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Matlab and linear fitting-based university students physical health evaluation model study

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ABSTRACT

In order to make reasonable evaluation on university students physical health, the paper firstly gets each factor and weight relationship by linear fitting method according to collected data, obtains six relations, and use MATLAB to make the image of every relation, observes images and then we get that weight and each factor relationship are inclined to be positive distributed, combines with relations,it gets that when weight is 90 to 100KG, height and lung capacity test results are the best, when weight is 70 to 90KG, step, long jump and grip test results are the best, while for schoolgirls test item sit and reach, when weight is 50 to 60KG, sit and reach results are the best. Use grey relational degree method to solve correlation coefficient, calculate weights, and then combine percentile method with mean and standard deviation, it solves a relative standard four items test data, finally use students actual measurement data to divide every item physical health test result and respectively multiply by respective weight, it gets respective scores, and then rank scores, assume that x% is qualified, then through students' results ranking, use x% to distinguish result, the ones that are higher the result is supposed to be qualified, otherwise is failed, so that it can quantize physical health indicators.

KEYWORDS

Linear fitting; Grey relational degree; Statistical analysis; Physical health; Evaluation model.

INTRODUCTION

University students possess good physical health is an important premise to promote their academic records and cultivate cross-century talents. But due to numerous reasons, university students' physical health is not going well. In recent years, university students' physical health level has trended down. Chinese university students' physique investigation indicates that national physique monitoring result in 2010 compares with 1985, lung capacity falls by nearly 10%; women university students 800m running, men students 1000m running performance respectively fall by 10.3% and 10.9%,standing long jump results respectively fall by 2.72cm and 1.29cm;Students are either excessive weight or excessive thin. In order to improve students' physical health problems, ministry of education, general administration of sport of China carry out " CPC's central committee's decision regarding deepen education reform and promote quality education",and in order to understand and monitor university students' physical conditions, ministry of education and general administration of sport of China issued implementation requirements of "Students' physical health standard" in July,2002, it required that universities in the country ought to start adopting ministry of education regulated test items and scoring methods to carry on physical test on university students at school since new term of 2003.

Causes that affect university students' physical health level are various; evaluation issues on university students' physical health are of actual guiding significances in how to enhance physical health level. Students' physical health conditions have been already brought into evaluation system on school overall work, university students' physical health test has become task that institutions of higher learning should finish. Every university will implement physical health test on university students at school every year, feedback the test result to ministry of education and publish it timely. Physical test mainly includes body shape, body function, physique and else.

Tang Xun, Ran Jian (2008)studied "Chengdu university students' physical health test situation analysis", in which they analyzed Chengdu university students' physical health status respectively from physical test equipment, fields, test working staff constitutes, test contents, test data and other aspects, pointed out existing problems, and put forward solution to ensure physical test work to go on smoothly[1].

Sun Wei-Bing (2010) in " University students' physical health status analysis and countermeasures-take Jiangsu economic and trade vocational technical institute as an example", he applied test method, mathematical statistics to carry on testing and analyzing on Jiangsu province economic and trade vocational technical institute grade 2007, 2008, 2009 students' physical health status, got that presently the school university students' physical health status overall level indicators, considering Jiangsu economic and trade vocational technical institute students' physical health status, he put forward suggestions as strengthening sports teachers' teaching and sports health knowledge reasonable advertising, intensifying extra-curricular activities organizations and management, creating good exercising environment for students, improving physical exercise facilities, providing sports optional courses to ensure students' physique improvement, comprehensive developing sports and health education, and establishing various sports teaching system aims at enhancing university students' physique[2].

Li Wei (2011) studied "University students' physical health test data analysis and counter measures", analyzed Dezhou University grade 05 university students' physical standard health test data, found that students' physical health level was not going well, and put forward corresponding measures for existing problems, which provided references and basis for future sports teaching reform and university students physical health test[3].

The paper establishes Matlab and linear fitting-based university students' physical health evaluation criterion model, which provides certain theoretical basis for universities.

