

Shot Rate Calculation of Soccer Match based on Monte Carlo Cycling

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Abstract: The development of Chinese football today, the competitive level still cannot meet the fans expectations, inefficient football shooting technology has become an important technical factor blocking our football dream. In all sporting events, psychological activity positively or negatively affects the result of the sporting event. Psychology is a reflection of the objective reality of the human brain, a product of the interaction of cognition, emotion and will, which can be transformed or maintained at a relatively high level of intensity for a long time. We talk about the Monte Carlo method used in the calculation of the shooting percentage of soccer matches.

Keywords: Monte carlo loop; Soccer match; Shot; Hit rate; Calculation; Application; Research

1. Introduction

The development of Chinese football today, the competitive level still cannot meet the expectations of fans, the inefficient football shooting technology has become an important technical factor blocking our football dream, compared to the domestic league and the UEFA shots and shooting efficiency, the results show Super League Club The number of shots below the European League, the football striker who cannot get an effective grasp of opportunities in front of the door, which led to our football goal score as a luxury a key factor. This article uses Monte Carlo method to explore the effect of gate football in competitive football teaching. In order to explore the solution, a lot of simulation training methods have been designed. In practice, these methods are applied to football teaching and one of the football games found is very helpful to improve the efficiency of football shooting. In addition, this method if applied to competitive football which can improve the shooter's shooting skills still need further verification.

Football development today, Kunitari athletic standards and performance is still far below the expectations of fans, go out of the country out of Asia, has become close to the dream of contemporary fans. The lack of genius shooter, bad shooter shinster blocking our dream of football to achieve a stumbling block. Football both the national fitness value, but also great economic value. Zhang Jilong, former vice president of the Chinese Football Association, once said: "For so many years, Chinese football has been exploring and finding a suitable path for its own development. We have also engaged in professionalism for more than 10 years and we look back, Chinese football is still spinning in place, which makes us have to reflect on what kind of road to be able to engage in the development of Chinese football. "Since the

appearance of the 2002 World Cup, the national football into a long period of recession, especially the China Football Mato 1: 5 The score of our good wishes into a dream of luxury, the Chinese football into a dilemma. Raising the level of football technology is the task of our era generation of football, training super shooter to become the shortcut to solve the current predicament, but also the dream of football coaches of all ages. Young football players have a dream, for their football dream, and exercise, do not give up.

In order to analyze our domestic shooters to cultivate the environment, I made such a statistic, nearly three seasons in major European league and Super League, the top ten clubs of the season the average number of shots, goal shooting rate. All data from Sina soccer statistics. Analysis shows the super shot hit rate in the six league rankings are middle rank, hit rate higher than the French, English Premier League, Serie A, only lower than the Bundesliga and La Liga. Shot efficiency has been a very good training market, but the number of shots, the Super addition to a little higher than the French, the average court less 1-2 times the number of shots, a season less 38-76 shots Chances, well below the other four major leagues. The number one team in the UEFA EURO soccer league has shot at around 700 throughout the season. In addition to Evergrande's 600 or more performances by 2015, the other teams barely reached 500 from the shooting efficiency, the top ten Supernova 13-14 season top ten only two local players even if the league shooting rate is high, but the main shooter are mostly super-foreign aid, so football players shot opportunities or very little. Integrated the world's major league shooting efficiency data analysis, super league shooting efficiency and major league or less if the national football striker who can get enough playing time, then they still have enough training

opportunities, but also have the opportunity to become a super shooter.

The soccer shooter who wins the competition is the key link, the technicality which the soccer shooter is strong, needs to shoot the angle to the soccer to carry on the optimization to solve, shoots the angle analysis mathematical model through the establishment of soccer, uses the computer simulation and mathematics modelling method carries on the superior angle analysis, realizes scientific analysis which shoots to the soccer to train, enhances scores a point the probability, the union shooter the way plan to carry on the soccer to shoot the path way analysis can by reasonable shoot the angle to complete shoots a ball. In the table 1, we show the motion analysis of the proposed model.

2. The Motion Analysis of the Proposed Model

2.1. Motion analysis of the proposed model

2.1.1. Details

Soccer is an instep shot technique of biomechanics features: football from the moment of maximum knee speed to the moment of foot touch before the leg swing stage. In the process of playing football. Because of the natural inertia of the body. Ask for an appropriate step up to the last step and support your feet. Support your feet first on the heel, and while the hips are on the hips, support your feet on the heel to land on your feet. The support of the body is converted from a diagonal brace to a straight brace, especially at close quarters. A more active step is needed to move the kick.

