

## Research Article

### Study on College Physical Education Management Information System Based on Support Vector Regression

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**Abstract:** In order to effectively alleviate the great pressure of sports function development and social service needs, changing the structure of a single, working form the old educational pattern, this study is based on the current situation of college sports management, introduced the support vector construction of information of college sports management system, learning theory and the information model of college sports management value through the analysis of fuzzy evaluation method, satisfactory results have been obtained. College sports management model based on support vector regression conforms to the trend of information management, to promote the standardization of sports teaching management, to promote the college physical education teaching and research has practical significance.

**Keywords:** College sports management, information, support vector regression

#### INTRODUCTION

The concept of education information, it refers to a new form of education comprehensively using modern information technology to promote education reform and development (Chen and Shi, 2010). Its core is the development to Internet as the core of the integrated information service system and promotion of information technology (Information Technology. Referred to as IT) is widely used in every field of the society, especially as an important means of implementing the twenty-first Century education reform of IT application in education (Johnson *et al.*, 2001). It will drive the education management information storage, access, update, the transformation of the mode of transmission, to further reduce the school human resources and financial management burden (Luo and Wang, 2003). The Ministry of education official said, the implementation of the Ministry of education will take a series of measures to promote the education management information standard, including the introduction of the education management information standard as soon as possible the implementation measures). The management of PE teaching refers to the teaching rules and characteristics, process planning, organization, control, supervision of the sports teaching work (Riesman Van Eck, 1999). To continuously improve the quality of teaching for the purpose, the implementation of the whole process management. The use of modern information technology in the universities sports teaching management, a comprehensive update of teaching

management, the establishment of modern education management pattern is already imperative.

Information of university sports management comprehensively summarize the way and effect of the teaching management, content, accurately reflect the various historical periods of the physical education teaching management and teaching quality, can provide strong evidence and reference for the teaching management work (Romero, 2004; Zhou and Zhang, 2004). It not only reflects the history of the development of the whole department itself, but also for teaching and scientific research progress, management work to develop in depth and the model of talent cultivation is very important.

In the era of knowledge economy, to the full development of college sports management information resources to produce a better social and economic benefits, not only need to do a good job of sports information resources development work, need to do more sports teaching management information construction. Sports management information is the modern computer technology, information technology, communication technology and make full use of the sports teaching archives information resources, conservation, management and arrangement provided by such activities, teaching management standardization, digitization, system and network. The objective of the study is effectively alleviate the great pressure of sports function development and social service needs, changing the structure of a single, working mode the old educational pattern, to promote the standardization of sports teaching management, to

promote the college physical education teaching and research has practical significance.

## LITERATURE REVIEW

**The status of college sports management information:** Information of university sports management is a reflection of a platform to carry out the work of the college sports, which is an important part of higher education management, so it has important significance (Sheen, 2005; Wang, 2003). However, from the actual situation, the management information compared to the personnel, technology and discipline of sports management, serious shortage of attention, universities even lack of sports management information system, some part-time job is in charge of sports management, the information of university sports management is not essential for a job. That information college sports management level is low, low value, need not pay enough attention to. The insufficient is directly caused the current level of information of college sports management long is not high.

At present, a management information system of college sports management has not yet formed, structure unreasonable phenomenon also exists in the information of university sports management record content (Yeh and Li, 2003). From the investigation of the college physical education management information content, most major to record every large games mainly, a serious lack of other content on sports quality of sports teaching, students, sports and other aspects of the change, the information of university sports management content node single structure directly affect the rationality of the whole structure of physical work.

**The development of college sports management information:** The computer is a carrier of information work, computer information system of college sports management is inseparable from the modern. Information path establishment should pay attention to the following points: first, using computer talent pool formation of sports management. According to the actual situation of their own, create suitable for recording system of the school sports work and the work methods. Second, establish of sports information management of university computer retrieval system. Third, establish the computer statistics system of classification, the physical data for statistical analysis and investigation and to provide the related statistical data, to exercise statistical supervision and quantitative management. Fourth, computer sports management information in storage. The daily tedious written to the computer store near the convenient degree, improving storage and utilization, but also improve the work efficiency and the level.

