

Association Rule Algorithm in Environmental and Cultural Benefits of Natural Protection

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Keywords: Association Rule, Nature Conservation, Environmental Protection, Cultural Benefit

Abstract: With the continuous development of social economy, people put forward higher and higher requirements for the quality of natural resources and ecological environment. In order to realize the sustainable development strategy, the environmental protection work must be strengthened and the utilization rate of resources must be improved. In this case, how to effectively solve the cultural benefits of environmental protection has become the most important issue. The traditional method of relying on manual environmental governance can no longer meet the actual needs of environmental problems. Therefore, it is necessary to improve the level of natural environment protection by adopting advanced technical means. Association rule analysis is a new data mining technology, which can discover rules from data. It can provide users with massive, rich and accurate information, and has the characteristics of high efficiency and convenience. It has a broad application prospect in the field of natural environment protection. This paper introduced the cultural benefits of natural conservation, expounded the advantages of association rule analysis method in the field of natural conservation, and focused on its key technologies. A model suitable for the calculation of natural environmental parameters was put forward, which provided a theoretical basis for the scientific decision-making of natural conservation management departments and environmental monitoring institutions. The traditional analysis method of environmental and cultural benefits of natural protection was compared with the analysis method based on association rules. The results showed that the analysis based on association rules could reflect the impact of human activities more comprehensively and accurately. At the same time, it is also conducive to improving the relationship between man and nature. The livability has also increased by about 6.2%, which has a very positive role in promoting the construction of ecological civilization.

1. Introduction

The impact of nature on human beings is huge and far-reaching. It not only changes people's lifestyle, but also brings new development opportunities and challenges to society. In the context of global warming, the protection and development of the natural environment is a long-term and arduous task. In this case, in order to give full play to the advantages of natural resources and achieve sustainable development, a set of effective means is needed to protect nature.

Natural environment protection is an inevitable requirement for human survival and development. Many scholars have studied environmental issues from different perspectives. Fahrig L studied the impact of the "the Belt and Road" on global trade and environment, and called on people to carry out strict strategic environmental and social assessment and improve the standards of global environmental protection [1]. Hanson Jeffrey O explored the global species niche protection, and analyzed the changes in the number of biological populations and their interrelationships under different environmental conditions, thus providing a basis for effective implementation of environmental protection, which was conducive to socio-economic development and ecological balance [2]. Whitburn Julie analyzed the relationship between human and nature and environmental behavior, understood the driving factors that encouraged people to participate in environmental behavior, and pointed out that individual and social responsibilities should be emphasized in environmental protection [3].

Kah Melanie outlined the challenges faced in the field of crop nutrition and protection, introduced the possible application of nanotechnology in this field, and provided new methods for the sustainable development of natural environment and agriculture [4]. Seddon Nathalie found that natural-based solutions could solve climate change and biodiversity loss, and support sustainable development, which was conducive to helping people cope with urgent challenges, so that nature and mankind could survive together now and in the future [5]. Hemingway Jordon D proposed two main mechanisms to explain the long-term global preservation of natural organic carbon, and showed the global data set of the activation energy of organic carbon in soil, sediment and dissolved organic carbon and the corresponding age distribution of radioactive carbon, providing new evidence for understanding the impact of climate change on the global change process [6]. Nature conservation is a complex and arduous task, which requires the cooperation of the whole society, including the government, enterprises and communities, to achieve this goal.

Association rules help to make better contributions to the construction of ecological environment, and many scholars are committed to work in this area. Golden Kroner Rachel E found that extensive legal changes had damaged the sustainability and effectiveness of the protected areas, and proposed the need to establish a new mechanism to promote the socio-economic system of sustainable development and provide impetus for the permanent protection of biodiversity and the environment [7]. Sala Enric developed a conservation planning framework to give priority to highly protected marine protected areas where multiple benefits are generated today and in the future, and significantly strengthen marine protection by protecting biodiversity, improving fishery production and protecting marine carbon stocks threatened by human activities [8]. Lewis Simon L believed that restoring natural forests was the best way to remove atmospheric carbon, and built a theoretical framework based on association rule model to achieve ecological reconstruction and ecosystem balance [9].

