



BioTechnology

An Indian Journal

FULL PAPER

BTAIJ, 10(2), 2014 [061-067]

The prediction research of “group of death” in FIFA world cup based on offensive efficiency and defensive efficiency

Hui Chang

Northwest Agriculture and Forestry University, Yangling 712100, Shanxi, (CHINA)

ABSTRACT

The “group of death” in World Cup has been the focus of attention of the participating teams. In this study, it takes the recent technical statistic results of each football team in the game as the data basis, conducts a comprehensive analysis on the win and lose sessions, goals and fumbles and the relevant data in the statistics data by the established model, and obtains the relationship expression of the team’s offensive efficiency M and defensive efficiency N . When the two teams meet, we can use the two teams’ offensive efficiency and defensive efficiency to calculate the respective winning probabilities W_i of both teams through the model. Apply the model in the round robin group stage of the World Cup, get the relative winning probability, get the variance D_ξ of relative winning probability of all the teams and then explain the competition intensity degree of the group game. Through the data analysis and forecasting on the intensity degree of the group stage in 2014 Brazil World Cup, this paper concludes that the intensity degree of the B, D and G groups is the maximum.

© 2014 Trade Science Inc. - INDIA

KEYWORDS

World cup;
Winning probability;
Intensity degree;
Gray prediction;
Group of death.

INTRODUCTION

A football match will be affected by objective factors, such as the weather, wind direction, temperature on the race day, enthusiasm degree of the audience on the field, the hardness of the venue, the level of the other players and whether the referees enforce law justly and other factors. But the outcome of a football match mainly depends on the strength of both teams. In large soccer match like the World Cup, only according to the process of qualification rules and lottery rules can the group-

ing condition of the final group match be obtained. So there will be some teams with considerable strength in these team sessions, and the game will be more intense, there are also conditions that the strength of the team competition differs largely, there will be no surprise. Therefore, after the grouping condition of the group stage is announced in the World Cup, there will appear “group of death”. This study focuses on the grouping condition of the World Cup group stage, and carries through the prediction research on the competition intensity degree of the team within the group.

FULL PAPER

Football tactics can be divided into offensive and defensive; in the game one-sided emphasis on the offensive or defensive will lead to the failure of the game. Offensive efficiency is mainly reflected in the effective attack number of players on the field, the goal number is the result of the final offensive efficiency. The defensive efficiency is mainly reflected in the effective attack number of players on the field that can break opposite side; the number of fumbles is the result of the ultimate defensive efficiency. Therefore, this paper takes the pros and cons of points, draw win and lose session as data basis, takes the offensive efficiency and defensive efficiency as intermediate relations and builds a model that can determine the competition intensity degree of the race team.

THE COMPREHENSIVE PREDICTIVE MODELING AND SOLVING

It is known that winning every game record three points, a draw record 1 point, lost a game record 0 point, then we can see the relationship between the teams' total score y during the entire league matches and x_1, x_2, x_3 : $y = 3 \times x_1 + 1 \times x_2 + 0 \times x_3$

And the goal difference g , the total goals m and the total fumbles n have the following relationship:
 $g = m - n$

Therefore, we can find the relationship between offensive efficiency M and total goals m , total points y and x_1, x_2 : $M = a \times m \times \frac{x_1 + 0.5 \times x_2}{y}$.

Defensive Efficiency N and fumble numbers n have inversely proportional relationship, which is the higher the number of fumbles is, the lower the team's defensive efficiency becomes; thus, draw the expression

of defensive efficiency N :
$$N = \frac{b}{n \times \frac{0.5 \times x_2 + x_3}{y}}$$

Assuming that when the team A and the team B meet for the first time in the game, we can use the offensive efficiency M and defensive efficiency N and the relevant data of the two teams through race process to predict the winning probability of the two teams,

this model gives the following formula:

The winning probability W_1 of team A : $W_1 = \frac{M_1}{M_2 N_2}$

The winning probability W_2 of team B : $W_2 = \frac{M_2}{M_1 N_1}$

Because when the two teams meet, the winning probability of team A and team B is close to or equal to each other, the competition of the two teams is more intense; thus, the intensity degree $Q_{A,B}$ of the game is related with the winning probability of team A, B . Therefore, this paper takes the competition teams in a single round-robin tournament of the group match in the World Cup as the study object, the statistic in TABLE 1 gives a general theory results:

TABLE 1 : The competition intensity degree statistics of 4 teams in world cup

Teams	Team 1	Team 2	Team 3	Team 4
Team 1	—	$Q_{2,1}$	$Q_{3,1}$	$Q_{4,1}$
Team 2	$Q_{1,2}$	—	$Q_{3,2}$	$Q_{4,2}$
Team 3	$Q_{1,3}$	$Q_{2,3}$	—	$Q_{4,3}$
Team 4	$Q_{1,4}$	$Q_{2,4}$	$Q_{3,4}$	—

Assuming the competition intensity degree between arbitrary two teams is located $Q_{i,j}$ ($i = 1, 2, 3, 4, j = 1, 2, 3, 4$ and $i \neq j$)

$$Q_{i,j} = \frac{W_i}{W_j}$$

Similarly, we have:

$$Q_{i,j} = \frac{1}{Q_i}$$

When $Q_{i,j} \approx 1$, the two countries have basically the same probability of winning as 50%, the football team's strength is quite deadlock, the competition intensity degree is higher.

In order to more accurately depict the intensity degree of the competition, the expression of the competition intensity degree is listed below:

The average value of competition intensity degree:

$$\overline{Q_{i,j}} = \frac{\sum_{i=1}^4 \sum_{j=1}^4 Q_{i,j}}{12}$$

($i=1,2,3,4, j=1,2,3,4$ and $i \neq j$)

The variance of competition intensity degree:

$$D_{\xi} = \frac{Q_{i,j}}{\sum_{i=1}^4 \sum_{j=1}^4 Q_{i,j}} (Q_{i,j} - \overline{Q_{i,j}})^2$$

($i=1,2,3,4, j=1,2,3,4$ and $i \neq j$)

The value of D_{ξ} can illustrate the strength gap of each team in the group; the greater D_{ξ} is, the large the strength difference between the teams is, and vice versa competitive level is pretty fair.

The variance D_{ξ} of competition intensity degree can accurately express the intensity degree when teams duel; but in order to exclude the special circumstances that the competition intensity of the group match is high when there are three strong teams and one weak team in the four representative teams, here this model is further explained.

Each team of the World Cup has four representative teams, first take out the three representative teams and calculate the competition intensity degree between these three teams, the calculated process is as follows in TABLE 2:

TABLE 2 : The competition intensity degree statistics of 3 teams in world cup

Teams	Team 1	Team 2	Team 3
Team 1	————	$Q_{2,1}$	$Q_{3,1}$
Team 2	$Q_{1,2}$	————	$Q_{3,2}$
Team 3	$Q_{1,3}$	$Q_{2,3}$	————

$$D'_{\xi} = \frac{Q_{i,j}}{\sum_{i=1}^3 \sum_{j=1}^3 Q_{i,j}} (Q_{i,j} - \overline{Q_{i,j}})^2$$

($i=1,2,3,4, j=1,2,3,4$ and $i \neq j$)

There are a total of A_4^3 kinds of situations take 3 teams from the 4 teams, it will get $D'_{\xi 1}, D'_{\xi 2}, D'_{\xi 3}, D'_{\xi 4}$; in the obtained four D'_{ξ} select the maximum value $D'_{\xi \max}$ as the maximum variance and select the minimum value value $D'_{\xi \min}$ as the minimum variance, namely:

$$D'_{\xi \max} = \max(D'_{\xi 1}, D'_{\xi 2}, D'_{\xi 3}, D'_{\xi 4})$$

$$D'_{\xi \min} = \min(D'_{\xi 1}, D'_{\xi 2}, D'_{\xi 3}, D'_{\xi 4})$$

If the maximum variance $D'_{\xi \max}$ and minimum variance $D'_{\xi \min}$ differs less, then the four teams' level is quite fair, the intensity degree is the highest; if the maximum variance $D'_{\xi \max}$ and minimum variance $D'_{\xi \min}$ varies widely, it indicates that in the four teams a team's level differs greatly from the other three teams level, the intensity degree will slightly reduce; by using this model we can more accurately depict the tournament situation of the group match.

