FUZZY MULTIFACTORIAL EVALUATION OF THE PHYSICAL CONSTITUTION OF THE STUDENTS

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ABSTRACT

In this paper, we make use of method of fuzzy multifactorial evaluation to carry on multifactorial evaluation for the physical constitution of the students, basde on content and requirement of reference[I]and the health cards, the result conforms to an objective reality by analySing.

Keyword: Physical constitution, Fuzzy multifatorial evaluation

I. PREFACE

In order to know growth and change conditions of the students constitution during the institute, we have a complete physical check-up and often establish health cards every year. This possesses important significance for bring up all-out developing men's ability about moral intelligence physique.

Based on reference[I]and the health cards, let's divide the physical constitutions of the students into five grades. We look upon every student's constitution that is good or bad as results which have been affected by seven factors. Now we carry on multifactorical evaluation to the constitutions of the students in accordance with standard of list[I], and[II]. As we know, there are many factor targets reflecting students constitutions to be better or worse, but the evaluation of the constitution is Fuzzy. Generally speaking evaluation of a single factor target is easy and simple. In regard to multi-target it is more difficult how to evaluate, objectively, the condition of a student or a unit(class or school). The result from Fuzzy mathematics provides the tool of new mathematics for us. The questions above may be full solved and treated with Fuzzy mathematics. This article makes use of Fuzzy multifactorial evaluation(see 2)to carry on evaluation for the constitutions of the students.

II. A PERSONAL MULTIFACTORIAL EVALUATION

The so-called personal multifactorial evaluation is comprehensive evaluation of constitution for a single student. We divide the targets of evaluation into seven items.

List 1. The item and standard of evaluation of constitution about the boys(18---25) in Tianjin Textile Engineering Institute

	U_1	U_2	U_3	U_4	U_5	U_6	U_7
V	[393, 440)	(54, 57]	(79, 95]	(6.4, 6]	(256, 270]	(320, 280]	(16, 22]
V	[376, 393]	(52, 54]	(73, 79]	(6.8, 6.4]	(245, 256]	(343, 320]	(11, 16]
V	[338, 376]	[50, 52]	[62, 73]	[7.6, 6.8]	[217, 245]	[380, 343]	[7, 11]
V	324, 338)	(48, 50)	[55, 62)	[8 , 7.6)	[201, 217)	[398, 380)	[4, 7)
V	[280, 324)	[45, 48)	[47, 55)	[8.6, 8)	[180, 201)	[440, 398)	[0, 4)

Note: U_1 = $\frac{\text{weight}}{\text{high}}$ ×1000 U_2 = $\frac{\text{chest}}{\text{high}}$ ×100 U_3 = vital capacity/weight

U_4 = 50m (sec.) U_5 = standing long jump (cm) U_6 = 1500m (sec)

U_7 = chin up

List. 2. The item and standerd of dvaluation of constitution about the girls(18---25) in Tianjin Textile Engineering Institute

	U_1	U_2	U_3	U_4	U_5	U_6	U_7
V	[373, 410]	(52, 56]	(60, 75]	(7.9, 7.4]	(198, 215]	(210, 190]	(32, 36]
V	(346, 373]	(50, 52]	(57, 60]	(8.4, 7.9]	(178, 198]	(223, 210]	(20, 32]
V	[301, 346]	[47, 50]	[44, 57]	[9.4, 8.4]	[160, 178]	[242, 223]	[11,20]
V	282, 301)	[45, 47)	[40, 44)	[10, 9.4)	[142, 160)	[270, 242)	[4,11)
V	240, 282)	[41, 45)	[25, 40)	[10.6, 10)	[115, 142)	[290, 270)	[0, 4)

Note: U_1 = $\frac{\text{weight}}{\text{high}}$ ×1000 U_2 = $\frac{\text{chest}}{\text{high}}$ ×100 U_3 = vital capacity/weight

