Prediction of Football Match Results Based on Edge Computing and Machine Learning Technology

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ABSTRACT

With the rapid development of artificial intelligence, various machine learning algorithms have been widely used in the task of football match result prediction and have achieved certain results. However, traditional machine learning methods usually upload the results of previous competitions to the cloud server in a centralized manner, which brings problems such as network congestion, server computing pressure, and computing delay. This paper proposes a football match result prediction method based on edge computing and machine learning technology. Specifically, the authors first extract some game data from the results of the previous games to construct the common features and characteristic features, respectively. Then, the feature extraction and classification task are deployed to multiple edge nodes. Finally, the results in all the edge nodes are uploaded to the cloud server and fused to make a decision. Experimental results have demonstrated the effectiveness of the proposed method.

KEYWORDS

Edge Computing, Football Result Prediction, Machine Learning, Sport Match Result Prediction

1. INTRODUCTION

Football is one of the most popular sports. Predicting the results of football matches is interesting to many, from fans to punters. It is also interesting as a research problem, in part due to its difficulty, because the result of a football match is dependent on many factors, such as a team's morale, skills, current score, etc. So even for football experts, it is very hard to predict the exact results of football matches (Owramipur 2013). However, since various types of football matches have outstanding similarities in some respects, in theory, it is possible to find the law from a large number of football matches to find a way to judge the level of victory or defeat (Guan 2021).

With the rapid development of artificial intelligence, machine learning algorithms have been widely used in real life, such as face recognition, stock price prediction, etc. Hence, how to build a football match prediction model based on machine learning algorithms and use scientific methods to solve the prediction problem has become a topic of interest to experts and scholars. Fortunately, researchers have constructed a variety of football match result prediction methods, and have achieved some results. For example, literature (Igiri 2015) used the SVM algorithm to study the factors that affecting the results of the British Championship. Lei used the logistics regression algorithm in machine learning to analyze and process the historical results of football matches, and realized the prediction of the football match results (Lei 2019). Guan also achieved effective result prediction of the Chinese Super League team by suing fuzzy neural network and extreme learning machine (Guan 2021).

However, traditional machine learning methods usually use centralized computing, which need to upload previous matches results to the cloud server for centralized processing. When there is a lot of data to be processed, the current methods will face new problems, that is, with the increase of match data, the amount of data that needs to be uploaded to the cloud server will increase significantly, which will occupy a large amount of bandwidth and cause network congestion. And if the classification tasks are all completed by the cloud server, the computing resources cannot be dynamically scheduled, which will occupy a large amount of server computing resources. In addition, in order to improve the learning ability of the classification model, it is usually necessary to increase the number of parameters. However, the increase in the amount of model parameters will cause the classification model to occupy too much computing and storage resources, which will further increase the computing pressure of the server.

In order to solve the above problems, this paper proposes a football match result prediction method based on edge computing and machine learning technology. Edge computing is a new computing method that appears to solve the problems of network congestion and cloud center computing pressure faced by cloud computing. Specifically, edge computing realizes the nearby processing of data by deploying edge computing nodes at the end close to the collection device, and these nodes have the capabilities of computing, storage and communication. And this manner can effectively alleviate network congestion, and sharing the computing tasks of the cloud center by edge nodes can effectively reduce the computing pressure of the cloud center (Wang 2020). Inspired by this, this paper splits the football match result prediction task into some sub-tasks that can be executed at multiple edge nodes, so that the task of feature extraction and classification is deployed on the edge computing nodes.

The remainder of this paper is organized as follows: Section 2 gives a summary of previous work on football result prediction. In Section 3, we describe the proposed architecture of football match result prediction method based on edge computing and machine learning technology. The experiments are provided in Section 4. Section 5 is the conclusion.

2. RELATED WORKS AND ANALYSIS

With the increasing popularity of football, the problem of predicting football match results has become a hot topic in the field of football sports, and it is also an important research content in academic circles. As early as 1990, a football result prediction modal was first proposed based on the average goal rate per football match at the International Gaming Conference. With the progress of the times and the development of technology, there are more and more ways to predict the results of football matches (Arabzad 2014). It can be seen from this that with the popularity of football worldwide, the commercialization of football has also entered a fierce struggle. Whether it is a fan or a data analyst who is interested in football matches, their research on predicting the results of football matches has never stopped. As a result, based on strict mathematical statistics, many scientific methods have been emerged. According to different fields of researchers, there are mainly the following prediction methods.

Bayesian model: The probability of both sides winning the match is determined by various uncertain factors such as the strength of both sides, including the number of historical battles and records of the two teams, and offensive and defensive capabilities. These three factors are used to compare the relative strength of any teams that ultimately scores more than the competing team. Other factors related to team strength may also affect the winning rate, but the Bayesian model believes that their influences are very small. The disadvantage of the Bayesian model is that it places too much emphasis on historical records. With the development of the times, it is impossible to predict the outcome of the current match by only relying on past play data (Razali 2017).

Fuzzy comprehensive evaluation: The fuzzy comprehensive evaluation method analyzes the factors that are likely to attract everyone's attention in the football match as an index to predict the football results, these factors include the number of goals, the number of shots, the weather temperature,

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