Bossio D. A quantified the role of soil carbon in natural climate solutions, and reviewed some project design mechanisms that could be used to tap potential, and their role in preventing carbon emissions, removing carbon dioxide from the atmosphere, providing ecosystem services, and mitigating climate change [10]. Whitburn Julie used a random effect model to prove the positive relationship between the relationship between human and nature and environmental protection

behavior. On this basis, he established a green circular economy model in the environmental economic system [11]. Deswanto Refandi Budi investigated the direct and indirect links between environmental information disclosure and financial performance, environmental performance and company value, and raised the importance of enterprises to environmental protection and governance [12]. Association rules are of great significance to environmental protection, which involves how to coordinate actions among different types of stakeholders, thus effectively promoting the sustainable development of the entire social and economic system.

In order to solve the difficulties faced in the process of nature conservation and maximize cultural benefits, more and more government organizations have formulated a series of policies to promote the construction of ecological civilization. However, people gradually realize that the traditional investment or production activities at the expense of the natural environment have become an undesirable practice. Therefore, it is needed to find new ways to deal with these problems. Association rules are considered as a tool to overcome this disadvantage, which can avoid serious problems such as environmental pollution and destruction caused by blindly pursuing economic benefits to a certain extent. This paper proposed a comprehensive evaluation method based on association rules, and tried to use this method to design a mechanism that can effectively coordinate the mutual restriction and interdependence between different stakeholders. Compared with the previous single-factor evaluation model, it is more reasonable and feasible, and can be applied to the analysis of the relationship between various subsystems in the environmental economic system, so as to achieve the purpose of contributing to the development of the whole society.

2. Cultural Benefits of Natural Protection

2.1. Relationship between Nature and Culture

In modern society, people have a new understanding of natural resources and ecological environment. All kinds of organisms and their lifestyles in nature are affected by human activities and gradually become an important resource [13]. With the development of science and technology and the continuous improvement of science and technology, the process of material production is also changing, which causes the contradiction between human and nature to become increasingly acute. Environmental problems are increasingly prominent, and the construction of ecological civilization has become one of the most prominent themes of the times. Therefore, it is necessary to theoretically explore the relationship between nature and culture and try to build a harmonious and stable natural environment, as shown in Figure 1.

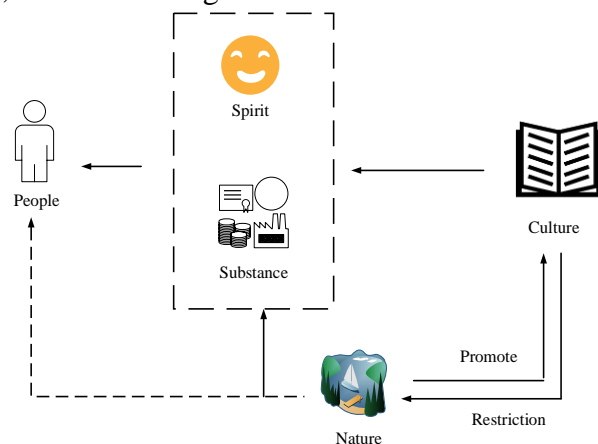


Figure 1. Relationship between nature and culture

First of all, natural ecology is the basis for human survival and the material basis for the generation and continuation of culture. With the development of human society today, the civilization and quality of life need to be constantly improved. This progress cannot be separated from the harmonious coexistence between human and nature. Culture is the crystallization of experience and knowledge with common value created by people in long-term production activities, and cultural construction cannot be separated from the material carrier of nature, because geographical environment, human traditions, customs and habits have a great impact on people's thinking and behavior. It is not easy to inherit culture. The ecological environment must be protected to achieve sustainable development.