U_4 = 50m (sec) U_5 = standing long jump (cm) U_6 = 800m (sec)

U_7 = push-up

U_1 = weight/high U_2 = chest/high U_3 = vital capacity/weight

U_4 = 50m running U_5 = standing long jump

U_6 = 1500m running(boys) or 800m running(girls)

U_7 = chin up(boys) or push-up(girls)

So that it forms factor set $U = \{u_1, u_2 \cdots u_7\}$. Distribution of number of weighted in the whole for all the factors, such as u_i is respctively $a_1 = 0.15$, $a_2 = 0.15$ $a_3 = 0.15$ $a_4 = 0.138$ $a_5 = 0.138$ $a_6 = 0.138$ $a_7 = 0.138$. This is shown in vector $A = \{a_1, a_2 \cdots a_7\}$. It is Fuzzy set on U.

Now the results of evaluation are divided into five classes.

V_1 = the highest V_2 = the higher middle V_3 = the middle

V_4 = the lower middle V_5 = the lowest.

So that they form evaluation set $V=\{v_1, v_2 \cdots v_5\}$.

The linchpin upon which problem depends is to establish fuzzy relation matrix R between factor set U and evaluation set V for every object of evaluation.

$$\begin{array}{c} \\ u_1 \\ u_2 \\ \vdots \\ u_7 \end{array} \begin{array}{c} \begin{array}{ccccc} V_1 & V_2 & V_3 & V_4 & V_5 \end{array} \\ \begin{bmatrix} r_{11} & r_{12} & r_{13} & r_{14} & r_{15} \\ r_{21} & r_{22} & r_{23} & r_{24} & r_{25} \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ r_{71} & r_{72} & r_{73} & r_{74} & r_{75} \end{bmatrix} \end{array} = R$$

One of them, r_{ij} shows the factor u_i which is some appraisable object is evaluated to get degree of comment V_j. This is evaluation of a single factor. So R is called appraisable matrix of a single fator.

If A have been got, according to the method of Fuzzy linear substitution—matrix operates on add and multiplication, we may calculate multifactorial evaluation vector $B=(b_1, b_2 \cdots b_5)$, it is Fuzzy set on V.

$$B = A \circ R \tag{1}$$

$$= (a_1, a_2 \cdots a_7) \begin{pmatrix} r_{11} & r_{12} & r_{13} & r_{14} & r_{15} \\ r_{21} & r_{22} & r_{23} & r_{24} & r_{25} \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ r_{71} & r_{72} & r_{73} & r_{74} & r_{75} \end{pmatrix}$$

$$= (b_1, b_2 \cdots b_5)$$

Among them

$$b_j = (a_1 \cdot r_{1j}) \oplus (a_2 \cdot r_{2j}) \oplus \cdots \oplus (a_7 \cdot r_{7j})$$

$$= \sum_{k=1}^{7} a_k \cdot r_{kj} \qquad (j=1,2,3,4,5) \tag{2}$$

$$a \oplus b = \begin{cases} 1, & a \oplus b > 1 \\ a+b, & a \oplus b \leq 1 \end{cases}$$

If $b_j = \max_{1 \leq j \leq 5} b_j$, then the appraisal object is evaluated to get a comment V_j. This is the final result which we have got—— multifactorial comment.

Now we introduce membership function and make up relation matrix R for the model above.

