\rho]. \tag{3}$$

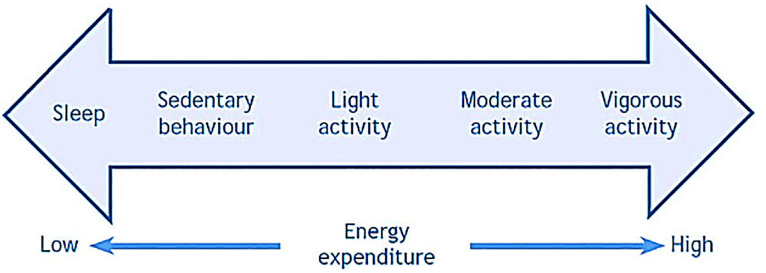

FIGURE 4 Physical activity scale [Color figure can be viewed at wileyonlinelibrary.com]

The resulting membership function can be written,

$$\mu_{\text{moderate intensity}}(y) = \begin{cases} 0 \; if\, y \notin [\overline{Y} - 2\rho, \overline{Y} + 2\rho] \\ 1 \; if\, y \in [\overline{Y} - \rho, \overline{Y} + \rho] \\ 1 + \frac{y-(\overline{Y}-\rho)}{\rho} \; if\, y \in [\overline{Y} - 2\rho, \overline{Y} + 2\rho] \\ 1 + \frac{(\overline{Y}-\rho)-y}{\rho} \; if\, y \in [\overline{Y} + \rho, \overline{Y} + 2\rho] \end{cases} . \quad (4)$$

To form the vigorous and light intensities, complementary modifiers has been employed as following the Equation (5),

$$\mu_{\text{light intensity }(y)} = 1 - \mu_{\text{moderate intensity}(y)} \text{ with } y \in [0, \overline{Y} - \rho],$$

and

$$\mu_{\text{vigorous intensity }(y)} = 1 - \mu_{\text{moderate intensity}(y)} \text{ with } y \in [\overline{Y} + \rho, +\infty]. \quad (5)$$

The application of these modifiers has resulted in two light and "vigorous" intensity memory functions, respectively:

$$\mu_{\text{light intensity }(y)} = \begin{cases} 0 \; if\, y \notin [0, \overline{Y} - \rho] \\ 1 \; if\, y \in [0, \overline{Y} - 2\rho] \\ 1 + \frac{(\overline{Y}-\rho)-y}{\rho} \; if\, y \in [\overline{Y} - 2\rho, \overline{Y} - \rho] \end{cases} , \quad (6)$$

$$\mu_{\text{vigorous intensity }(y)} = \begin{cases} 0 \; if\, y \notin [\overline{Y} + \rho, +\infty] \\ 1 \; if\, y \in [\overline{Y} + 2\rho, +\infty] \\ 1 + \frac{y-(\overline{Y}-\rho)}{\rho} \; if\, y \in [\overline{Y} + \rho, \overline{Y} + 2\rho] \end{cases} . \quad (7)$$

Figure 4 shows the PA scale defined by light, moderate, and vigorous intensities. MI-make breathing more difficult, feel warmer and beat the heart faster still have a conversation. Vigorous-intensity activity makes it much harder to breathe, feel warmer and beat the heart much faster so that a conversation is much harder for everyone. It depends on the fitness level as well as the form and length of the PA of the person.

3.2 | Preposition 2: Fuzzy binary operation

Let us consider $B = (b_{ji})_{n \times m}$ is a fuzzy matrix such that $0 \le b_{ji} \le 1$ for j = 1,2, … n, i = 1,2, … m then $B_\lambda = (b^\lambda_{ji})_{n\times m}$ the λ-cutting matrix of the fuzzy matrix B expressed as,

$$b_{ji}^{(\lambda)} = \begin{cases} 0, if\, b_{ji} < \lambda \\ 1, if\, b_{ji} \geq \lambda \end{cases} . \tag{8}$$

As shown in Equation (8) where λ is the confidence level with $\lambda \in [0, 1]$.