Secondly, the natural environment provides people with spiritual products and promotes cultural exchange and innovation. As one of the important cultural heritages, historical and cultural cities not only have rich national cultural heritage, but also have a good cultural environment. This is a kind of precious spiritual wealth and the product of the perfect combination of nature and humanity, which can make people enjoy beauty while enjoying physical and mental pleasure and satisfaction.

Finally, culture has a binding effect on the natural environment. This is because nature itself has many disadvantages, and effective measures must be taken to rectify them. Environmental protection is a very important part. Moreover, human culture is not passively adapted to nature, but is the result of continuous development and progress in accordance with the laws of nature. The environment provides material guarantee and spiritual impetus for it. Therefore, the strengthening of the protection of the natural environment is an unavoidable problem. Only through scientific and effective management can environmental pollution be fundamentally eliminated or reduced, thus achieving sustainable development [14].

2.2. Classification of Environmental and Cultural Benefits of Natural Protection

Cultural benefit is a kind of economic value, which is the comprehensive economic benefit obtained in the rational development and comprehensive utilization of resources and environment. The cultural benefit of natural protection of the environment is to use natural laws to transform the nature and maintain ecological balance, so as to promote the progress of human society and ultimately achieve the goal of harmony between man and nature, man and things. The cultural message of nature conservation includes three levels, namely, the improvement of material civilization, spiritual civilization and political civilization, as shown in Figure 2.

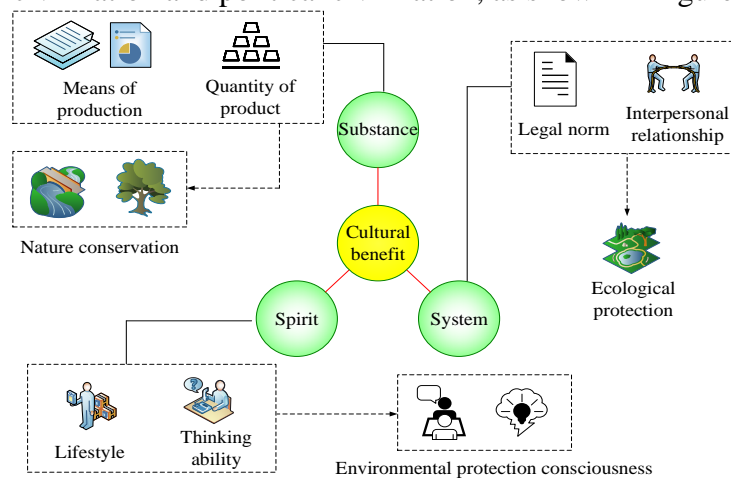


Figure 2. Classification of cultural benefits of nature conservation

First of all, material refers to the quantity or use effect of material wealth created by human

beings. For example, how many labor products are produced in the process of material production and whether the labor products have certain functions are all belong to the category of productivity and can be used as an important indicator to measure the economic development. Moreover, there are obvious differences in these issues between different regions, different industries and different stages. Agricultural society is based on crop planting for grain production, and industrial society is mainly based on machine manufacturing. At the level of natural protection, it is necessary to pay attention to the sustainable use of natural resources, such as the rational development of water resources, the restoration and reconstruction of forest ecosystems, etc. [15].

Secondly, spiritual civilization refers to the spiritual enjoyment and pleasure brought by people's social activities, including lifestyle, mode of thinking, moral concepts and environmental protection awareness. This value orientation plays a subtle role in the social climate, thus forming a certain code of conduct, namely, socialist ideology. On the one hand, it can promote economic development. On the other hand, it can also provide people with a good living environment, thus promoting the further development of productive forces.

Finally, political civilization is also institutional culture, which refers to the degree of harmony between people, mainly including political power and legal norms, as well as the efficiency of institutional operation and the construction of democracy and the rule of law. Ecological protection is one of the important characteristics of this concept in environmental protection, which has an undeniable impact on maintaining social order and improving people's understanding of environmental issues.

3. Related Algorithms of Association Rules

As a new information processing technology based on knowledge network, data mining plays an increasingly important role in practical applications. Association rules and clustering are the main contents in the field of data mining. Its main purpose is to mine the relationship between data, find rules and forecast results, providing basis for data analysis and decision-making.