THE EMPIRICAL TEST OF THE COMPREHENSIVE FORECAST MODEL

Use the statistical competition results of each team in 2010 World Cup (see TABLE 2) to predict the intensity degree of the 2014 World Cup in Brazil:

According to the statistical competition results of each team in 2010 World Cup and the relation between the offensive efficiency and defensive efficiency established in this article obtain the calculations results of offensive and defensive efficiency in TABLE 4.

According to the offensive and defensive efficiency calculation results of each team in 2010 World Cup, respectively obtain the relation graph of the offensive efficiency (Figure 1), defensive efficiency (Figure 2), and rank diagram.

Given the grouping condition of the 2014 World Cup in Brazil, predict the intensity degree of the following eight teams in the group phase, as shown in TABLE 5.

TABLE 3 : The statistical competition results of each team in 2010 world cup

Ranking	Team name	session	win	draw	lose	Goals	fumble	Goal difference	Integration
1	Spain	7	6	0	1	8	2	6	18
2	Netherlands	7	6	0	1	12	6	6	18
3	Germany	7	5	0	2	16	5	11	15
4	Uruguay	7	4	1	2	11	8	3	13
5	Argentina	5	4	0	1	10	6	4	12
6	Brazil	5	3	1	1	9	4	5	10
7	Paraguay	5	2	2	1	3	2	1	8
8	Ghana	5	2	1	2	5	4	1	7
9	Japan	4	2	0	2	4	2	2	6
10	Chile	4	2	0	2	3	5	-2	6
11	Portugal	4	1	2	1	7	1	6	5
12	United States	4	1	2	1	5	5	0	5
13	England	4	1	2	1	3	5	-2	5
14	Mexico	4	1	1	2	4	5	-1	4
15	Republic of Korea	4	1	1	2	6	8	-2	4
16	Slovakia	4	1	1	2	5	7	-2	4
17	Côte d'Ivoire	3	1	1	1	4	3	1	4
18	Slovenia	3	1	1	1	3	3	0	4
19	Switzerland	3	1	1	1	1	1	0	4
20	South Africa	3	1	1	1	3	5	-2	4
21	Australia	3	1	1	1	3	6	-3	4
22	New Zealand	3	0	3	0	2	2	0	3
23	Serbia	3	1	0	2	2	3	-1	3
24	Denmark	3	1	0	2	3	6	-3	3
25	Greece	3	1	0	2	2	5	-3	3
26	Italy	3	0	2	1	4	5	-1	2
27	Nigeria	3	0	1	2	3	5	-2	1
28	Algeria	3	0	1	2	0	2	-2	1
29	France	3	0	1	2	1	4	-3	1
30	Honduras	3	0	1	2	0	3	-3	1
31	Cameroon	3	0	0	3	2	5	-3	0
32	North Korea	3	0	0	3	1	12	-11	0

Use the relevant data and models to analyze the intensity degree of each group for the teams of these eight groups, by comparing the final results obtain the three groups with the biggest intensity as shown in Table 6 below.

Calculation results analysis

The $D_{\xi}'_{\min}$ and $D_{\xi}'_{\max}$ in Group B differs less, indi-

cating that the four teams' competitive level in Group B has little difference, the strength is very close, and the game will be very intense.

The condition of group D and group G are the same, the value of $D_{\xi}'_{\min}$ is very small and the value of $D_{\xi}'_{\max}$ is very large; it can be seen from the data that there may appear three teams with considerable strength in these

TABLE 4 : The offensive and defensive efficiency calculation results of each team in 2010 world cup