WEIGHT INFLUENCES ON PHYSICAL HEALTH

Factors that affect freshman physical health status are quite a lot, weight is an important indicator that reflects physical health status, and we firstly analyze weight influences on physical health. Physical health criterion can be analyzed from students' test height, lung capacity, standing long jump, grip (man), sit and reach (woman), and step test.

Through analyzing collected data, use MATLAB to respectively carry on one-time fitting, twice fitting and three times fitting on height, lung capacity, step, long jump, sit and reach (woman), grip (man) with weight. Finally it gets equations and compares them with images, observes and can get that twice fitting relative conforms to reality, and gets each test result and weight fitting equation:

(1) Height and weight fitted equation:

$$h = -0.026w^2 + 0.5909w + 145.2146 \quad \textbf{(1)}$$

(2) Lung capacity and weight fitted equation:

$$y_1 = -0.4976w^2 + 96.6462w - 140.1076 \quad \textbf{(2)}$$

(3) Step and weight fitted equation:

$$y_2 = -0.0022w^2 + 0.3410w + 38.6193 \quad \textbf{(3)}$$

(4) Long jump and weight fitted equation:

$$y_3 = -0.0003w^2 + 0.0553w - 0.1889 \quad \textbf{(4)}$$

(5) Sit and reach (woman) and weight fitted equation:

$$y_4 = -0.0048w^2 + 0.4909w + 4.5643 \quad \textbf{(5)}$$

(6) Grip (man) and weight fitted equation:

$$y_5 = -0.0082w^2 + 1.4237w - 10.0507 \quad \textbf{(6)}$$

And according to equation, it solves weight and physical conditions fitted equation Figure as following:

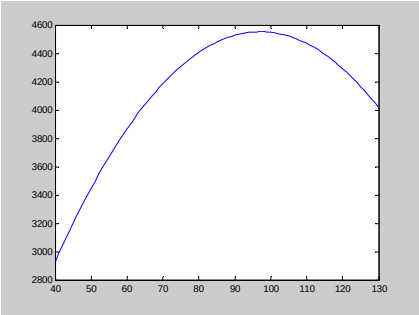

Figure 1 : Height and weight fitted equation figure

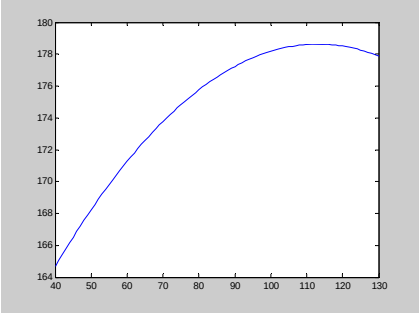

Figure 2 : Lung capacity and weight fitted equation

Analyze Figure 1, Figure 2, from the Figure, we can clearly observe height, lung capacity changes with weight :

By Figure 1, it is clear that height is roughly in the rising trend with weight increases, but when weight goes beyond the interval among 100 to 110, height is in the declining trend, so we analyze that height among 40 to 100 is positive related to weight, and is negative related to weight when being 100 to 130.

By Figure 2, it is clear that lung capacity is also roughly in the rising trend with weight increases, among 40 to 100, lung capacity is positive related to weight, and among 110 to 130, lung capacity is negative related to weight.