Based on list[I](boys)[II](girls), we establish membership function which is every factor relative to each class. In order to make them simple, they have adopted trapezoidal distributive function. If $f_{ij}(x)$, $g_{ij}(x)$ $(i=1,2 \ldots 7,$ $j=1,2 \ldots 5)$ show, respectively, membership function of boys and girls. Here $f_{ij}(x)$, $g_{ij}(x)$ show membership which is factor u_i relative to the grade V_j. We only [illegible] on every $f_{ij}(x)$, but $g_{ij}(x)$ is the same.

$$f_{11}(x)=\begin{cases} 1 & , \ 393<x\leq 440 \\ 1/113(x-280), & 280\leq x\leq 393 \end{cases}$$

$$f_{31}(x)=\begin{cases} 1 & , \ 79<x\leq 95 \\ 1/32(x-47) & , \ 47\leq x\leq 79 \end{cases}$$

$$f_{51}(x)=\begin{cases} 1 & , \ 256<x\leq 270 \\ 1/76(x-180) & , \ 180\leq x\leq 256 \end{cases}$$

$$f_{71}(x)=\begin{cases} 1 & , \ 16<x\leq 22 \\ 1/16(x) & , \ 0\leq x\leq 16 \end{cases}$$

$$f_{12}(x)=\begin{cases} 1/47(440-x) & , \ 393<x\leq 440 \\ 1 & , \ 376<x\leq 393 \\ 1/96(x-280) & , \ 280\leq x\leq 376 \end{cases}$$

$$f_{32}(x)=\begin{cases} 1/16(95-x) & , \ 79<x\leq 95 \\ 1 & , \ 73<x\leq 79 \\ 1/26(x-47) & , \ 47\leq x\leq 73 \end{cases}$$

$$f_{52}(x)=\begin{cases} 1/14(270-x) & , \ 256<x\leq 270 \\ 1 & , \ 245<x\leq 256 \\ 1/65(x-180) & , \ 180\leq x\leq 245 \end{cases}$$

$$f_{72}(x)=\begin{cases} 1/6(22-x) & , \ 16<x\leq 22 \\ 1 & , \ 11<x\leq 16 \\ 1/11(x) & , \ 0\leq x\leq 11 \end{cases}$$

$$f_{13}(x)=\begin{cases} 1/64(440-x) & , \ 376<x\leq 440 \\ 1 & , \ 338\leq x\leq 376 \\ 1/58(x-280) & , \ 280\leq x<338 \end{cases}$$

$$f_{33}(x)=\begin{cases} 1/22(95-x) & , \ 73<x\leq 95 \\ 1 & , \ 62\leq x\leq 73 \\ 1/15(x-47) & , \ 47\leq x<62 \end{cases}$$

$$f_{53}(x)=\begin{cases} 1/25(270-x) & , \ 245<x\leq 270 \\ 1 & , \ 217\leq x\leq 245 \\ 1/37(x-180) & , \ 180\leq x<217 \end{cases}$$

$$f_{73}(x)=\begin{cases} 1/11(22-x) & , \ 11<x\leq 22 \\ 1 & , \ 7\leq x\leq 11 \\ 1/7(x) & , \ 10\leq x<7 \end{cases}$$

$$f_{14}(x)=\begin{cases} 1/102(440-x) & , \ 338\leq x\leq 440 \\ 1 & , \ 324\leq x<338 \\ 1/44(x-280) & , \ 280\leq x<324 \end{cases}$$

$$f_{34}(x)=\begin{cases} 1/33(95-x) & , \ 62\leq x\leq 95 \\ 1 & , \ 55\leq x<62 \\ 1/8(x-47) & , \ 47\leq x<55 \end{cases}$$

$$f_{54}(x)=\begin{cases} 1/53(270-x) & , \ 217\leq x\leq 270 \\ 1 & , \ 201\leq x<217 \\ 1/21(x-180) & , \ 180\leq x<201 \end{cases}$$

$$f_{74}(x)=\begin{cases} 1/15(22-x) & , \ 7\leq x\leq 22 \\ 1 & , \ 4\leq x<7 \\ 1/4(x) & , \ 0\leq x<4 \end{cases}$$

$$f_{21}(x)=\begin{cases} 1 & , \ 54<x\leq 57 \\ 1/9(x-45), & 45\leq x\leq 54 \end{cases}$$