The evaluation system of information of college sports management should focus on sports management information collection evaluation in Colleges and universities. Information collection is a foundation work and information college sports management

should be carried out based on original collection, collection after the completion of the work, work is the focus of the next step, need to use scientific methods and with the help of various modern computer system for the collection of physical data classification, so the need for the quantitative assessment of the stage. Information management is the basis of the next work. This stage of the evaluation should have a feedback regulation of link, link information is the link between past and future, college sports management is ultimately for physical education services, so the evaluation should be combined with sports practice, combined with the collation of data, were evaluated to establish the interaction of contact system.

In view of the current status of single information college sports management content structure, need to establish beneficial to enrich and perfect the sports management system, rich in promoting sports content, collecting all kinds of physical data for physical work effectively for reference. Sports management content should be involved in sports teaching and training, sports teaching, sports competition, sports social practice, sports clubs, sports scientific research, students physical fitness, sports networks, diversity in form, content arrangement, these contents are classified according to scientific collection, a collection system from daily work, to avoid the final finishing, do daily routine collection, classification, daily management, which helps to improve the college sports management information collection and utilization efficiency, but also conducive to further enrich the content of sports management.

## METHODOLOGY

**Support vector regression principle:** From the beginning of the 1960's and constantly promote the new SLT theory matured and the neural network learning method has not obtained the theoretical breakthrough key, to ninety time metaphase, SLT began a high-profile. Cortes and Vapnik (1995), SLT in the VC dimension theory and structural risk minimization principle was first proposed by Support Vector on the Machine, has replaced the neural network become a hot new, strong expansion of the machine learning theory and technology. Different from the same neural network learning mechanism, SVM is based on a SLT basis, pattern recognition method with mathematical methods and optimization techniques for the advantageous tool, which is widely used in the field of pattern recognition. The unique advantages in solving small sample, nonlinear and high dimensional pattern recognition problems and can be widely applied learning problems in function fitting and some other machine.

Two classification problems can be divided in the linear, requires minimal confidence range so that the expected risk minimum promotion of community and empirical risk minimum 0. The optimal separating hyper plane (Optimal Separating Hyper plane) to meet these two points, because it can be of two types of

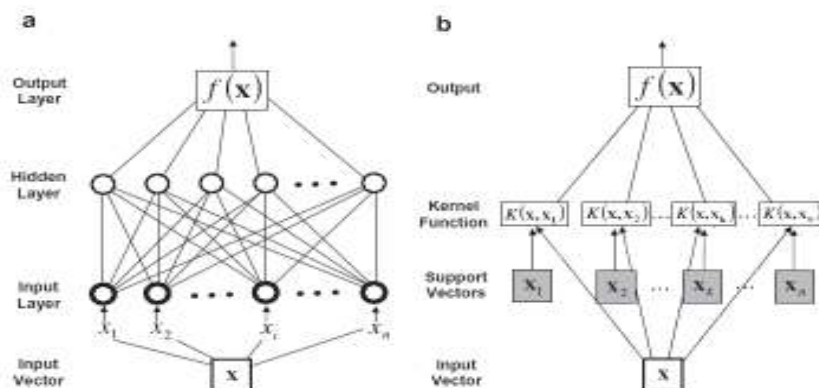


Fig. 1: A schematic diagram of the models used in this study: ANN (a) and SVM (b)

Table 1: Technical grade title of the sports instructor

Statistical terms	National level	One level	Two level	Three level
The number of the annual training	8	2	2	4
The annual examination and approval number	12	16	19	21
The end of the year the total cumulative	20	18	21	25

Table 2: Obtain occupation qualification of University Sports Instructors

Statistical terms	Mentor	Junior	Senior	Middle
The number of the annual training	42	22	54	40
The end of the year the total cumulative	37	19	40	32