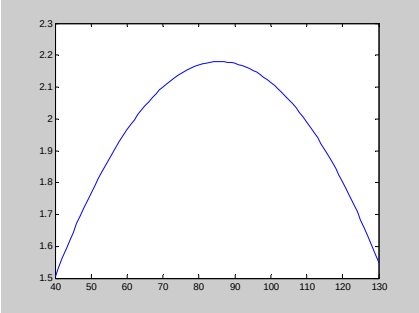

Figure 3 : Step and weight fitted equation figure

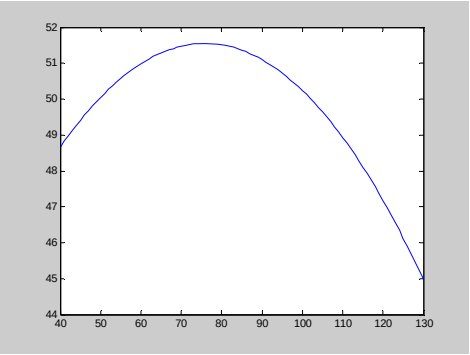

Figure 4 : Long jump and weight fitted equation figure

Analyze Figure 3, Figure 4, from the Figure, we can clearly observe step, long jump changes with weight : By Figure 3, it is clear that step result is firstly increasing progressively and then decreasing progressively with weight increases, among 40 to 80, its increasing range is faster with weight increases and has better positive correlation linear relation, among 80 to 140, and it rapidly decreases with weight increases and shows negative correlation linear relations. By Figure 4, it is clear that long jump result and weight relationship quite conform to quadratic function relationship, among 40 to 80, it turns to be positive relational increasing with weight, among 80 to 130, it turns to be negative relational sharply dropping with weight, which indicates long jump suffers greater influences from weight.

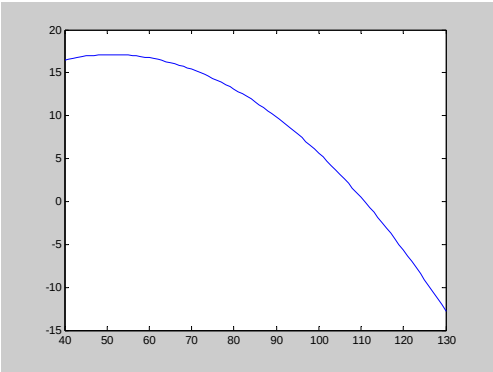

Figure 5 : Sit and reach and weight fitted equation figure

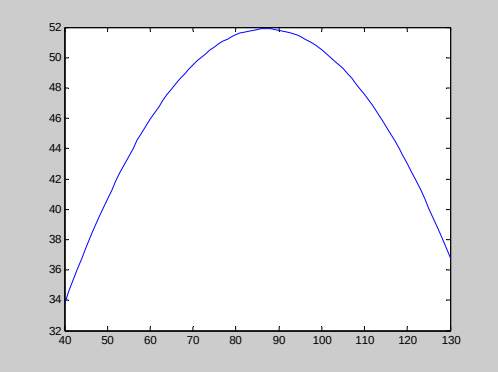

Figure 6 : Grip and weight fitted equation figure

Analyze Figure 5, Figure 6(Figure 5 is only for schoolgirls, Figure 6 is only for schoolboys),from Figure,we can clearly observe sit and reach, grip changes with weight : by Figure 5,it is clear that sit and reach is roughly in decline with weight increases, among 40 to 50, sit and reach is slightly increasing with weight increases,and they have positive correlations; but among 50 to 130, it is in decline, negative correlations are relative remarkable. By Figure 6, it is clear that grip also has larger relationship with weight, among 40 to 90,grip and weight get closer to one-time relationship, obviously they are positive related, among 90 to 130, grip declines with weight increases and also shows better negative correlations.

By above formula and Figure analysis, it is clear that weight has larger influences on physical health, physical health firstly is positive correlation, and then arrives at an optimal value, after that physical health starts declining with weight increases, so we should regularly take exercises, keep weight well that is more helpful for our physical health.

ESTABLISHED MATHEMATICAL MODEL TEST RESULTS CORRECTNESS AND ACCURACY

By analysis, we have already got weight and height, lung capacity, step, long jump, sit and reach (woman), grip (man)and others fitted equations. According to fitting equations, we can calculate every test item fitting value q according to weight w ,and then according to formula, it solves fitting error rate r :formula is as following: $r = {}_{(q-p)/q}$

According to fitting error rate range, it defines test results correctness and accuracy.