$$f_{41}(x)=\begin{cases} 1 & , \ 6.4>x\geq 6 \\ 5/11(8.6-x), & 8.6\geq x\geq 6.4 \end{cases}$$

$$f_{61}(x)=\begin{cases} 1 & , \ 320>x\geq 280 \\ 1/120(440-x), & 440\geq x\geq 320 \end{cases}$$

$$f_{22}(x)=\begin{cases} 1/3(57-x) & , \ 54<x\leq 57 \\ 1 & , \ 52<x\leq 54 \\ 1/7(x-45) & , \ 45\leq x\leq 52 \end{cases}$$

$$f_{42}(x)=\begin{cases} 5/2(x-6) & , \ 6.4>x\geq 6 \\ 1 & , \ 6.8>x\geq 6.4 \\ 5/9(8.6-x), & 8.6\geq x\geq 6.8 \end{cases}$$

$$f_{62}(x)=\begin{cases} 1/40(x-280), & 320>x\geq 280 \\ 1 & , \ 343>x\geq 320 \\ 1/97(440-x), & 440\geq x\geq 343 \end{cases}$$

$$f_{23}(x)=\begin{cases} 1/5(57-x) & , \ 52<x\leq 57 \\ 1 & , \ 50\leq x\leq 52 \\ 1/5(x-45) & , \ 45\leq x<50 \end{cases}$$

$$f_{43}(x)=\begin{cases} 5/4(x-6) & , \ 6.8>x\geq 6 \\ 1 & , \ 7.6\geq x\geq 6.8 \\ 1/2(8.6-x) & , \ 8.6\geq x>7.6 \end{cases}$$

$$f_{63}(x)=\begin{cases} 1/63(x-280), & 343>x\geq 280 \\ 1 & , \ 380\geq x\geq 343 \\ 1/60(440-x), & 440\geq x>380 \end{cases}$$

$$f_{24}(x)=\begin{cases} 1/7(57-x) & , \ 50\leq x\leq 57 \\ 1 & , \ 48\leq x<50 \\ 1/3(x-45) & , \ 45\leq x<48 \end{cases}$$

$$f_{44}(x)=\begin{cases} 1/16(x-6) & , \ 7.6\geq x\geq 6 \\ 1 & , \ 8\geq x>7.6 \\ 5/3(8.6-x) & , \ 8.6\geq x>8 \end{cases}$$

$$f_{64}(x)=\begin{cases} 1/100(x-280), & 380\geq x\geq 280 \\ 1 & , \ 398\geq x>380 \\ 1/42(440-x) & , \ 440\geq x>398 \end{cases}$$

f[illegible](x) = $\begin{cases} 1/116(440-x), & 324 \le x \le 440 \\ 1, & 280 \le x < 324 \end{cases}$

f[illegible](x) = $\begin{cases} 1/40(95-x), & 55 \le x \le 95 \\ 1, & 47 \le x < 55 \end{cases}$

f[illegible](x) = $\begin{cases} 1/69(270-x), & 201 \le x \le 270 \\ 1, & 180 \le x < 201 \end{cases}$

f[illegible](x) = $\begin{cases} 1/18(22-x), & 4 \le x \le 22 \\ 1, & 0 \le x < 4 \end{cases}$

$$f_{25}(x) = \begin{cases} 1/9(57-x), & 48 \le x \le 57 \\ 1, & 45 \le x < 48 \end{cases}$$

$$f_{45}(x) = \begin{cases} 1/2(x-6), & 8 \ge x \ge 6 \\ 1, & 8.6 \ge x > 8 \end{cases}$$

$$f_{65}(x) = \begin{cases} 1/118(x-280), & 398 \ge x \ge 280 \\ 1, & 440 \ge x > 398 \end{cases}$$

After membership functions were established, the relation matrix R can be got according to the data of students physical examination.Now taking the students of 81 session for example, we take the sample for evalution, and then put the sample data which we have got into list III (girls), IV (boys). The boys are shown in $X=\{x_1, x_2 \cdots x_{40}\}$, and girls in $Y=\{y_1, y_2 \cdots y_{20}\}$. They are called the object set of evaluation. If W_{Ki} is a number which is on the line K and the row I in the list IV, $r_{ij} == f_{ij}(W_{Ki})$, take $x_1 \in X$ for instance, we form relation matrix R_1.