Ranking	1	2	3	4	5	6	7	8
Offensive efficiency	6.86	10.29	11.43	7.07	8.00	6.30	1.80	2.50
Defensive Efficiency	3.45	1.16	0.70	0.35	0.83	0.83	1.25	0.50
Rank	9	10	11	12	13	14	15	16
Offensive efficiency	2.00	1.50	3.50	2.50	1.50	1.50	2.25	1.88
Defensive Efficiency	1.00	0.40	2.00	0.40	0.40	0.32	0.20	0.23
Rank	17	18	19	20	21	22	23	24
Offensive efficiency	2.00	1.50	0.50	1.50	1.50	1.00	0.67	1.00
Defensive Efficiency	0.67	0.67	2.00	0.40	0.33	1.00	0.50	0.25
Rank	25	26	27	28	29	30	31	32
Offensive efficiency	0.67	1.33	0.50	0.00	0.17	0.00	0.00	0.00
Defensive Efficiency	0.30	0.30	0.24	0.60	0.30	0.40	0.20	0.08

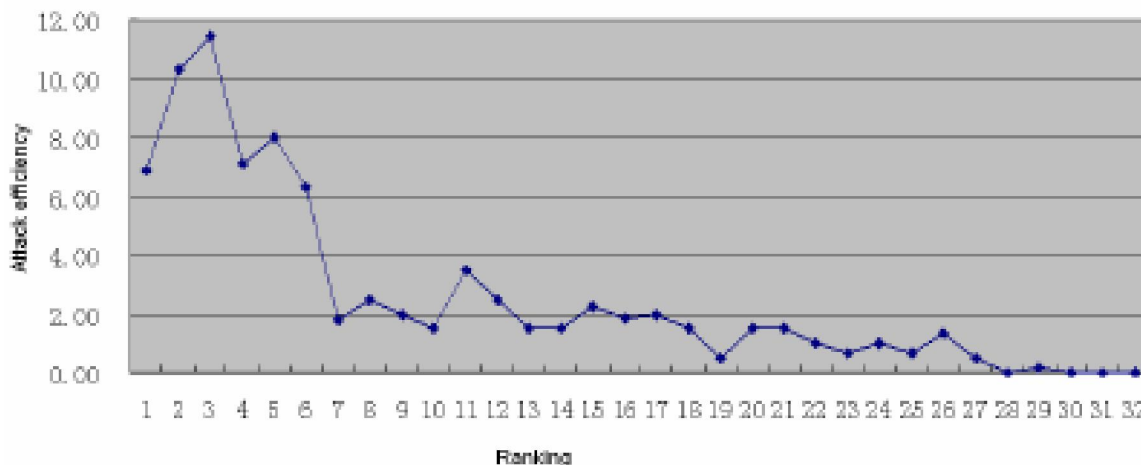


Figure 1 : The relation graph of the offensive efficiency and ranking

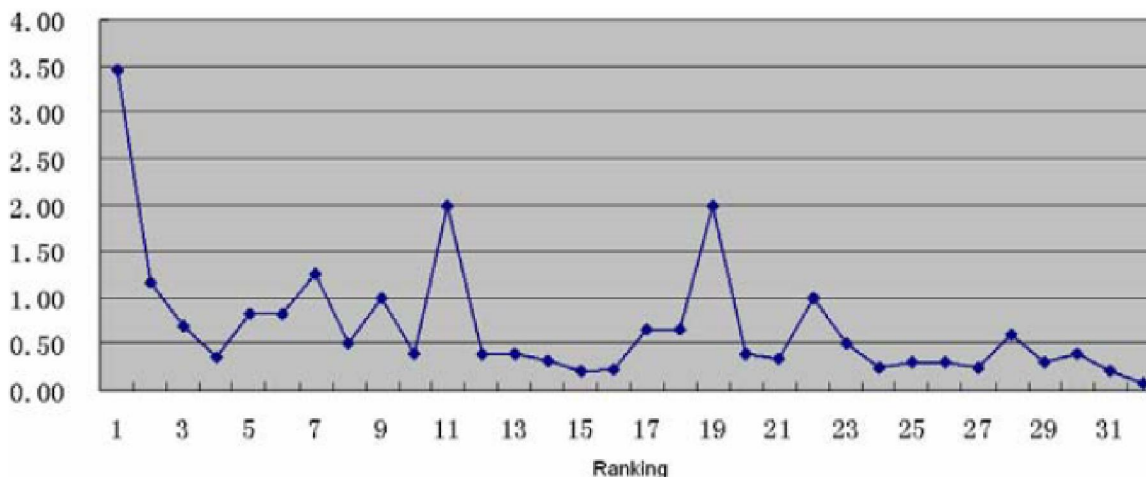


Figure 2 : The relation graph of the defensive efficiency and ranking

two groups; when these three teams compete for the qualifying place of top two, the competition process of the group stage is more intense.