According to collected data, by fitting equations, it calculates physical status fitting value, and according to formula $r = (q-p)/q$, it calculates fitting error rate :and rank and screen data, it gets Class 1, 2, 3 students possible deviation test results, as following data TABLE 1-6:

TABLE 1 : Deviation result after height fitting

Class No.	Student number	Gender	Date of birth	Origin of student	Height	Weight	Height fitted value	Height fitted error rate
1	120029	2	1991-09-08	1	154.4	53	169.2289	0.087626
1	120028	2	1992-01-13	7	158.7	50.6	168.4572	0.057921
2	120059	2	1993-11-21	1	159.1	50.3	168.3586	0.054994
2	120060	2	1993-09-11	1	152.2	49.6	168.1268	0.094731
2	120035	1	1992-07-19	6	160.8	55.9	170.1214	0.054793
3	120085	2	1990-06-02	3	156.9	49.6	168.1268	0.066776
3	120086	2	1990-08-15	1	158.3	46.6	167.1045	0.052688

TABLE 2 : Deviation result after lung capacity fitting

Class No.	Student number	Gender	Date of birth	Origin of student	Weight	Lung capacity	Lung capacity fitted value	Lung capacity fitted error rate
1	120029	2	1991-09-08	1	53	1708	3584.383	0.523488
2	120058	2	1994-10-05	1	70.2	1891	4192.263	0.548931
3	120088	2	1993-06-18	1	50.5	1622	3471.521	0.53277
2	120059	2	1993-11-21	1	50.3	1229	3462.223	0.645026

TABLE 3 : Deviation result after step fitting

Class No.	Student number	Gender	Date of birth	Origin of student	Weight	Step test	Step fitted value	Step fitted error rate
1	120011	1	1992-02-20	1	65.2	74	51.50	-0.44
2	120055	2	1995-02-15	1	65	68	51.49	-0.32
3	120064	1	1993-03-07	2	62.8	67	51.36	-0.30
1	120017	1	1993-01-23	5	51.6	32	50.36	0.36
2	120045	1	1994-05-31	1	58.5	32	51.04	0.37
2	120053	1	1992-03-29	7	57.6	30	50.96	0.41

TABLE 4 : Deviation result after long jump fitting

Class No.	Student number	Gender	Date of birth	Origin of student	Weight	Standing long jump	Long jump fitted value	Long jump fitted error rate
2	120040	1	1993-06-18	1	98.4	1.86	2.35	0.21
2	120060	2	1993-09-11	1	49.6	1.41	1.82	0.22
2	120057	2	1993-06-08	1	60	1.54	2.05	0.25
2	120056	2	1994-03-07	1	55.8	1.42	1.96	0.28
2	120059	2	1993-11-21	1	50.3	1.31	1.83	0.29
2	120058	2	1994-10-05	1	70.2	1.52	2.21	0.31
3	120068	1	1994-05-25	4	88.4	1.88	2.36	0.20
3	120087	2	1990-08-01	1	48.2	1.41	1.78	0.21

TABLE 5 : Deviation result after Grip (man) fitting

Class No.	Student number	Gender	Date of birth	Origin of student	Height	Schoolboys: grip BMI	Grip fitted value	Grip fitted error rate
1	120001	1	1992-04-17	4	167.3	59.4	46.33	-0.28
1	120023	1	1993-11-09	1	170.4	32.4	45.90	0.29
1	120019	1	1993-05-03	6	176.4	31.7	48.30	0.34
2	120036	1	1994-02-18	1	178.1	61.4	47.44	-0.29
2	120049	1	1993-06-17	1	169.7	37.1	49.80	0.25
2	120048	1	1994-05-05	1	168.1	33.1	47.59	0.30

TABLE 6 : Deviation result after sit and reach (woman) fitting

Class No.	Student number	Gender	Date of birth	Origin of student	Weight	Schoolgirls: sit and reach	Sit and reach fitted value	Fitted error rate
2	120056	2	1994-03-07	1	55.8	31.3	17.01	-0.84
2	120058	2	1994-10-05	1	70.2	26	15.37	-0.69
3	120085	2	1990-06-02	3	49.6	26.5	17.10	-0.55
2	120059	2	1993-11-21	1	50.3	6	17.11	0.65