List III (girls of 81 session)

item / object	U_1	U_2	U_3	U_4	U_5	U_6	U_7
y_1	291.1	51.3	48.9	7.9	147	230	11
y_2	295.7	48.2	30.9	8.1	192	219	20
y_3	320.1	49.4	47.6	10	150	230	15
y_4	325.3	48.2	55.6	7.9	183	248	23
y_5	279.9	47.2	44.9	8.6	155	232	14
y_6	338.6	54.4	51.4	8.6	165	242	10
y_7	366.5	53.4	29.7	8.8	166	231	11
y_8	298.1	48.4	57.3	8.4	180	214	12
y_9	279.5	46.0	44.4	8.1	198	207	14
y_{10}	302.5	52.2	52.6	8.3	173	230	13
y_{11}	317.6	52.8	39.6	8.2	197	220	20
y_{12}	340.6	51.8	45.9	7.9	188	215	9
y_{13}	273.0	51.5	44.9	9.6	146	285	6
y_{14}	326.9	52.6	44.1	8.7	175	211	5
y_{15}	307.6	52.6	46.9	9.6	154	230	4
y_{16}	339.3	47.6	48.8	8.6	172	231	14
y_{17}	298.7	51.9	59.8	9.4	154	240	14
y_{18}	304.9	49.4	55.0	9.9	178	264	8
y_{19}	337.4	51.5	36.4	9.1	155	236	11
y_{20}	272.2	49.4	46.5	8.1	174	211	14

Note: The U in this list is the same as the list II.

List IV (boys of 81 session)

item / object	U_1	U_2	U_3	U_4	U_5	U_6	U_7
x_1	[illegible]	47.1	54.1	7.7	210	330	3

x	309.5	50.0	57.7	7.3	210	375	9
x	367.8	51.7	46.9	7.3	214	360	10
x	343.5	46.9	52.6	7.8	235	345	10
x	325.7	50.5	58.0	7.7	225	359	6
x	422.1	53.6	47.3	8.2	220	383	3
x	259.2	50.6	66.3	7.4	220	343	10
x	317.0	48.8	57.7	6.9	245	405	6
x	314.0	45.9	60.2	8.2	238	397	10
x	395.5	50.8	57.1	7.2	235	373	3
x	325.6	51.2	80.4	6.3	255	329	10
x	352.9	52.9	75.0	7.6	240	294	10
x	356.2	48.5	51.3	7.3	230	390	7
x	314.7	48.2	51.4	8.1	205	345	16
x	310.1	51.9	76.5	7.2	225	375	9
x	319.8	50.0	50.0	6.8	240	338	9
x	337.1	48.9	66.7	6.9	250	375	6
x	329.5	46.6	60.5	7.0	220	420	3
x_{19}	294.1	47.1	75.0	7.4	234	389	10
x_{20}	335.3	49.7	51.7	7.8	198	380	9
x	301.1	47.7	75.4	6.6	265	325	8
x	306.1	50.9	64.4	7.1	250	307	11
x	347.5	47.5	61.0	6.9	236	337	6
x	347.3	53.3	64.7	6.6	248	354	17
x	360.6	49.1	54.6	7.0	215	367	14
x	332.4	48.0	63.0	7.2	235	390	9
x	309.9	49.1	56.6	6.6	216	362	16
x	317.0	48.8	72.1	7.8	200	390	12
x	315.4	48.2	70.8	7.1	216	373	15
x	348.6	50.0	47.5	6.7	250	320	4
x	332.3	51.8	68.8	6.7	244	337	15
x	285.3	46.2	57.5	7.1	190	367	16
x	362.4	47.2	50.4	6.4	260	345	11
x	327.8	46.4	50.8	7.1	241	338	9
x	326.0	45.3	55.1	7.0	250	337	9
x	356.7	45.5	55.1	7.7	253	395	5
x	289.1	53.0	76.5	8.1	225	380	9
x	339.6	46.2	48.7	7.2	205	365	16
x	354.9	53.7	52.2	7.5	219	345	8
x	319.6	46.5	50.0	7.2	241	383	16