Frontal ball; the front of the forehead is hard and flat, the ball is large, it is in front of the head and above the two eyes, it is convenient to observe the ball around the ball when the ball is on the ball, so that the shot is accurate and powerful. Place kick action method as an example, the head when the first selected stations, the body is to the direction of the ball, feet after opening, bend the knee, the focus in the post. Watching the ball, to judge the speed of the ball, ready to work, the waist legs before and after the opening before the very mention, chest, arms, mandibular flat open, upper body inclination and the body center of gravity on the right on the head when the foot pedal rapidly, the upper body from a forward swing. Frontal side of the top of the ball, the frontal side of the dome of the site is the forehead on both sides. Although this part is also hard, but not flat, the area is small, but also in the two sides of the front, the top of the ball when the body force direction and the direction of the ball is not met, the smaller the power of the ball. Take the on-the-spot jacking as an example: The front leg and the direction of the ball are taken one step forward on the ipsilateral leg, the knees are slightly bent, and the body center of gravity is placed on the rear leg. Upper body

and head slightly to the opposite side of the tilt and swivel about 45, eyes strabismus to the ball, arms naturally open. When the top of the ball, the rear pedal, upper body and head to the direction of the ball quickly reversed. The rest body in front of the shoulder with the same side of the direction of the ball out of the top, with the frontal side of the front ball.

3. Calculating the Shooting Rate of a Goal based on Monte Carlo

3.1. Monte carlo prediction

Based on a given rule, the Monte Carlo method learns the state-value function by averaging the returns in all the "visit" experiences over that state, assuming that given a episodes collection that follows the rule π , in an episode Each time in states is called a visit to states, the first time in every episode s is called first visit to s .

The prediction methods in MC can be divided into two types: first-visit MC and every-visit MC, where the first-visit MC method is the average of all first visits that evaluate $v\pi(s)$ as s , and the every-visit MC method is Evaluating $v\pi(s)$ as the average of all visits for s , these two methods are very similar with only slightly different theoretical properties. Both converge to $v\pi(s)$ when s is visited for an infinite number of times. First-visit MC pseudocode as shown below, each of its return value is an independent, and with a finite variance, each average is an unbiased estimate, this estimate can be said to be square convergence.

For the signal in stationary white Gaussian noise, it is naturally conceivable to use the difference between the eigenvalue corresponding to the noise space and the eigenvalue corresponding to the signal space to decompose the eigenspace and estimate the number of sources. Obviously this method does not work for SNRs below 0 dB. In addition, if the incident angle of the space source is close, the eigenvalues corresponding to these two sources are also small, so that it is more difficult to accurately estimate the source number. But the advantages of this approach are straightforward and do not add extra computation, making it attractive. To adopt this method, we must solve the problem that the signal subspace and the noise subspace are separable, and make full use of the output of the array element to construct a higher-dimension matrix with rank d .

The backup diagram estimated by the Monte Carlo method is shown below. From this we can see that each experience of the MC method begins with an initial state (ie, the root node) traversing each transition along particular episode Experienced nodes, the end of the final state. For a certain node, the MC method only contains the conversion of the action selected by the particular episode, and the DP method will include all possible conversions.

Globally, the MC method includes all conversions experienced by an episode, while the DP method contains only one-step conversions.

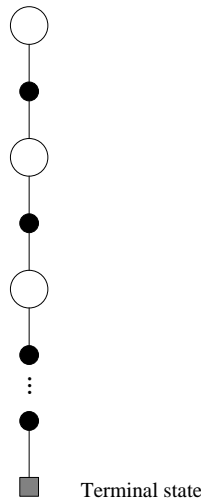


Figure 1. Terminal state

An important property of the MP method is that it evaluates each state independently and does not rely on the estimation of other states. Also, the MP method estimates that the computational cost of each single state value is independent of the number of states, as can also be seen from its pseudocode, that it only needs returns of the state that it wants to compute, and does not need the computed state which can be ignored.

$$U \leq \frac{f(Y)}{c * g(Y)} \tag{1}$$

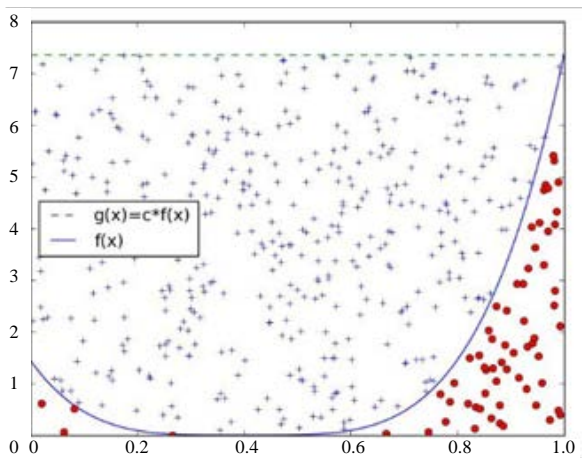


Figure 2. Intuitive interpretation of the sampling

3.2. Monte carlo control without exploring starts

In order to avoid the investigation of starts, the only way is to ensure that all the actions can be selected, there are

usually two ways: on-policy method and off-policy method, in which the on-policy method is to assess and improve the decision making policy. The off-policy approach evaluates and improves not on the policy used to generate the data. Two policies are typically used in the off-policy approach, one to learn and become the optimal policy, and the other to explore and produce behavior. The pseudocode for On-policy first-visit MC control is as follows:

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Initialize, for all  $s \in S, a \in A(s)$  :
 $Q(s,a) \leftarrow$  arbitrary
 $Returns(s,a) \leftarrow$  empty list
 $\pi(a|s) \leftarrow$  an arbitrary  $\epsilon$ -soft policy
Repeat forever :
(a) Generate an episode using  $\pi$ 
(b) For each pair  $s, a$  appearing in the in the episode :
     $G \leftarrow$  return following the first occurrence of  $s, a$  Append  $G$  to  $Returns(s,a)$ 
     $Q(s,a) \leftarrow$  average ( $Returns(s,a)$ )
(c) For each  $s$  in the episode :
     $A^* \leftarrow \arg \max_a Q(s,a)$ 
    For all  $a \in A(s)$ 
 $\pi(a|s) \leftarrow \begin{cases} 1 - \epsilon + \epsilon / |A(s)| & \text{if } a = A^* \\ \epsilon / |A(s)| & \text{if } a \neq A^* \end{cases}$ 
    
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3.3. Metropolis algorithm explanation

To prove the correctness of the Metropolis sampling algorithm, it is most important to prove that the constructed Markov process satisfies the above detailed smoothing conditions:

$$\pi(i)P_{i,j} = \pi(j)P_{j,i} \tag{3}$$

The transfer probability is:

$$P_{i,j} = a_{i,j} \bullet Q_{i,j} \tag{4}$$

For the selection of this known distribution, in the Metropolis sampling algorithm, we require that this known distribution must be symmetric.

$$q(\theta = \theta(t) | \theta(t-1)) = q(\theta = \theta(t-1) | \theta(t)) \tag{5}$$

The Monte Carlo method uses the learned episodes to obtain the value function and the optimal policies. Compared with the DP method, the Monte Carlo method has the following advantages:

It learns directly from the interaction with the environment and does not require a dynamic model of the environment.

It can make use of simulation or sampling model. In many practical applications, it is easy to simulate the sample episodes, and it is difficult to construct the exact model of transition probabilities required by DP.

The Monte Carlo method can easily focus on these states if one wishes to obtain only a part of the stated estimates, as long as it does not count the states that do not care, whereas the DP method requires some interference in the estimation of one state to all other related states, it is not as easy as the Monte Carlo method.

The Monte Carlo method is less affected when the Markov property is violated because it does not need to update the value estimates based on the value estimates of subsequent states, that is, they are not "bootstrap".

3.4. Practice shooting skills

In football teaching, the majority of students to the football stadium on the exceptionally excited, in no hurry to carry out a variety of shooting practice and beginners often do not shoot the right action, over time it will form the wrong action stereotypes. Therefore, students should not shoot the goal too early before they master the action technique.

The control group according to the routine to take group goal shooting technical training, due to the action is not strictly regulate the training form of a single, boring, the students failed to really grasp the shooting technology in a certain period of time; and experimental classes are not more goal-oriented auxiliary Practice so that students focus more on the mastery of basic techniques. Various forms of practice can make students maintain a high enthusiasm for learning, practice often used to explain the second stimulus to stimulate the second signal system, thus accelerating the formation of dynamic stereotypes.

In shooting data, from the above analysis of the data we can see the number of shots, shots positive, long shot more, the greater the odds of winning the game. In terms of set-pieces, the more the corner, the free-kick, the 30-meter free-kick in the front, the greater the chance of winning the game, and the top of the game, with a corner and a 30-meter free-kick. Then a free kick and foul play have little effect on the outcome. In the ball control rate, it can be seen that the higher the ball control team, the more the number of shots, the greater the chance of winning the game.

In the teaching of soccer shot technique, students will inevitably produce a variety of erroneous actions due to various reasons. If the erroneous actions are not corrected in time, erroneous technical stereotypes will be formed over time, affecting the mastery of correct techniques. Therefore, in teaching should take positive and effective measures to prevent and correct wrong moves. To prevent and correct erroneous actions, we should first analyze the causes of erroneous actions so as to make the right remedy. There are many ways to correct mistakes. The teachers explain according to the actual situation of the students, and then the teachers do a proper demonstration to make the students form the correct action appearance. For a number of habitual errors can be a variety of auxiliary exercises to prevent and eliminate.

4. Conclusion

This approach to shorten the offensive distance, saving energy, improve the number of shots and improve the efficiency of shooting shots. At the same time can simulate a variety of sudden shooting scenes of the game, is conducive to the coach to arrange a variety of tactical exercises. This training method is only based on grass-roots training theory analysis, due to the conditions have not really applied to modern competitive football, especially football professional league. But for improving

basic football technology teaching, training has been very effective. If this technology is nationally promoted, grass-roots football shooting technology may also be further improved. But the ability to show his value in competitive football needs to be further verified. In the future, we will test the performance of the proposed model.

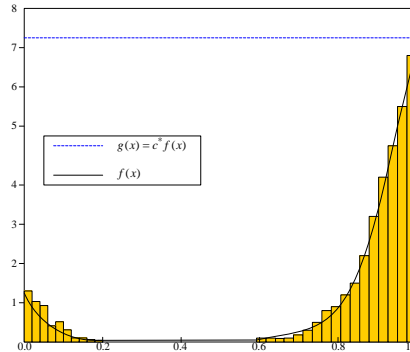


Figure 3. Histogram and target probability density function of 10000 shots

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