Let $B = (b_{ji})_{n\times m}$ and $A = (a_{ji})_{m\times q}$ be $n \times m$ and $m \times q$ fuzzy matrix correspondingly. Then $B \circ A$ is $n \times q$ fuzzy matrix and is known as composition matrix of the $n \times m$ fuzzy matrix B and the $m \times q$ fuzzy matrix A, where $\circ$ is called the composition operation of fuzzy matrixes, written as $C = B \circ A = (c_{ji})_{n\times q}$ and c_{ji} is estimated as following Equation (9),

$$c_{ji} = \bigvee_{l=1}^{m} (b_{jl} \wedge a_{li}), j = 1, 2, \dots n, \quad i = 1, 2, \dots q. \tag{9}$$

As shown in the Equation (9) where $B = A = (b_{ji})_{m\times m}$ particularly, then denoting $B^2 = B \circ B$. Generally, $B^m = B^{m-1} \circ B$ if m is a nonnegative integer.

The min-max transitive closure T^* for a fuzzy matrix $T = (t_{ji})_{m\times m}$ can be estimated as follows,

$$T^* = T \cup T^2 \dots \cup T^m \tag{10}$$

For a given fuzzy similarity matrix $T = (t_{ji})_{m\times m}$ there exists the smallest nonnegative integer l ($l \leq m$), such that $T^* = T^l$ and for each nonnegative integer k ($k > l$), fuzzy equivalence matrix and finite times of compositions can be expressed as follows,

$$T \to T^2 \to T^4 \to \dots \to T^{2^l} \to \dots \tag{11}$$

As shown in Equation (11) where l must exist a positive integer such that $T^* = T^{2^l} = T^{2^{l+1}}$ is a fuzzy equivalence matrix.

3.3 | Preposition 3: Fuzzy-level evaluation

The students' cognitive skills $t(e_j)$ can be computed from the correct vector table exercises e_j ($j = 1,2,3 \dots\ m$).

$$T(e_j) = \frac{M_{e_j}(1)}{M_{e_j}(1) + M_{e_j}(-1)} \quad j = 1, 2, 3 \dots . \tag{12}$$

As shown in Equation (12) where $M_{e_j}(1)$ and $M_{e_j}(-1)$ correspondingly are the number of the correct utilizing wrong utilizing subcognitive skills in the activities, respective to the depicted formula, correct usage rate vector can be obtained as,

$$T = (t_1, t_2, t_3, \dots t_m)(t_j = t(e_j) \in [0, 1]). \tag{13}$$

The correct usage rate vector can be obtained from the evaluation process,

$$T = \left(\frac{\frac{2}{3}, \frac{1}{2{,}1}}{2}, 1, 1, 1 \right). \tag{14}$$

Now, domain V is the right usage rate range, namely $V[0,1]$. Student quality assessment (excellent, good medium, and poor) is the fuzzy V subsets. A has been designed to convey the "excellent" fuzzy subset, $V_B(v)$ is the membership function of B:

$$V_B(v) = \begin{cases} 0 \\ \left[1 + \frac{v}{0.12}\right]^{-1.} \end{cases} \tag{15}$$

The membership grade of the subcognitive skills can be determined and, accordingly, a correct vector generated by appropriate usage rate vector and the arithmetic explanation of the basic component function:

$$B = (b_1, b_2, b_3, \dots b_m). \tag{16}$$

As shown in the Equation (16) where b_j denotes the membership degree of J subcognitive skills are excellent. The hypothesis that the activity is Q sets and that several evaluation vectors are available. Therefore, obtain a q times m dimension evaluation matrix regarding "excellent."

$$H = \begin{bmatrix} b_{11} & b_{12} & \cdots & b_{1m} \\ b_{21} & b_{22} & \cdots & b_{2m} \\ \vdots & \vdots & \ddots & \vdots \\ b_{q1} & b_{q2} & \cdots & b_{qm} \end{bmatrix}. \tag{17}$$

As shown in Equation (17) where the rows of matrix H in the formula correspond to the assessment vector for a set of questions.

As every Q activities play various roles (as certain unit tests, some practices are usual), various sets of exercises match various weights. Setting a vector of weight:

$$S = (S_1, S_2, \dots S_Q), \quad \sum_{j=1}^{q} S_j = 1. \tag{18}$$

The weighted average algorithm allows for a comprehensive evaluation of vector "a" which represents students' learning ability.

$$a = SH = (a_1, a_2, \dots a_m). \tag{19}$$

The test score, $a_1, a_2, \dots a_m$ the learning environment, age, learning efficiency, physiological conditions, education, mood, and other variables are regarded as the input node of the multimedia network, the output value of network X in which is a nonlinear mapping of a multidimensional space to three-dimensional space.

$$F_{aq} Y - X.$$

$$Y = \{score, a_1, a_2, \dots a_m\ b_1, b_2, ..a_7\}.$$

$$X = \{X_1, X_2, X_3\}. \tag{20}$$

As shown in the above equations where X_1, X_2, X_3 correspondingly denote the mastery degree of students on the skills, concept, and application.