[illegible]: The U in this list is the same as in list II.

[illegible] x_1 we [illegible]:

f[illegible](320.6) = 0.36 $f_{12}(320.6) = 0.42$ $f_{13}(320.6) = 0.70$ $f_{14}(320.6) = 0.90$

f[illegible](320.6) = 1

f[illegible](47.1) = 0.23 $f_{22}(47.1) = 0.30$ $f_{23}(47.1) = 0.42$ f[illegible](47.1) = 0.70

f[illegible](47.1) = 1

f[illegible](54.1) = 0.22 $f_{32}(54.1) = 0.27$ $f_{33}(54.1) = 0.47$ $f_{34}(54.1) = 0.89$

f[illegible](54.1) = 1

f[illegible](7.7) = 0.41 $f_{42}(7.7) = 0.50$ $f_{43}(7.7) = 0.45$ $f_{44}(7.7) = 1$

f[illegible](7.7) = 0.45

f[illegible](210) = 0.39 $f_{52}(210) = 0.45$ $f_{53}(210) = 0.81$ $f_{54}(210) = 1$

f[illegible](210) = 0.87

f[illegible](330) = 0.92 $f_{62}(330) = 1$ $f_{63}(330) = 0.79$ $f_{64}(330) = 0.50$

[illegible] 0.42

[illegible] 0.19 $f_{..}(3) = 0.27$ $f_{..}(3) = 0.43$ $f_{..}(3) = 0.75$

[illegible] 1

Then [illegible] got.

$$R_1 = \begin{bmatrix} 0.36 & 0.42 & 0.70 & 0.92 & 1 \\ 0.23 & 0.30 & 0.42 & 0.70 & 1 \\ 0.22 & 0.27 & 0.47 & 0.89 & 1 \\ 0.41 & 0.50 & 0.45 & 1 & 0.45 \\ 0.39 & 0.46 & 0.81 & 1 & 0.87 \\ 0.92 & 1 & 0.79 & 0.50 & 0.42 \\ 0.19 & 0.27 & 0.43 & 0.75 & 1 \end{bmatrix}$$

From formula (1),(2) we can get

[illegible] (0.392. 0.456, 0.585, 0.825, 0.828)

Therefor x_1 get comment "the lowest". we can alse get comment of other object x_i, [illegible] ...40, y_k, $k=1,2,...20$. They can omitted here.

[illegible] Multifactorial Evaluation of Group

Multifactorial evaluation of group is comprehensive evaluation of group (class, grade, department) formed by many students.

( ). Multitarget comprehensive evaluation of group: We take the result of sampling check of the students of 81 session to explain. Let object set Z [illegible]. Relation matrix R is established from list I, II (by their own standard of boys and girls).

First of all we line list V about frequence that every factor u_i drops into every class in sum total Z. Let q_{ij} be frequence, then divide 60 into q_{ij} and we get r_{ij}. The 60 are numbers of sum total Z.

$$r_{ij} = q_{ij}/60 \triangleq q_{ij}/n \text{ (n is numbers of sum total Z).}$$

[illegible] matrix R is got.

