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Some aspects concerning the mathematical relations corresponding to the extrapolation methods at swimmers of 14-16 years old

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Keywords: approximation methods, sportswomen, sport activity
Summary: The paper aims at making us understand what kind of relation exists between certain aspects concerning the extrapolation of the data obtained by the sportswomen and which of this data must be analyzed and included in the model, when a certain issue is studied.

Introduction

The planning method in the current stage of the sport practice has an important place in the training of high-performance sportsmen. It is a known fact that practice planning is made on short, medium, long and very long periods of time.

The duration of planning depends on several factors: the structure of the contest activity and the sportsmen's training, the laws which are at the basis of obtaining sport performances, the adaptive, functional, motor and ***psychomotor processes and last but not least the recovery process.***

Obtaining sport performances depends on the level of training, age, sex, and the biological maturation periods.

Therefore the planning of the training process is very important for teenagers, considering the pre-puberty period, the disproportions of the development of various body systems, which cause great modifications in the adjustment to great physical efforts, the body's low reaction and other factors that influence the young body of the sportswomen.

At teen age, the planning of the sport practice must rely on the multilateral physical development and the creation of an extensive motor potential therefore it is necessary to provide the accumulation of some motor and psychomotor sport skills.

Being of great importance in view of the sportswomen's training, planning the sport practice at teen age, requires a correct distribution of the physical exercise for the education of the motor and psycho-motor skills.

Matherial – method:

On the basis of the datasets obtained during the training period (September, December and January) on a number of 12 girls with the age between 14 and 16 years that prepare for swimming the approximation functions were evaluated through the programs created on the basis of the mathematical relations corresponding to the extrapolation methods.

In the case of the Lagrange and Newton algorithms, which are practically identical from the point of view of the obtained result, the approximation function will be:

$$f(x)=\sum_{i=0}^{n} C_i x^i \qquad [1.1],$$

The stages covered for establishing this function are the following:

- The introduction of the number of interpolated points $n+1$, the maximum degree of the resulted interpolation polynominal being n;

-The introduction of the values X_j Y_j $i=0,\ldots\ldots n$, corresponding to the abscissa, respectively the ordinates of the interpolation points, representing, according to the facts previously mentioned, precisely measured values of the size applied at the entrance of the sensor or the transducer and respectively of the size provided by it on exit;

-the determination of the C_i coefficients of the polynominal for Lagrange and respectively Newton's algorithms;

-the determination of the polynominal's expression ***[1.1].***

For the implementation of the approximation methods in square average, following the attempts and the experimentations of the various possible versions satisfactory results were obtained for orthonormated polynominals type Cebisev, Laguerre, Legendre, Hermite. We must notice that for the approximation by Cebisev and Laguerre polynominals in these methods we need to normalize the abscissa's variation interval, in the sense of bringing it into the interval [-1,1], operation which, obviously, must be made afterwards for a new point in the interval in which we desire to calculate the approximation function, while for the approximation by Legendre and Hermite polynominals the normalization operation is no longer necessary. Another aspect that must be mentioned refers to the fact that in this case the approximation function obtained will be:

$$f(x)=\sum_{i=0}^{m} C_i p_i \qquad [1.2],$$

i=0

in which p_i represents the polynominals of the orthonormated basis determined with the help of the recurrence relations and of the initial values , and C_i the corresponding coefficients, determined by the condition of minimization of the approximation error. In the case in which we want to obtain the approximation function in the form ***[1.1], for the purpose of comparing the results obtained through each of the specified methods, we must determine through manual calculation the coefficients of the orthonormated polynominals written in the form [1.1] for the respective basis, we must introduce these polynominals into the calculation program in this from and finally deduct from the relation [1.2] a relation of [1.1] type. The programs were created in both versions.***

The work stages for the created approximation programs in square average are:

- ***introduction of the number of* n+1 *points in which we know the values of the function to be approximated;***
- ***introduction of the desired degree* m*, corresponding to the polynominal that is going to approximate the function;***
- ***introduction of the values*** X_j Y_j $i=0,\ldots\ldots n$ corresponding to the abscissa respectively the ordinates of the interpolation points;
- the determination of the polynominals from the orthonormated basis, corresponding to the method, on the basis of the recurrence relations and initial values. This stage is valid only in the case when these polynominals are not explicitly introduced as we have pointed out above;
- the determination of the C_i coefficients by solving a system.
- the determination of the approximation function.

The main distinction between the polynominals obtained through approximation in square average to those obtained through Lagrange or Newton method, consists in the fact that the first ones go through the interpolation nodes only incidental, while the others must pass through the interpolation nodes.

Results:

The results of the scientific research concerning the elaboration of the mathematical model in laboratory conditions have allowed us to move to the next stage of the experiment where this mathematical

algorithm was applied in real practice conditions of the experimental group.