Table 3: College sports venues investment

New investment	Sports and fitness engineering	Outdoor fitness facilities						
		Fitness path	Fitness center	Sports park	Fitness plaza	Outdoor camp	Stadium	Fitness trail
The number of sites (a)	1	1	2	1	2	1	1	5
Pieces of equipment (pieces)	15	30	120	6	18	6	20	
site area (m <sup>2</sup> )	200	185	800	1000	1865	1320	1200	2000
Subtotal (million)	286.00	319.20	501.11	32.55	95.31	20.09	451.23	6.52
The central (million)	150	200	355	16.55	55.30	11	400	6.52
Provincial (million)	136	119.2	145.11	16.00	40.01	9.09	51.23	

samples without separate errors, which meets the expected risk minimum and make the two kinds of sample classification maximum distance, which satisfies the empirical risk minimum 0. SVM is built on the basis of optimal classification hyper plane, as shown in Fig. 1.

**Data sources and processing:** Taking Jiang Su University of Science and Technology sports institute sports in 2011 data as the data source, application SVR establish of sports management information system of the regression vector. Selected technical grade title of the sports instructor, obtain occupation qualification of university sports instructors and college sports venues investment as the object. Research data are shown in the Table 1, 2 and 3.

Assume the existence of linearly separable datasets:

$(y_1, x_1), \dots, (y_l, x_l), x \in R^n, y \in \{-1, 1\}$ ,  $Y$  general form for linear decision function:

$$f(x, w) = \text{sign}(w \bullet x + b)$$

Convert to Lagrange function:

$$L(w, b, a) = \frac{1}{2} \langle w \bullet w \rangle - \sum_{i=1}^l a_i [y_i (w \bullet x_i + b) - 1]$$

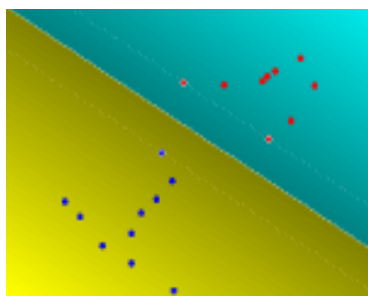
$$|y - f(x)| \xi = \max \{0, |y - f(x)| - \xi\}$$

$$\max W(a_i, a_i^*) = -\frac{1}{2} \sum_{i=1}^n \sum_{j=1}^n (a_i - a_i^*) (a_j - a_j^*) < \varphi(x_i),$$

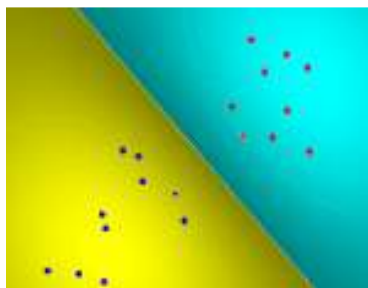
$$\varphi(x_j) > -\xi \sum_{i=1}^n (a_i + a_i^*) + \sum_{i=1}^n y_i (a_i - a_i^*)$$

$$f(x) = \sum_{i=1}^n (a_i - a_i^*) k(x_i, x) + b$$

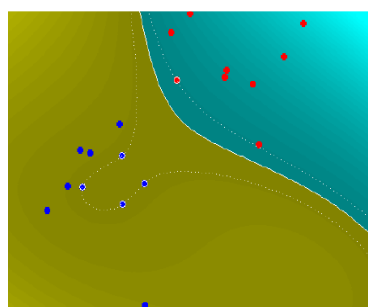
Application of Matlab program function input operation of computer program, until the scatter of three groups of data distribution, as shown in Fig. 2. This set of fixed parameter instance parameters that we set. Examples of parameters for the optimization iteration process maintain discrete variables constant. In order to make optimization more robust, adaptable, needs to be optimized under various working



(a)



(b)



(c)

Fig. 2: The distribution of samples

conditions are considered as parameters, multiple instances of optimization., as shown in Fig. 2a.

Adjusting parameter refers to changes in the design variables in the optimization model. Selection of design variables and instance parameters need to instantiate the parameters in the model, instance variables cannot be set at the same time parameters and design, as shown in Fig. 2b.