According to equation, it carries on fitting and solving, according to formula $r = (q - p)/q$,it solves fitted error rate, we screen data, and screen out some data out of range, as above TABLE 6 shows, so test results correctness and accuracy have deviation, deviation results, on one hand, it may be students physical health exactly has problems, on the other hand, it may be errors occur when recording data, so in above our screened larger deviation results, some part may be not the status of real physique, and then we go on comprehensive analysis of height, lung capacity, long jump, step, grip, sit and reach after-fitting deviation rate, find that some students physical test results reflect in both two deviation rates results, it may be the student physical health really has something wrong, such as :the student of number 120059 ,her long jump fitted value occurs larger deviation rate, and her sit and reach also occurs to deviation rate, the probability of issues occur to the student physical health status is larger, as TABLE 7.

TABLE 7 : Students that physical health status may occur to deviation

Class No.	Student number	Gender	Date of birth	Origin of student	Height	Weight	Lung capacity	Step test	Schoolboys:grip BMI ;schoolgirls:sit and reach	Standing long jump
1	120029	2	1991-09-08	1	154.4	53	1708	51	11.2	1.71
2	120056	2	1994-03-07	1	166.5	55.8	2772	55	31.3	1.42
2	120058	2	1994-10-05	1	168.1	70.2	1891	52	26	1.52
2	120059	2	1993-11-21	1	159.1	50.3	1229	44	6	1.31
3	120085	2	1990-06-02	3	156.9	49.6	1919	48	26.5	1.69

ESTABLISH PHYSICAL HEALTH EVALUATION MODEL

Use grey correlation method to respectively solve correlation coefficients, then calculate weights, after that use percentiles method to combine with mean and standard deviation,it solves a relative standard four items test data, finally use students' actual measurement data to divide every physical health test result and respectively multiply by respective weights to obtain respective scores, then get scores ranking. By comparing whole school physical health test results excellent rate, good rate, pass rate, failure rate, then classify their physical health test results. Firstly use grey relational degree method to solve schoolboys and schoolgirls correlation coefficients, and use data to proceed with normalization, and then get TABLE 8:

TABLE 8 : Schoolboys and schoolgirls each item result normalization

Single item score	1	0.98	0.96	0.94	0.92	0.9	0.87	0.84	0.81	0.78
Lung capacity BMI	1	0.988095	0.97619	0.964286	0.952381	0.928571	0.916667	0.892857	0.869048	0.845238
Step test	1	0.97561	0.939024	0.902439	0.865854	0.817073	0.792683	0.768293	0.731707	0.695122
Standing long jump(m)	1	0.996241	0.988722	0.984962	0.977444	0.969925	0.962406	0.947368	0.932331	0.913534
Grip BMI	1	0.98913	0.978261	0.967391	0.945652	0.934783	0.913043	0.880435	0.858696	0.815217
Sit and reach(cm)	1	0.982609	0.956522	0.930435	0.895652	0.86087	0.821739	0.76087	0.704348	0.621739
Single item score	**0.75**	**0.72**	**0.69**	**0.66**	**0.63**	**0.6**	**0.5**	**0.4**	**0.3**	**0.2**
Lung capacity BMI	0.809524	0.785714	0.761905	0.72619	0.690476	0.654762	0.642857	0.619048	0.607143	0.583333
Step test	0.646341	0.634146	0.621951	0.609756	0.585366	0.560976	0.54878	0.536585	0.52439	0.512195
Standing long jump(m)	0.894737	0.883459	0.868421	0.849624	0.827068	0.804511	0.796992	0.785714	0.774436	0.763158
Grip BMI	0.782609	0.76087	0.717391	0.684783	0.641304	0.586957	0.576087	0.554348	0.532609	0.51087
Sit and reach(cm)	0.543478	0.491304	0.413043	0.33913	0.234783	0.130435	0.104348	0.06087	0.021739	-0.03478

By formula $\Delta = \left| x_0(k) - x_1(k) \right|$, it gets following TABLE 9.