On the basis of the analysis of the practice plan for swimmers aged 14-16 years and following the introduction of the mathematical model, some aspects concerning the training of these sportswomen during a training macro cycle (8 months) were elucidated.

The restructuring of the plan took place on the basis of the results obtained during the implementation of the mathematical model in view of establishing the psychological, psychomotor, motor and somato-functional potential of the swimmers included in the study.

In this sense we present the training plan, created by the trainer in (Table no. 1)

Table no. 1

Annual Training Plan 2005-2006

Planual anual de pregătire 2005-2006

CALENDAR	LUNILE	sept.				octombr.				noiembr.			deembr.			ianuarie			febr.		
	SĂPTĂMÂNA																				
	NR. SĂPT.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
COMPETIŢII	AMICAL													X	X						
	OFICIALE											X	X								
PERIODIZAR	PERIOADE					I															II
	ETAPE																				
FORMA ŞI F	CLUB	x	x	x	x	x	x	x	x	x	x	x				x	x	x	x	x	x
	CANTONAMENT																				
MIJLOACE	NR. ANTR.	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
	NR. ORE USCAT	4	4	4	2	2	2									6	6	4	4	4	4
	NR. ORE APĂ	8	8	8	10	10	10	12	12	12	12	12	12	12	12	6	6	8	8	8	8
	VOLUM	12	12	14	16	16	16	18	18	20	18	16	12	12	12	10	10	12	12	14	14
CONTROL MEDICAL		x					x					x				x					
LECŢII TEORETICE		x	x								x	x				x	x				

CALENDAR	LUNILE	martie						aprilie				mai			iunie					iulie			
	SĂPTĂMÂNA																						
	NR. SĂPT.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	
COMPETIŢII	AMICAL		X													X							
	OFICIALE							X													X		
PERIODIZAR	PERIOADE															III							
	ETAPE																						T
FORMA ŞI F	CLUB	x	x	x	x	x			x	x	x	x	x	x	x	x	x	x	x				
	CANTONAMENT																						
MIJLOACE	NR. ANTR.	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	246
	NR. ORE USCAT	2	2	2					6	6	4	4	4	4	4	4	2	2	2				94
	NR. ORE APĂ	10	10	10	12	12	12	12	6	6	8	8	8	8	8	8	10	10	10	12	12	12	152
	VOLUM	16	16	16	16	14	12	12	10	10	12	12	14	14	14	16	18	20	14	12	12	12	572
CONTROL MEDICAL		x				x			x					x					x				
LECŢII TEORETICE					x	x			x	x								x	x				

The pedagogical experiment consisted in the test of some parameters included in the study, in the initial and intermediary stage, and on the basis of this data we established the level of psychological, psychomotor, motor and somato-functional development of these sportswomen 14-16 year old and the mathematical anticipation model was created.

$$y_x = \sum_{i=1}^{m} (a_i \cdot e^{-b_i \cdot x}) \qquad [1.3],$$

In the subsequent period of the experiment we had in view the evolution of these sportswomen by inclusion of some methods and means specific for every swimmer during the middle cycle (6 weeks).

Discussions:

Following this process the final test of the sportswomen was made to observe the various modifications of the parameters included in the study.

Bibliography:

1. Ilioi C., Analiză numerică. Tehnici de aproximare, "Al. I. Cuza"University Iasi;
2. Iorga V., Programare numerică, Editura Teora, 1996;
3. Lăzărescu D., Szogz A., Tasrady, Evaluarea capacităţii de efort fizic în sporturile cu caracter ciclic, prin modelare matematică, CCEFS, Bucureşti, 1976;
4. Raţă, E., Prognozarea pregătirii psihomotrice a sportivelor de 14-16 ani specializate în proba de 50m craul prin aplicarea modelării matematice, teză de doctorat Chişinău, 2007;
5. Rîşneac B., Milici D. , Raţă E., Utilizarea tehnicii de calcul în evaluarea performanţelor sportive, Editura Universităţii Transilvania, Braşov 2004.

Titlu: Aspecte privind relaţiile matematice conforme metodelor extrapolării la înotătorii de 14 – 16 ani
Cuvinte cheie: metode de aproximaţie, sportivi, activitate sportivă
Rezumat: Lucrarea îşi propune să facă să înţelegem ce fel de relaţie există între anumite aspecte privind extrapolarea datelor obţinute de sportive, date care trebuie să fie analizate şi incluse în model, atunci când o anumită problemă este studiată.

Titre: Quelques aspects concernant les relations mathématiques conforme aux méthodes d'extrapolation aux nageurs de 14-16 ans
Mots-clé: les méthodes d'approximation, les sportives, l'activité sportive
Résumé: Ce travail se propose de faire comprendre quelle est la relation entre certains aspects concernant l'extrapolation des données obtenues par les sportives et lesquelles on doit analyser et inclure dans le modèle, lorsqu'on étudie un certain problème.