Example goals refer to the objective function value of the constraint. In general, variable characteristics need to define the value type mainly has: the starting value, the final value, minimum value, maximum value, integral value, average value, maximum overshoot, square integral, oscillation time and rise time, as shown in Fig. 2c.

According to the sample scatter probability regression data tables in the sample set, the output support vector regression model, as shown in Fig. 3.

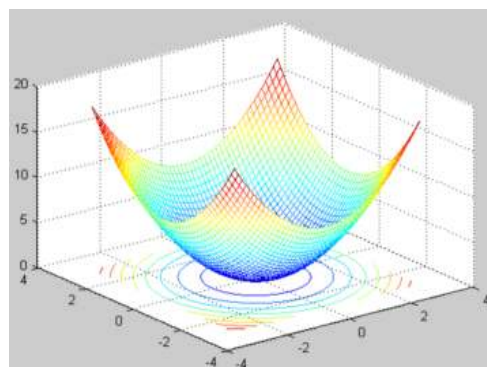


Fig. 3: Output support vector regression model

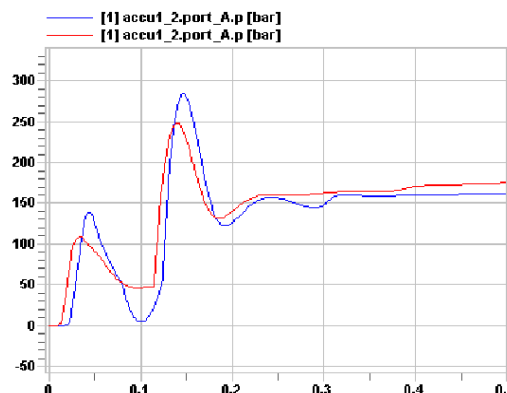


Fig. 4: Results of college sports management information data

**Test and analysis of information system:** According to the fitting function  $|y - f(x)|\xi = \max \{0, |y - f(x)| - \xi\}$  the output data, information and data fitting and the calculation error, by means of analysis and calculation, the support vector regression model output error is 5%, can meet the requirements of management information system fitting. As shown in Fig. 4, the effect of fitting information management.

## RESULTS AND DISCUSSION

**Fuzzy function score:** The theory of fuzzy membership is introduced into the evaluation, trying to solve the problems of the evaluation of subjectivity and uncertainty. Press the construction of membership function:

$$u(x) = \begin{cases} 1 & x = a \\ 1 - f(x) & a < x < b \\ 0 & x = b \end{cases}$$

Type of: a, b In order to evaluate the sample on the adjacent level two standard level;  $f(x)$ : Trapezoidal membership for the standard.

**Analysis of the results of management information system evaluation:** Indicated through the fuzzy

function evaluation, support vector regression model was applied to the sports information management in Colleges and universities can be effective management and control of information and make classification management, actual effect. Support vector regression based on global optimization algorithm is stable and efficient, has a good prospect in engineering applications. But the shortage is that when the equation the variable number is too big or too many sampling points, construction model will often get into trouble.

### CONCLUSION

Development and application of modern information technology, is the inevitable result of social development and education reform itself, but also to cultivate modern citizens in modern society, to master modern information technology. One of the important of the modernization of educational technology is the modernization of teaching administration. As part of the teaching management, teaching management in Colleges and universities sports will be scientific, standardization, modernization. The implementation of university sports teaching information management imperative.

At present, China's education management departments at all levels and all the school hardware facilities in the continuous improvement, education management departments will be gradually introduced industry codes and standards, the construction of teaching management information will gradually move towards the specification. In the process of development, standardization and standardization is undoubtedly the most important factor of success in the construction of teaching management information. Colleges and universities should attach great importance to the modernization of equipment investment, the sports investment and other disciplines into equal treatment. The construction of key should do

a good job of campus network and multimedia teaching system. Create favorable conditions for the modernization of University physical.

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