

2014

BioTechnology

An Indian Journal

FULL PAPER

BTAIJ, 10(10), 2014 [4625-4633]

Based on stepwise regression analysis of the rowing athlete selection potential research colleges and universities

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ABSTRACT

The coaches in the selection of athletes is mainly according to the performance of athletes in the game or the daily training, it has certain blindness. Potential model is established in this paper, through the, rowing over long distances, for example, for the coaches provide a based on stepwise regression analysis and cluster analysis of athlete selection method. By data analysis and correlation of the movement's biggest test project. Stepwise regression analysis was carried out on the data, and the results of the competition the most relevant test results. Athletes can be divided into three levels using the clustering analysis. According to the test result make the athlete result change curve. And the stable performance athletes before the last point of the slope, the value is the potential value of the athletes. According to the different level of athletes choose standard, choose a potential value of the highest level of the athletes athletes, is the most potential athletes more outstanding achievements

KEYWORDS

Potential model; Stepwise regression analysis; Cluster type analysis; Selection of athletes, Physiological index.



INTRODUCTION

Rowing originated in Britain, the second Olympic Games in 1990, a man rowing is listed as events. The development of Chinese rowing is started in 1913. China's first appeared about rowing, was established in Shanghai in 1913, the British "rowing association". 40 Russians in Harbin has established the "club", but only for foreigners. The earliest development of rowing, China is after the founding of new China. In 1954, Harbin first to develop the mass organizations of rowing activities. In 1959, with the development of rowing, rowing officially became the first session of the national games events. Rowing is developing fast in China, in Asia's emerging power in 1966, the Chinese rowing team scored the rowing three projects (single, double, four people). In 1973, China and the international federation of rowing. Since 1975, China sent teams to participate in world championships. In 1988, the Chinese rowing team, to take part in the Olympic Games for the first time, and for China to get a silver and a bronze good results.

The Chinese rowing team including China men's rowing team and the Chinese women's rowing team, is the first-class rowing team in Asia. Since the Chinese rowing team for the Asian games, won the outstanding achievement. Since the rowing in new Delhi since the Asian games became a full 1982 rowing, the Chinese team won the 72 gold MEDALS in 64. Shows the Chinese rowing team absolute dominance in Asia.

However, due to the origins of rowing are European countries. Our Asian countries in rowing the movement project is not dominant. The Chinese rowing team represented in five games, China has so far for China won one gold and two silver copper five gold MEDALS. This compared with British American and other countries, China's relatively backward. Relative to China and European countries have more rowing history and experience. This is the main reason for the Chinese rowing progress. In recent years, as a new generation of athletes, China also appeared a lot of have the potential to have the strength of rowing athletes. Among them, Jin Ziwei, Tang Bin four outstanding rowing female athletes, such as for China in the 2008 Beijing Olympic Games, won the first gold in Olympic history.

In order to make China rowing to continue the outstanding achievements, required to continue to select potential athletes to develop. Coaches choose canoeists' main method, is based on rowing athletes in the game options, no specific basis. Some coaches may see the athletes' physical quality, choose some of the young athletes, training for a long time. But these choices - law is blind, lack of the basis. In this paper, through the study of athletes training results, in the training of a team player, for example, provide coaches with a selection of method.

FORMULATION

We take the long distance rowing as an example, and analyze the performance of the athletes in the long distance test program. The athletes will conduct program test for the inspection of training progress. The long distance rowing over water range from 1.2km, 1.5km, 500m, 4km, 3km. Overload strength test biochemical criterion, 11.4km, according to the related materials, we can conclude that the 11.4km program can reveal the speed, endurance to some degree. So we choose the performance in the 11.4km as the criteria of selecting athletes. The label one shows the results of athletes in a certain program.