List V

frequence item \ class	V_1	V_2	V_3	V_4	V_5
u_1	2	2	21	14	21
u_2	6	10	19	11	14
u_3	1	7	22	11	19
u_4	1	14	31	9	5
u_5	2	13	27	11	3
u_6	2	15	29	11	3
u_7	2	9	24	11	4

[illegible] we can get R:

$$R = \begin{bmatrix} 0.03 & 0.03 & 0.35 & 0.23 & 0.35 \\ 0.10 & 0.17 & 0.32 & 0.18 & 0.23 \\ 0.02 & 0.12 & 0.37 & 0.18 & 0.32 \\ 0.02 & 0.23 & 0.52 & 0.15 & 0.08 \\ 0.03 & 0.22 & 0.45 & 0.25 & 0.05 \\ 0.03 & 0.25 & 0.48 & 0.18 & 0.05 \\ 0.03 & 0.15 & 0.40 & 0.18 & 0.67 \end{bmatrix}$$

[illegible] formula (1), (2), we get evaluation vector B.

$B = A \circ R = (0.0477, 0.1652, 0.4115, 0.1920, 0.2216)$

So we know that physical constitution of 81 session students are of the [illegible]. Similar to this, we may evaluate Students constitution of other departments, sessions or even the whole college.

II. [illegible] single target multifactorial evaluation of group: It carries on comprehensive evaluation for boys and girls, separately. We take a target of "vital capacity/ weight" of 81 session(boys) for example to explain. Here we take object set $Z' = F$, then based on grade standard of vital capacity/weight [illegible] (boy), we establish relation matrix R' of every grade.

First of all we take average of all datas of which the sum total F drops into each grade V_j, then according to the membership function, we established relation motrix R' of grade of a single target.

	V_1	V_2	V_3	V_4	V_5
	0.0063	0.0077	0.0133	0.025	1
	0.3406	0.4192	0.7267	1	0.9275
$R' =$	0.6281	0.7731	1	0.8455	0.6975
	0.8969	1	0.9091	0.5848	0.4825
	1	0.9125	0.6636	0.4424	0.3650

[illegible] frequence ofwhich each data of the totality Z' drops into every class [illegible] f_{ij}, then divide n' into f_{ij} and get $a_{ij} = f_{ij}/n'$(n' is number of sum [illegible]). Here a_{ij} is the number of weighted of f_i relative to each class V_j [illegible] total. It is shown by vector $A' = (a'_1, a'_2 \cdots a'_5)$. It is Fuzzy set on F. Then we get $A' = (0.575, 0.275, 0.200, 0.125, 0.025)$

[illegible] formula (1), (2) evaluation vector B' can be worked out.

$B' = A' \circ R' = (0.3588, 0.4206, 0.5350, 0.5377, 0.8390)$

We [illegible] that physical developmemtal condition---"vital capacity/weight" in [illegible] students (boys) is the lowest. We can also make out evaluation [illegible] development condition of physical constitution of other targets.

CONCLUSION

[illegible] use of Fuzzy mathematics carries on multifactorial evaluation for [illegible] constitution of students. First of all according to purpose and requirement of evaluation, we pick on proper target and establish standard. [illegible] that we use the method of Fuzzy multifactorial evaluation to make evaluation. This article makes class evaluation to the targets of the health card by means of the method of percent position (or the method of departure [illegible] difference), according to the content and requirment of the health card, [illegible] standard is based on every target of class evaluation, and making use of the method of Fuzzy multifactorial evaluation carries on multifactorial evaluation for the physical constitution of the students. The method has good points of methods of percent position and departure equal difference. It may not only evaluate physical constitution of one person, but also evaluate the group. Owing to introducing membership function, the result is made more reasonable and accurate. Its particular property can carry on multifactorial evaluation about the inner laws of many disperse factors which reflect students constitutions, and it can make multifactorial evaluation multitarget for a single or group. It makes up for insufficiency of methods of percent position and departure equal difference.

Applying fuzzy mathematics to evaluation of physical constitution, it will open up a new way for physical development and evaluation of physical condition.

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