TABLE 9 : Schoolboys and schoolgirls each item result difference table

Lung capacity BMI	0	0.008095	0.01619	0.024286	0.032381	0.028571	0.046667	0.052857	0.059048	0.065238
Step test	0	0.00439	0.020976	0.037561	0.054146	0.082927	0.077317	0.071707	0.078293	0.084878
Standing long jump(m)	0	0.016241	0.028722	0.044962	0.057444	0.069925	0.092406	0.107368	0.122331	0.133534
Grip BMI	0	0.00913	0.018261	0.027391	0.025652	0.034783	0.043043	0.040435	0.048696	0.035217
Sit and reach(cm)	0	0.002609	0.003478	0.009565	0.024348	0.03913	0.048261	0.07913	0.105652	0.158261
Lung capacity BMI	0.059524	0.065714	0.071905	0.06619	0.060476	0.054762	0.142857	0.219048	0.307143	0.383333
Step test	0.103659	0.085854	0.068049	0.050244	0.044634	0.039024	0.04878	0.136585	0.22439	0.312195
Standing long jump(m)	0.144737	0.163459	0.178421	0.189624	0.197068	0.204511	0.296992	0.385714	0.474436	0.563158
Grip BMI	0.032609	0.04087	0.027391	0.024783	0.011304	0.013043	0.076087	0.154348	0.232609	0.31087
Sit and reach(cm)	0.206522	0.228696	0.276957	0.32087	0.395217	0.469565	0.395652	0.33913	0.278261	0.234783

Then solve two-stage minimum difference, it gets $\min(\min\left| x_0(k) - x_i(k) \right|) = 0$

Two-stage maximum difference is $\max(\max\left| x_0(k) - x_i(k) \right|) = 0.563158$

Input data into correlation coefficient computational formula:

$\xi_i(k)=\dfrac{\min(\min|x_0(k)-x_i(k)|)+\frac{1}{2}\max(\max|x_0(k)-x_i(k)|)}{|x_0(k)-x_1(k)|+\frac{1}{2}\max(\max|x_0(k)-x_i(k)|)}$, it gets following TABLE 10.

TABLE 10 : Schoolboys and schoolgirls results correlation coefficients

Lung capacity BMI	1	0.972054	0.945627	0.9206	0.896863	0.907879	0.85783	0.841951	0.82665	0.811895
Step test	1	0.984648	0.930672	0.882306	0.838718	0.772495	0.78457	0.797028	0.782443	0.768382
Standing long jump(m)	1	0.945468	0.907439	0.862307	0.830561	0.80107	0.752915	0.723951	0.697133	0.678319
Grip BMI	1	0.968593	0.939098	0.911346	0.916505	0.890054	0.867405	0.874432	0.85256	0.888833
Sit and reach(cm)	1	0.990821	0.987798	0.967146	0.920413	0.877988	0.853684	0.780626	0.72716	0.640185
Lung capacity BMI	0.825496	0.810782	0.796583	0.809671	0.823198	0.837183	0.663419	0.562453	0.478289	0.423483
Step test	0.730923	0.766342	0.805368	0.848582	0.863175	0.878278	0.852341	0.673369	0.556514	0.474219
Standing long jump(m)	0.660494	0.632708	0.612128	0.597575	0.588282	0.579273	0.48668	0.421972	0.372452	0.333333
Grip BMI	0.896213	0.873252	0.911346	0.919107	0.961403	0.955728	0.787268	0.645932	0.547619	0.47528
Sit and reach(cm)	0.576887	0.551819	0.504138	0.467391	0.416047	0.374867	0.41578	0.453641	0.502963	0.545314

It gets correlation coefficient $\xi_i(k)$ set in each time frame that is above TABLE listed correlation coefficient order ξ_1,then use correlation degree expression $r_i=\frac{1}{N}\sum_{k=1}^{N}\xi_i(k)$,it gets correlation coefficient, as following TABLE 11:

TABLE 11 : Each item correlation coefficient table

Lung capacity BMI	Step test	Standing long jump(m)	Grip BMI	Sit and reach(cm)
0.800595	0.799519	0.674203	0.854099	0.677733

Due to the schoolboys don't take sit and reach testing, get rid of sit and reach data, it gets TABLE 12:

TABLE 12 : Each item correlation coefficient table

Lung capacity BMI	Step test	Standing long jump(m)	Grip BMI
0.800595	0.799519	0.674203	0.854099

According to correlation, obtained lung capacity BMI weight is:

$$j_1=\frac{0.800595}{0.800595+0.799519+0.674203+0.854099}=0.255911,$$

Similarly, it gets:

$$j_2=\frac{0.799519}{0.800595+0.799519+0.674203+0.854099}=0.255567$$

$$j_3=\frac{0.374203}{0.800595+0.799519+0.674203+0.854099}=0.215509$$

$$j_4=\frac{0.854099}{0.800595+0.799519+0.674203+0.854099}=0.273013$$

By mean method $\zeta_p=\dfrac{\sum_{i=1}^{n}X_i}{n}$, it gets schoolboys each item average result in above TABLE 2 as following TABLE 13.

TABLE 13 : Schoolboys each item average result

Lung capacity BMI	Step test	Standing long jump(m)	Grip BMI
68.1	58.5	2.38	71.9

Then use percentile method to value p respectively as 20%,40%,60%,80%,by $\frac{d}{m} < p \le \frac{d+1}{m}$, $\zeta_p = (m_p - d)(x_{(d+1)} - x_{(d)}) + x_{(d)}$,it gets lung capacity BMI is as TABLE 14:

TABLE 14 : Lung capacity BMI

20%	40%	60%	80%
52	61	71	78

Then take the mean, it gets $\zeta = \frac{52+61+71+78}{4} = 70$,similarly it gets step test, standing long jump, grip BMI are respectively 55,2.34,69. It gets TABLE 15.

TABLE 15 : Each item scoring index

	Lung capacity BMI	Step test	Standing long jump(m)	Grip BMI
Mean method	68.1	58.5	2.38	71.9
Percentile method	70	55	2.34	69
Reference score	69.05	56.75	2.36	70.45

Students actual measurement lung capacity BMI, step test, standing long jump, grip BMI mean value are respectively s_1, s_2, s_3, s_4 ,reference scores are a_1, a_2, a_3, a_4. By students' actual measurement results, it solves students' physique evaluation model result $Y = 100(\frac{s_1 j_1}{a_1} + \frac{s_2 j_2}{a_2} + \frac{s_3 j_3}{a_3} + \frac{s_4 j_4}{a_4})$

According to "State physical health criterion" and attach TABLES through screening method, it gets schoolboys data TABLE 16:

TABLE 16 : Screening criterion

	Excellent	Good	Qualified	Fail
Number of people	0	1	59	763
Percentage	0	0	7.80%	92.20%

By students' physique model, it scores, and then ranks scores, takes schoolboys pass rate 7.8% that is the school physical health status.

In the following, make physical health evaluation on Class one schoolboys, evaluation scores from high to low is as following TABLE 17:

TABLE 17 : Class one schoolboys physical health evaluation

Student number	120001	120011	120004	120023	120006	120020	120008	120005
Score	100.23	94.179	88.845	85.89	84.78	83.99	83.96	83.77
Student number	120014	120015	120013	120016	120022	120019	120010	120009
Score	83.281	82.541	82.478	82.06	81.53	80.44	80.25	80.01
Student number	120012	120007	120002	120017	120021	120003	120018	
Score	79.99	79.54	78.56	78.52	78.29	77.41	72.17	

Class one has 23 schoolboys in total, model and qualified amount is $23 \times 7.8\% \approx 2$,that is to say Class one schoolboys only two with student number 120001,120011are qualified.