TABLE 1: the results of athletes in a certain program

athlete	On water	On water	On water	On water	On water	3km	Overload power test	biochemical criterion	On water
	1.2km	1.5km	500m	15.2km	4km				
	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9
A	2801.3	440.64	131.74	5238.22	1316.96	717.76	72.67	67.00	3981.10
B	335.65	421.54	131.57	5098.86	1305.82	870.55	72.33	66.18	3924.47
C	361.41	409.70	129.62	4977.39	1294.71	868.50	59.33	59.91	3905.12
D	324.22	437.65	130.51	5181.29	1329.43	817.28	62.67	62.14	3991.65
E	299.05	396.43	121.16	4804.03	1190.64	703.58	81.67	66.59	3700.45
F	297.58	390.97	125.53	4842.94	1213.98	758.84	82.50	74.06	3793.64
G	313.82	404.47	130.45	4919.18	1248.27	756.93	66.67	65.95	3854.75
H	310.07	407.65	130.03	4994.88	1264.85	787.94	86.00	67.14	3908.50
I	349.94	418.50	131.72	4934.46	1313.20	900.95	78.33	63.44	3923.00
J	310.43	385.95	122.32	4797.35	1314.48	792.74	95.00	66.82	3737.18

Their performance varies due to their initial ability, besides, the growth of veteran sportsman after long time training is slower than that of young sportsman after a short time of training. For that, selecting the sportsman according to their growth ratio is not fair for the veteran sportsman, and it is also unfair for the new sportsman according to the results in the program. So, in terms of the potential of athletes, we establish a study model and test the potential of athletes in rowing, which provides a way for the coach the select athletes of greater potential.

We define potential as the growth rate of a potential athlete after long time training when their performance tends to become steady.

By establishing the study model, we analysis their pace of progress in the 11.4 km program which can reveal their pace of development in rowing, that is to say, the potential of an athlete. Under the help of MATLAB, and stepwise regression analysis, we analyze the collected data and analyzed all the data with stepwise regression analysis; we come to the results as the Figure 1 shows:

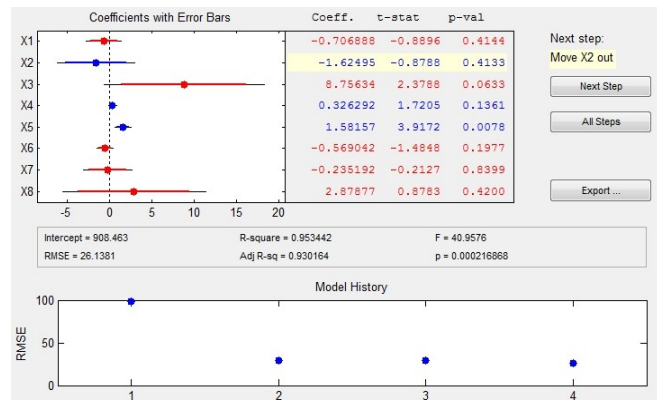


Figure 1 : the result of stepwise analysis

B is the estimated result of the coefficient of linear equations, and the first value represents a constant, the second value indicates the regression coefficients. bint is the confidence interval of the confidence coefficient, the value of which estimated to be 95%, r represents the residuals, rint represents the confidence interval for each of the residuals, stats for the test of static of regression model, of the three values in which R_2 and Represent regression statistics and P values were significant probability,

alpha is the confidence level. The greater the correlation coefficient r^2 , the more significant the regression equation would be; When (the probability corresponding with F) $P < \alpha$ H_0 would be refused, so the regression model was established:

$$y = -1.62495x_2 + 0.362392x_4 + 1.58157x_5$$

As can be seen by Figure 1, the value associated with the maximum value of y are x_2, x_3, x_4 . In Stepwise regression process, when values R^2 and F are gradually larger, p value is gradually reduced. The whole process shows that three regression model containing x_2, x_3, x_4 is reasonable. Therefore, the final result of stepwise linear regression is:

$$y = -1.62495x_2 + 0.362392x_4 + 1.58157x_5$$

The results of stepwise linear regression show that in the test project, the test scores in 1.5km has the greatest effect on the scores of athletes 11.4km. The thing that has the greatest association with water 1.5km and 11.4km water projects and Rowing Athletes. The training date 1.5km test results of the collected athletes list as follow in TABLE 2:

TABLE 2 : Results of athletes in the 1.5km program

A		B		C		D		E	
0	501.90	0	405.72	0	419.50	0	517.18	0	391.10
45	410.38	50	478.00	43	612.93	45	405.19	36	405.56
114	409.63	95	400.56	50	421.67	68	390.57	43	398.55
		163	401.87	95	396.75			50	400.88
				163	397.64			95	393.14
								163	389.34
F		G		H		I		J	
0	384.69	0	408.37	0	416.84	0	413.20	0	379.01
36	401.14	36	417.92	7	409.95	36	414.71	36	393.74
43	391.20	43	403.67	13	408.86	43	415.94	43	387.51
50	395.50	50	406.72	58	404.71	50	424.91	50	393.00
95	382.30	95	395.53	127	397.88	95	417.64	96	380.59
		163	394.63			163	424.57	163	381.82

The collected data from the program of 11.4km is incomplete; the vacant part can be added by minimum adjacent point interpolation method. So we get the 11.4 km test scores in TABLE 3:

TABLE 3 : the 11.4 km test scores (the red ones are added)

A	B	C	D	E	F	G	H	I	J	
0	4135.52	3998.85	4001.13	4132.25	3786.52	3868.33	3961.34	3978.64	3962.23	3851.33
9	4508.13	4236.03	4256.57	4516.80	3811.11	4140.85	4200.69	4200.72	4168.54	3941.92
14	4216.52	4064.85	4073.26	4195.77	3682.79	3747.64	3924.62	4015.93	3875.17	3764.60
15	4216.52	4064.85	4073.26	4195.77	3779.18	3676.55	3950.39	4015.93	3986.27	3833.73
17	4223.98	4196.31	4228.65	4196.86	3779.18	3676.55	4002.18	4041.43	4013.98	3906.13
28	3734.04	3835.94	3742.55	3769.74	3560.14	3534.85	3716.39	3609.62	3824.31	3618.62
30	3660.06	3754.90	3582.95	3758.46	3560.14	3534.85	3732.90	3609.62	3824.31	3596.84

38	3641.37	3635.87	3645.52	3669.8	3560.14	3534.85	3575.38	3735.61	3630.50	3469.15
65	3729.17	3672.98	3710.29	3693.54	3582.94		3628.87	3777.54		3652.32

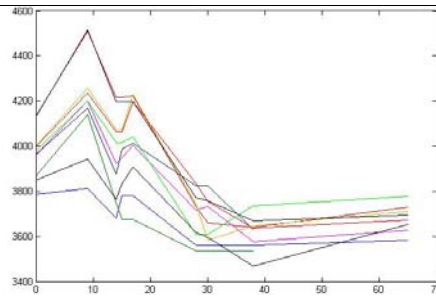


Figure 2 : Athletes water line chart 11.4 km test scores

From the Figure 2, it can be seen that at the start of the athletes, because their strength is different, their scores vary. But gradually their scores growth tends to be stable later, and the difference between them starts to reveal. Athletes, with the method of cluster analysis are divided into early, middle and high level athletes.

C luster analysis of the basic idea is to assume that each sample as Sui generic, so the distance between different kinds is the distance between the samples, if the difference between two kinds is almost the same, then the two kinds will be merged into a new class. nest we will calculate the distance between new class and other classes, so every time a narrow category, until almost all kinds are merged into one kind. And then determine the final classification according to need or the threshold value.

According to the thought of clustering analysis, athletes can be divided into ten classes at first. Calculate the distance between the two of the ten classes; merge the closest distance between every two. Continue this until they merge into three categories in the end. Cluster analysis results are as follows:

Junior athletes: A, D

Intermediate athletes: B, C, G, H, I

Senior athletes: E, F, J

We use meander line to show the results of athletes, and the results of athletes list as follow Figure3-12:

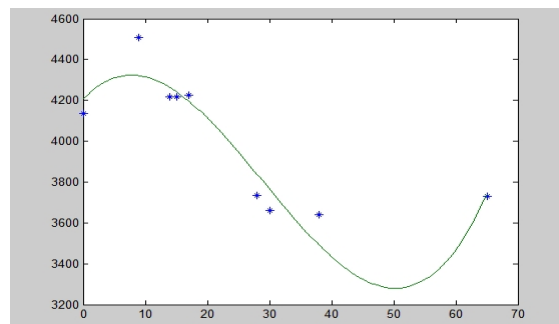


Figure 3 : The result of athlete A in meander line

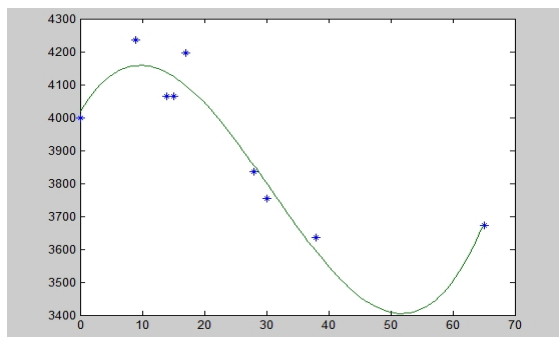


Figure 4 : The result of athlete B in meander line

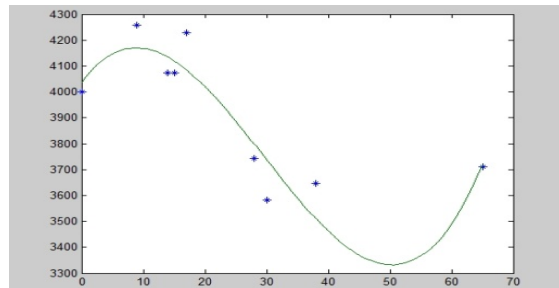


Figure 5 : The result of athlete C in meander line

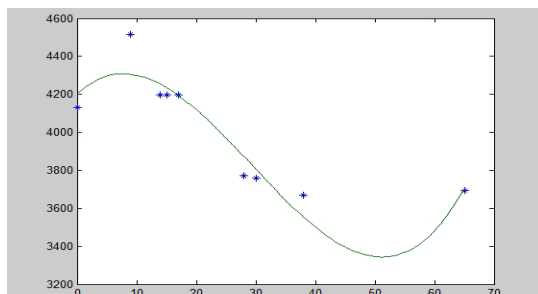


Figure 6 : The result of athlete D in meander line

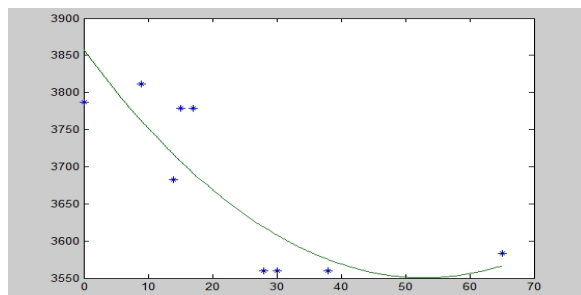


Figure 7 : The result of athlete E in meander line

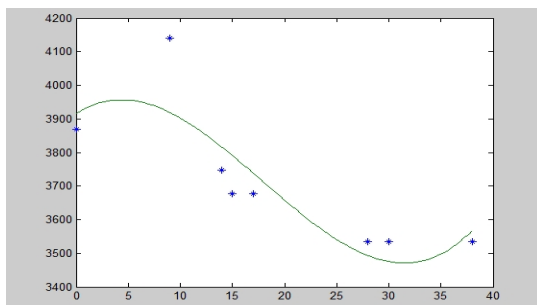


Figure 8 : The result of athlete F in meander line

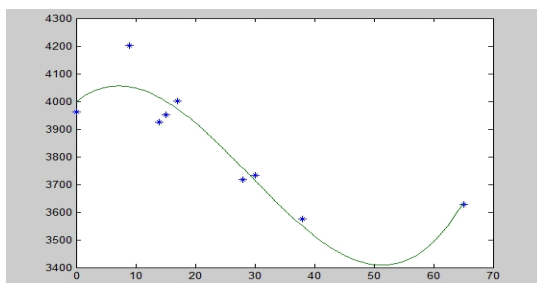


Figure 9 : The result of athlete G in meander line

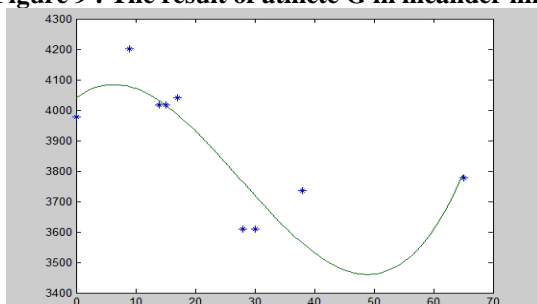


Figure 10 : The result of athlete H in meander line

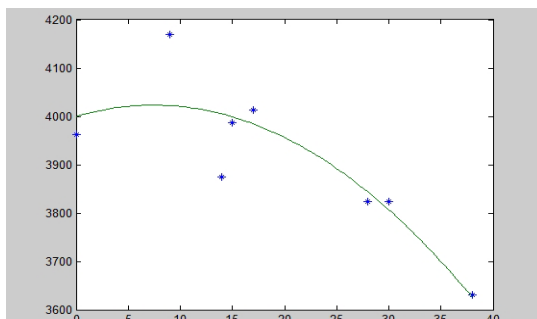


Figure 11 : The result of athlete I in meander line

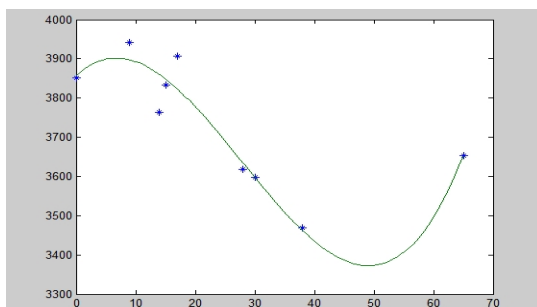


Figure 12 : The result of athlete J in meander line

By studying the results curve line of 10athlets in 11.4 program, we can find that the major results trends of all the athletes are basically the same, when the changes are basically the same, the lengths of time for them to get the best results are also nearly the same, and their time to maintain a stable result is basically the same.

Please calculate the last slope of the athletes when they performance is basically stable and its absolute value. The potential value list as follow TABLE 4

TABLE 4: The potential value

athletes	Potential value
A	3.25
D	0.37
B	0.42
C	1.75
G	1.98
H	1.55
I	2.57
E	0.84
F	2.41
J	6.78

According to the analysis in TABLE 4, the smaller the slope of the tangent, the better the athlete tends to be, the greater the potential of the athlete. It can be concluded as:

Junior athlete potential: $D > A$

Intermediate athletes potential: $B > H > C > G > I$

Senior Athlete potential: $E > F > J$

Based on the above information, coaches can choose higher potential athletes according to their levels and potential, this is better to achieve better results.

However, in real situation, athletes are different; areas of expertise of each person are also different. Combined analysis of three levels of athletes, we can see the progress of junior athletes is faster, have greater development potential. You can choose the primary athletes, as follow-up forces and give them long-term high-quality primary training, thus the athletes achievements will quickly grow and become the backbone of the new generation in the field.

