

The Promotion of Women's Leisure Sports Behavior Based on Improved Decision Tree Algorithm

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ABSTRACT

In women's daily leisure choices, sports is an important content that cannot be ignored. In this context, this paper studies the promotion of women's leisure sports behavior based on improved decision tree algorithm. Based on the simple analysis of the research progress of leisure sports and decision tree algorithm, a female leisure sports behavior model based on decision tree is constructed. Based on the decision tree algorithm, the calculation method of information gain rate is optimized to avoid logarithmic operation, and the continuous attributes are discretized. Simulation results show that in terms of classification accuracy, the improved decision tree algorithm is significantly higher than the classical decision tree algorithm, and can significantly shorten the running time, which has high application value in the realization of accurate classification analysis of female leisure sports behavior.

KEYWORDS

Decision Tree Algorithm, Female Leisure Sports Behavior, Information Gain Rate, Taylor Formula

INTRODUCTION

With the improvement of national physical quality and economic development, sports have become an indispensable part of life, and leisure sports have gradually become an important part of people's daily leisure lives (Yu, 2020). Women living in the new era have a great demand for leisure sports and have also spent a lot of energy and financial resources on leisure sports (Zheng, 2018). At present, the research on sports behavior is mostly carried out in cities, considering things such as sports consumption, sports choice, sporting goods, and stadiums, but it is rarely discussed from the perspective of women (Strain et al., 2020).

This paper studies the promotion of women's leisure sports behavior based on an improved decision tree algorithm, which is mainly divided into four sections (Ahn & Chon, 2018). The first section briefly introduces the research background of leisure sports behavior and the arrangement of this study. The second section introduces the research status of behavior at home and abroad and the application and improvement of the decision tree algorithm. This section also summarizes

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the shortcomings of current research. The third section constructs an analysis model of women's leisure sports behavior based on a decision tree model, improves the decision tree algorithm and the calculation method of information acquisition, and discretizes the continuous attribute problem. In the fourth section, the improved decision tree model constructed in this paper is simulated and analyzed to test the accuracy and running time of the algorithm. Compared with the classical decision tree algorithm, the experimental results show that the improved decision tree algorithm proposed in this paper has advantages in classification accuracy and running time, and has good application value in the analysis of female leisure sports behavior.

The innovation of this paper is the improvement strategy of decision tree analysis using the Taylor formula and McLaughlin expansion formula to improve the information gain rate of the C4.5 approximation algorithm, simplify the algorithm, improve the accuracy of the algorithm, and avoid logarithmic operation. In addition, aiming at the problem of discretization of continuous attributes, the discretization method based on the chi-square value is used to obtain the alternative optimal splitting breakpoint value to ensure classification accuracy.

LITERATURE REVIEW

There is much research on behavior analysis at this stage. The early research is mainly qualitative research. With the development of big data technology, data mining technology is gradually applied. By mining the action data extracted from the log files of different subsystems in the corresponding field, different types of user behaviors in different modules and subsystems in the intelligent manufacturing environment are discovered and determined (Shang et al., 2020). In the network behavior analysis, Tao et al. (2019) analyzed the microblog behavior through machine learning and cloud computing technology and proposed a microblog recommendation algorithm based on statistical features (Tao et al., 2019). The feature data mining is carried out through a cloud computing big data method, which is suitable for online mining microblog behavior (Yuan, 2020). In the analysis of consumer behavior, Dixit et al. (2021) established a multilevel hesitation mining model. The multi-stage hesitation model improves the threshold and confidence threshold in design and the minimum support threshold covers attraction and hesitation and uses prior attributes to generate a mining model in a step-by-step. In their research, Dixit et al., in the analysis of behavior characteristics, sorted out the characteristics of customer data and the loss of existing customers and used a fuzzy decision tree algorithm to establish a decision tree. The accuracy of the iris data set reached 97.8%, achieving the highest accuracy (Hu et al., 2020). Han et al. also optimized and improved the decision tree algorithm in this study, introduced temporal feature selection, combined it with the decision tree algorithm, used ant miner fuzzy decision tree classifier to extract intelligent fuzzy rules from weighted temporal capabilities, and then used fuzzy rule extractor to reduce the diversity of functions in the extracted rules (Han et al., 2021). Choi et al. designed a new decision tree structure. After analyzing the experimental motion pattern data using the original value of a single inertial measurement unit in a 200 ms time window, they identified nine common motion patterns hierarchically, and used artificial bee colony algorithm to search the initial weight and threshold globally (Choi et al., 2018).

To sum up, we can see that there is much research on behavior analysis and decision tree algorithms at home and abroad. In addition to qualitative analysis, data mining technology is widely used in behavior analysis, and the decision tree algorithm also has many improvements based on classical algorithms. However, these decision tree algorithms are mostly used to analyze the behavior of a certain type of data, and their adaptability is not strong. In addition, in terms of behavior analysis, leisure sports behavior analysis mostly belongs to qualitative analysis. Quantitative research is insufficient and rarely discusses women's vision, mostly from the perspective of mass consumption behavior, so the research is not universal. Therefore, it is of great practical significance to carry out research on women's leisure sports behavior based on an improved decision tree

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