For schoolgirls health evaluation model, use above method, it gets correlation coefficient as following TABLE 18:

TABLE 18 : Schoolgirls health evaluation correlation coefficient

Lung capacity BMI	Step test	Standing long jump (m)	Sit and reach(cm)
0.714784	0.714681	0.709617	0.595462

It gets weights as following TABLE 19:

TABLE 19 : Get schoolgirls each item weight

Lung capacity BMI	Step test	Standing long jump (m)	Sit and reach(cm)
0.261391	0.261353	0.259501	0.217756

Schoolgirls reference scores are as following TABLE 20:

TABLE 20 : Schoolgirls each item reference score

	Lung capacity BMI	Step test	Standing long jump (m)	Sit and reach(cm)
Mean method	56.65	55.55	1.87	11.42
Percentile method	52.75	49.5	1.76	9.87
Reference score	54.7	52.52	1.81	10.65

According to "State physical health criterion" and attach TABLES through screening method, it gets schoolgirls data TABLE 21:

TABLE 21 : Screening criterion

	Excellent	Good	Qualified	Fail
Number of people	0	9	97	199
Percentage	0	2.95%	31.8%	65.24%

Finally, it gets schoolgirls score result as following TABLE 22:

TABLE 22 : Schoolgirls score result

120024	120025	120026	120027	120028
120.3124	119.5017	110.4683	108.476	106.8584

Schoolgirls good amount is $6\times 2.95\% = 0.177$, qualified amount is $6\times 31.8\% = 1.9$,it is nearly two schoolgirls are qualified, qualified schoolgirls student numbers are respectively 120024, 120025. Correlation data is as TABLE 23.

TABLE 23 : Class one physical health evaluation

	Excellent	Good	Qualified amount	Failed amount	Total amount	Qualified rate
Schoolboys	Without	Without	2	21	23	8.69%
Schoolgirls	Without	Without	2	4	6	33.33%

CONCLUSION

The paper solved weights and reference scores can grasp weights and reference previous results to provide their reference result by oneself accord to schools practical situation, after teachers inputting results in Excel; and then ranks students results, according to every school practical situation, take respective results controlled pass rate so that is convenient for scoring students, and further gets students physical health evaluation. The paper applies linear fitting, linear fitting as a common mathematical method in mathematical calculation, the model has been basically applied in building, physics, chemistry, and even astrophysics and aerospace. In general, linear fitting needs to take different fitting degrees according to practical demands; fitting has been widely used in industry, commerce, communication and transportation, engineering technology, public administration and other fields.

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REFERENCES

[1] Xiao Huan-Yu, Weng Zhi-Qiang, Chen Yu-Zhong; Basic Characteristics of Social and Sports Population Structures of

Contemporary China. Journal of Shanghai Physical Education Institute, **29(2)**, 10-14 **(2005)**.

[2] Xiao Huan-Yu, Fang Li; Concept, Classification and Statistical Criteria of Sports Population. Sports Science Research, **26(1)**, 7-10 **(2005)**.

[3] Miao Zhi-Wen, Qin Chun-Lin; Sociological analysis of contemporary Chinese sports population structures. Journal of Physical Education, **13(1)**, 119-121 **(2006)**.

[4] Yan De-Yi; Development of sports for all under circumstance of building well-off society. Journal of Wuhan Institute of Physical Education, **40(1)**, 15-19 **(2006)**.

[5] Guo Hong; Summary on Chinese Sports Population Research Since 1980s. China Sport Science and Technology, **43(3)**, 36-40 **(2007)**.

[6] Li Hong, Xue Hai-Hong, Feng Wu-Long; Sociological Analysis of Comparison of Chinese Population with the Sports Population of Chinese. Journal of Xi'an Institute of Physical Education, **24(4)**, 25-28 **(2007)**.

[7] Chen Po, Qin Zhong-Mei, Yin Ying, Xia Chong-De; Correlation Analysis of Current Situation of Regional Athletics Sports Development and Society Population Structure in China. Journal of Beijing Sport University, **30(12)**, 1610-1613 **(2007)**.

[8] Xue Jin-Xia, Wang Jing-Tong; Analysis on Development Level of Competitive Sports of Eastern China in the "Eleventh Five-Year" Period. Bulletin of Sport Science & Technology, **19(4)**, 57-59 **(2011)**.

[9] Li Lin, Yang Jie, Yang Tian, Xu Lie-Hui; A Research on the Sustainable Development of Evaluation Index System of Regional Sports Industry. Journal of Beijing Sport University, **9**, **(2010)**.