Intermediate athletes' performance progress gradually stabilized after a period of training. In the mid-athletes, C's potential value stands out, so is the test scores of Water 11.4km program. So in Intermediate athletes, athletes C's potential is large, you can choose he.

Senior athletes' progress in performance is the less than the other two among the three levels of athletes. The reason is that after a long period of training, high-level athletes have reached a peak in terms of fitness and skill levels. It is more difficult to conduct further improve in the training and may even be back. So for advanced players, compared with the ability to improve performance, it is more important to maintain their potential. Among senior athletes E has greater potential, we can choose him.

CONCLUSION

In rowing, for example, the model mainly provides a long boat race athlete selection method. Analyze the athletes training test scores. Select associated with long distance rowing match result one of the biggest training test scores, through the establishment of stepwise regression model, get the correlation between the training test scores and one of the biggest training. Two kinds of training of athletes performance data analysis, potential model is set up. Athletes and use the cluster analysis divided into elementary, secondary and senior three levels. Makes the performance curve according to

the score line chart, and obtain stable performance athletes before a bit, of the absolute value of the performance curve slope is the potential value of the athletes. According to the selection of athletes of different levels, different rank highest potential value of athletes, the biggest development potential.

This method not only can be used for long distance rowing athlete's selection, rowing athletes can also be used to select a short distance. When selecting short rowing athletes, test scores, can be studied to athletes can direct response in short rowing match performance test project. The model can also be used for other events, the athletes of different levels of selection.

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