The architecture of the evaluation model utilizes the fuzzy evaluation theory of the mathematical model to increase the efficiency of the intelligent tutoring program, it would be useful to add the concept to computer information technology.

Algorithm 1. Modified Fuzzy Clustering Algorithm for PE

Input: j, i, l, k
Output: X, Y
For$(i = 1)$
$c_{ji} = \bigvee_{l=1}^{m} (b_{jl} \wedge a_{li})$
For $(j = 1)$
$T^{*} = T \cup T^{2} \ldots \cup T^{m}$
For $(l = 1)$
$T(e_j) = \frac{M_{e_j}(1)}{M_{e_j}(1)+M_{e_j}(-1)}$
For $(k = 1)$
$T = (t_1, t_2, t_3, \ldots t_m)(t_j = t(e_j) \in [0, 1])$
If $(l > k)$
$S = (S_1, S_2, \ldots S_Q), \quad \sum_{j=1}^{q} S_j = 1$
Else $(k > l)$
$Y = \{\text{score}, a_1, a_2, \ldots a_m\ b_1, b_2, .. a_7\}$
End if
End for
End for
End for
End for
Return

As shown in Algorithm 1 the modified fuzzy clustering algorithm has been proposed for the physical education evaluation purpose. The fuzzy clustering algorithm has been utilized for the ranking problem in college students' PA. When changes to the data from large datasets and the progressive algorithm of clustering only update the results to the changes in the partial data and make full use of the previous clustering results to improve efficiency. The theory of the ranking is that the faster the team's cluster gets closer to the ranking. Due to the random initial cluster centers that lead to clustering results, in front of outlier and imbalances of sample distribution, the clustering results are of excessive dependence on the initial clustering center, the clustering fall to the optimal local state.

4 | RESULTS AND DISCUSSION

There are complex and bidirectional links between PA and fitness. Many studies have revealed a significant connection between physical fitness and PA which can improve fitness or allow individuals who are physically fit to engage in PA to exceed or both their pairs. Experimental studies have demonstrated that exercise improves health. Figure 5 shows the physical education relationships between health and academic performance.

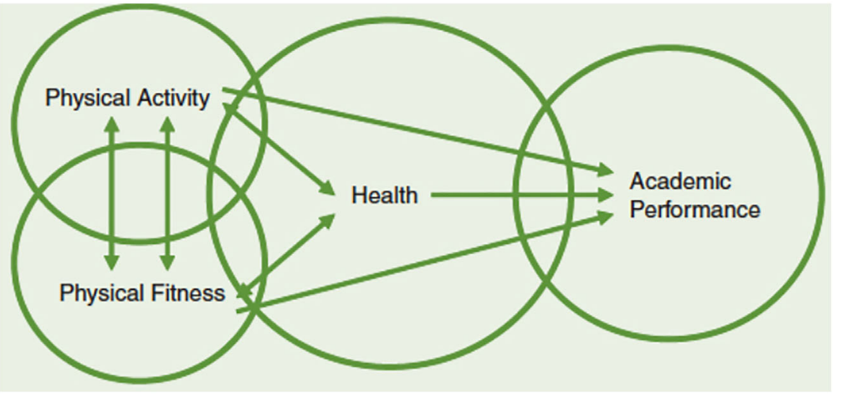

FIGURE 5 The relationships among physical education [Color figure can be viewed at wileyonlinelibrary.com]