By browsing the web reviews and consulting rel-

evant historical data, derived from the expert’s analysis and forecast “group of death” in group game of the 2014 Brazil World Cup are group B, group D and group G, which is basically consistent with the results predicted

TABLE 5 : The grouping condition of the 2014 Brazil world cup

Groups	Seeded team	Second gear	Third gear	Fourth gear
Group A	Brazil	Cameroon	Mexico	Croatia
Group B	Spain	Chile	Australian	Holland
Group C	Columbia	Ivory Coast	Japan	Greece
Group D	Uruguay	England	Costa Rica	Italy
Group E	Switzerland	Ecuador	Honduras	France
Group F	Argentina	Nigeria	Iran	Bosnia and Herzegovina
Group G	Germany	Ghana	The United States	Portugal
Group H	Belgium	Algeria	Korea	Russia

in this article, indicating that the established intensity degree prediction model of the World Cup is reliable. Group D is absolutely true "group of death". England, Italy and Uruguay will fight to the death; this is the first time in World Cup history that three championship teams meet in the group stage, the tragic extent flings straight to five stars. Compared to the stable Italy and "crazy" Uruguay, England is a little "tepid." Once the ballot results came out, many commentators marvel that "the England team will out." After Beckham retired, the Three Lions was rated lacking of star quality, Gerrard, Rooney are not really super idol. In contrast, the two rivals, two shooters Cavani and Suarez of Uruguayan are ruling PSG and English Premier League, Italian core Andrea Pirlo can only be regarded as "masterful midfield" in this World Cup.

CONCLUSIONS

Only the seeded teams in World Cup are grouped according to the FIFA rankings, the generation of 2, 3, 4 grade team is determined by geography and sports standard (geographic and sports criteria). Take the 2010 World Cup, for example, the second grade is the teams in Asia, Oceania, North America and the Caribbean area; the third grade is the teams in African and South American area, the fourth grade is the team from the European area. In addition to the European team, the team of the same continent cannot be in the same group, the host must be in Group A, while the third grade team will adopt the same continents avoiding principles dur-

ing the team draw.

This model is established based on the game facts in the World Cup, the study takes the practical issues as the background; through the establishment of functional relationship between the various data, and it ultimately predicts the competition intensity degree between the teams of the group game. In order to make the model more in line with the actual situation, in late period of the modeling the model also be extended; it analyzes the grouping condition for 2014 Brazil World Cup, and ultimately finds the most brutal three "group of death". We still require in-depth study of the model and can add the research on condition of objective factors in the future study course, which makes the results more accurate and effective.

REFERENCES

- [1] Tony Karon; Beware Wall Street's World Cup Predictions [J]. Overseas English, **8**, (2010).
- [2] Ni Yu Ming; Analyze the Past World Cup Football Games and Predict the Outcome of China Football Team's First Participation in the World Cup Final [J]. Fujian Sports Science and Technology, **21**(2), 4-7 (2002).
- [3] Ren Yi; A Program for Predicting World Cup's Group Matches Promotion Results [J]. Computer Programming Skills & Maintenance, **18**, 45-47 (2012).
- [4] Wang Dingwei; A Poisson Distribution Based Simulation for World Cup of Soccer in South Africa [J]. System Simulation Technology, **6**(1), 64-70 (2010).
- [5] Peng Xiaosong, Zhu Wenyi; A primary analysis on

the strategy of host city of the opening ceremony & first match of the fifa world cup: A series of strategic studies on the planning of the fifa world cup 2018 in China (4)[J]. *World Architecture*, **7**, 152-155 (2007).

- [6] Xia Han-Min; A Team Evaluation System Based on Fuzzy-Neural Network [J]. *Computer Simulation*, **24(12)**, 163-165 (2007).
- [7] Zheng Niangyou; Statistical Analysis about Forecasting the Number of the Audience for the World Cup in Japan and Korean in 2002[J]. *Journal of Huaihua University*, **5**, (1999).