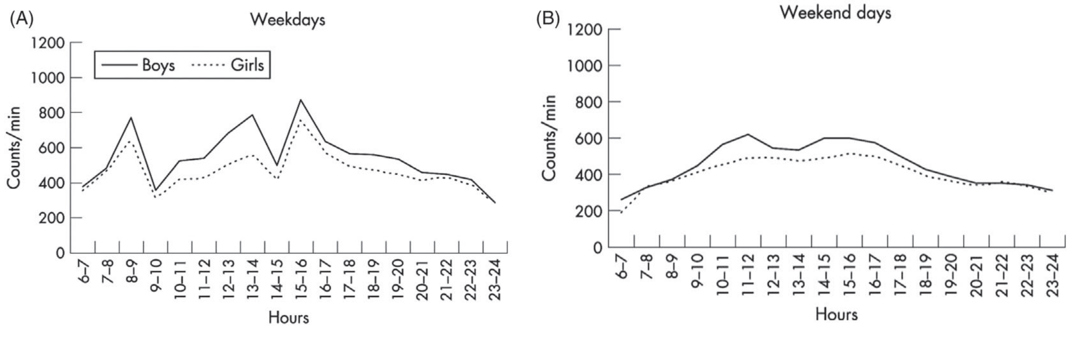

FIGURE 6 Physical activity counts per minutes (A) weekdays physical activity and (b) weekend physical activity

4.1 | PA level in counts per minutes

The linguistic term "movement count" reflects PA, and the fuzzy sets light-moderate and vigorous. It is visible how some counts of movement between two fuzzy groups have been distributed. There are significant differences in the patterns of activities in both boys and girls between weekdays and weekends. The weeks have more high and troughs, presumably the college day, as students sit in classrooms interspersed by free time and leisure. Boys and girls have very similar patterns of activity. Figure 6A,B demonstrates the weekdays and weekend days of PA of boys and girls.

4.2 | Overall performance analysis

The conventional computer information technology has strong visual performance with the proposed fuzzy evaluation theory. The support for autonomy received in physics education, directly and indirectly, influenced leisure PA via a motivational series involving internal conceptual settings of causality, behaviors, behavior regulation and intentions. The psychological processes through which students transfer motivation while training into leisure activities during

FIGURE 7 Overall performance analysis [Color figure can be viewed at wileyonlinelibrary.com]

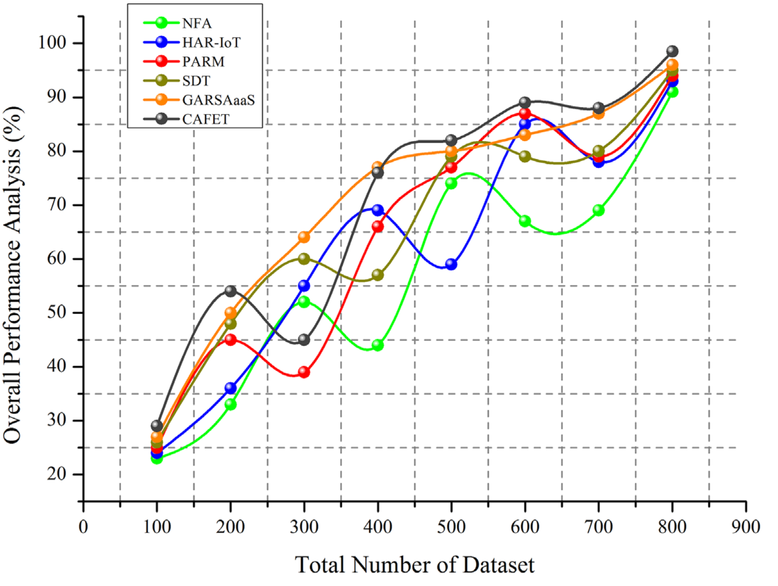

TABLE 1 Overall performance analysis

Total number of dataset	NFA	HAR-IoT	PARM	SDT	GARSAaaS	CAFET
100	24.7	25.3	26.7	27.4	28.9	29.4
200	34.5	45.2	56.6	57.3	59.4	60.1
300	44.6	47.1	49.5	59.3	63.4	65.6
400	55.8	58.4	59.6	62.2	66.6	74.5
500	67.6	70.3	74.8	76.1	83.7	88.9
600	76.5	79.2	80.2	74.4	84.6	89.3
700	79.5	83.2	84.3	87.5	90.5	91.2
800	91.4	92.1	94.4	95.7	96.4	98.5

Abbreviations: CAFET, comprehensive adaptive fuzzy evaluation theory; GARSAaaS, group activity recognition and situation analysis as a service; HAR-IoT, human activity recognition using the Internet of Things; NFA, neuro-fuzzy approach; PARM, physical activity recognition and monitoring; SDT, self-determination theory.

physical education. Figure 7 demonstrates the overall performance analysis of the proposed CAFET system.

Table 1 shows the overall performance analysis of the college student regarding physical education activity and sport science. Each student has an individual responsibility and interest in the PA sessions. The question and answer feedback show the proposed system has a high-performance ratio when compared to other existing systems.

4.3 | Evaluation score

In this evaluation model, the outcomes of the tests and other practical data shall be reported as a vector table after the off-line evaluation. The variables of the vector table must first be set to 0

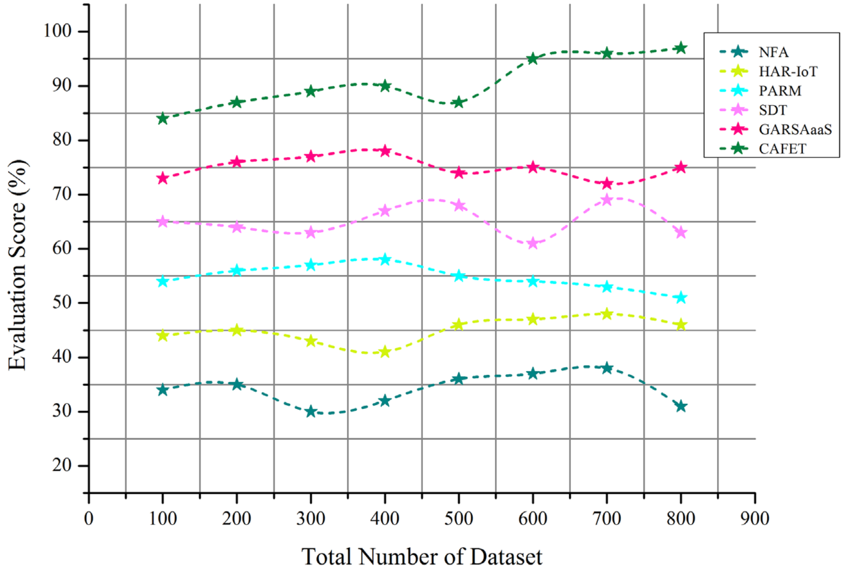

FIGURE 8 Evaluation score [Color figure can be viewed at wileyonlinelibrary.com]

TABLE 2 Evaluation score analysis

Total number of dataset	NFA	HAR-IoT	PARM	SDT	GARSAaaS	CAFET
100	34.2	44.9	54.1	65.6	73.4	84.5
200	35.1	45.2	56.3	64.5	76.7	87.8
300	30.8	43.5	57.2	63.4	77.8	89.3
400	32.3	41.5	58.8	67.8	78.9	90.3
500	36.9	46.6	55.9	68.9	74.5	87.4
600	37.3	47.4	54.7	61.2	75.6	95.6
700	38.5	48.2	53.3	69.8	72.3	96.7
800	31.9	46.3	51.1	63.4	75.4	97.8

Abbreviations: CAFET, comprehensive adaptive fuzzy evaluation theory; GARSAaaS, group activity recognition and situation analysis as a service; HAR-IoT, human activity recognition using the Internet of Things; NFA, neuro-fuzzy approach; PARM, physical activity recognition and monitoring; SDT, self-determination theory.

in the input of information. To analyze the answers and the steps for problem resolving of the students and compare the standard response, the respective value of the respective vector table is indicated according to the matching rate of the two cases: problems difficulty, correlation and the type of topic.[31,32] To promote a match rating that is higher than 90%, the corresponding factor is 1; otherwise, the student can get a record vector table when completing a set of questions if a vector record for training is collected. Suppose a vector record for training is collected. Figure 8 shows the evaluation score of different physical education methods.

Table 2 shows the evaluation score analysis of the proposed CAFET system. The proposed system has a high evaluation score of the college students when compared to other existing NFA, HAR-IoT, PARM, SDT, and GARSAaaS methods.

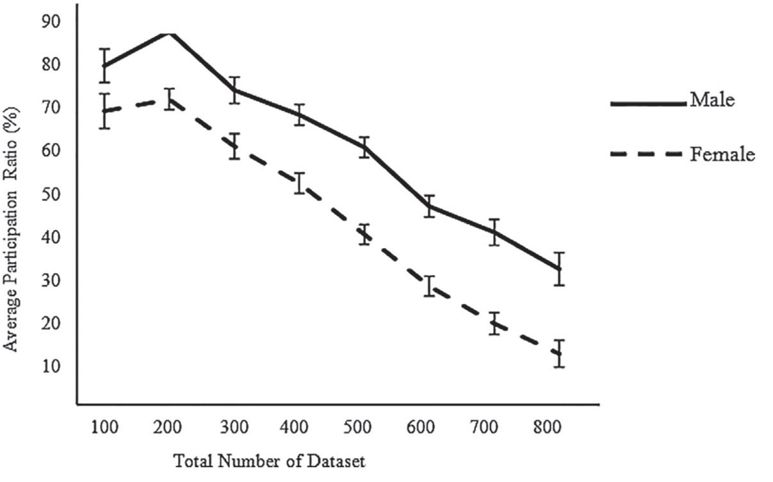

FIGURE 9 Average participation ratio

4.4 | Average participation ratio

All attributes of PA, body mass (body mass index) and weight has been distorted, and log transformations, therefore, have been made. Such transformed variables have been statistically checked.[33] Differences among groups with independent testing samples have been evaluated. In the proportion of college students achieving the recommended levels of activity, a two-sample proportional test has been utilized to test group difficulties (participants vs nonparticipants, boys vs girls). The total time (minutes) recorded has been separated by the total number of days reported which indicates an average minute/day over the measurement time. Figure 9 shows the average participation ratio of the proposed CAFET method.

4.5 | Energy expenditure vs step rate

The levels of activity in overweight and obese students are lower, though the exact nature of the association between students tends to be different. The accelerometer tracks movement and does not measure energy expenditure. Consequently, variations in activities as reported in the accelerometer may not reflect true energy consumption variances, as heavier students have more weight to move. It may be that obesity is a more significant outcome factor in conjunction with other metabolism measures. Furthermore, accelerometers worn on the waist misclassify time spent in a sedentary condition of motion which is not considered a sedentary activity that could contribute to estimates of the true amount. Figure 10 shows the energy expenditure vs speed of the proposed CAFET method.

5 | CONCLUSION

This paper presents a CAFET based on computer information technology for college physical education and sport science. Evaluation of sports courses can be done by computer through the advancement of computer information technology and the enhancement of the system for PE.

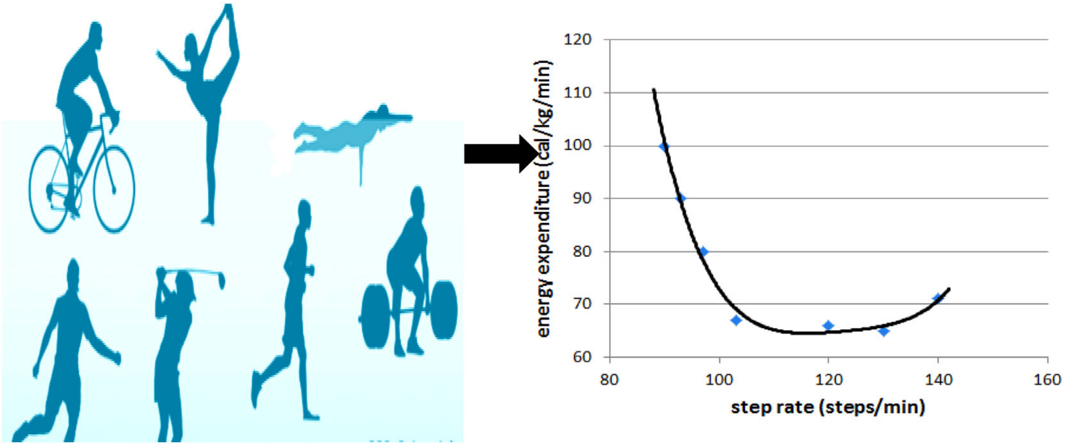

FIGURE 10 Energy expenditure vs step rate [Color figure can be viewed at wileyonlinelibrary.com]

The teaching approaches have undergone a lot of changes in light of the new education reform. Exemplary instruction belongs to PE. In the context of physical education, teachers and students must share information in real-time that can enhance their success and efficacy in teaching. The PE curriculum evaluation computer system mode and developed a PE curriculum assessment mathematical model depends on a CAFET. Eventually, the paper introduces the PE curriculum assessment framework programming language via the Java software and the expert weight coefficient for the evaluation of the curriculum PE. It creates a physical education assessment computer evaluation system that gives a theoretical framework for the Physical Education curriculum testing method.

ORCID

Shan-an Yu https://orcid.org/0000-0002-7274-7766

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How to cite this article: Yu S. Application of computer information technology in college physical education using fuzzy evaluation theory. *Computational Intelligence*. 2020;1–18. https://doi.org/10.1111/coin.12352