3.1. April Algorithm

It is supposed there are vectors \bar{A} and \bar{B} . Among them, $\bar{A} = \{a_1, a_2, \dots, a_i\}$ and $\bar{B} = \{b_1, b_2, \dots, b_i\}$. Their dot product is:

$$\bar{A} \bullet \bar{B} = \sum_{x=1}^i a_x b_x \quad (1)$$

The central idea of this method is to calculate the total frequency of an item set containing an element, and find the item set with at least the smallest support, that is, the set of the largest item in one dimension. After that, the circular processing is started until the maximum item set is no longer generated.

3.2. Two-party Safety Calculation

It is supposed that the database is composed of m records. For one of the itemsets u -, site P has e attributes. W is an N-dimensional vector in the site, then the value of the n-th dimension is:

$$a_n = \prod_{j=1}^e e_{xj} \quad (2)$$

Similarly, site Q also has an N-dimensional vector. The value of the nth dimension is:

$$b_n = \prod_{j=1}^e v_{xj} \quad (3)$$

In the formula, v represents the number of remaining attributes, $u = e + v$. Therefore, the support count of u -itemset is:

$$\overline{AB} = \sum_{x=1}^i a_x b_x \quad (4)$$

Finally, global frequent sets and association rules can be obtained.

3.3. Evaluation Model of Cultural Benefits of Natural Conservation Based on Association Rules

Association rules are an important decision-making tool, which can effectively carry out information acquisition, analysis and processing, prediction and other work. This paper applies this idea to the evaluation of ecological environment and cultural benefits. By establishing a scientific and comprehensive evaluation system of ecological economic system, the results are more accurate and more in line with the actual situation, which improves the ability to optimize the allocation of ecosystem resources, as shown in Figure 3.

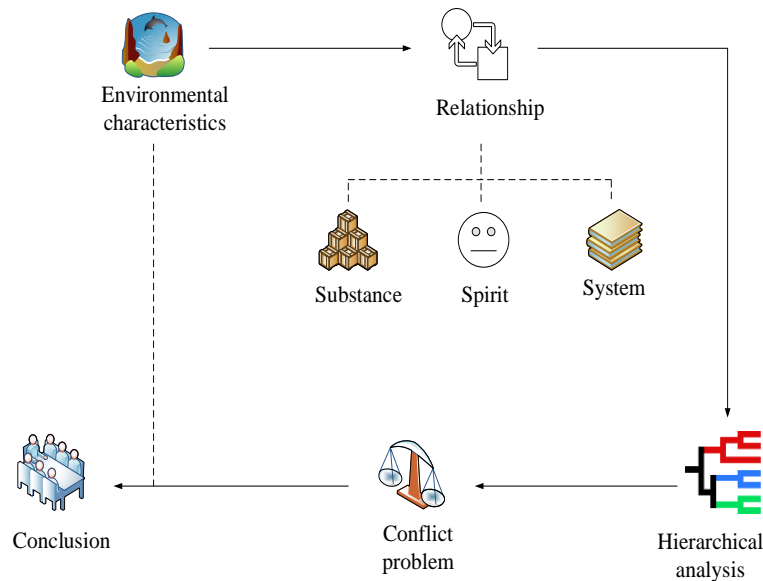


Figure 3. Evaluation model of cultural benefits of nature conservation based on association rules

First of all, according to the environmental characteristics, the relationship between the elements and the degree of impact are determined and taken as the assessment object. In this process, material, spiritual and institutional aspects need to be considered, and attention should be paid to the coordination and unification with other relevant factors. Secondly, Analytic Hierarchy Process (AHP) is used to construct the index system, and the fuzzy comprehensive evaluation method is used to solve the problem of data conflict. Then, according to the different criteria corresponding to each dimension, the required score and total score of each category are obtained to form an overall evaluation system. Finally, an objective and reasonable evaluation conclusion is drawn. This analysis method can not only effectively reflect the importance of various resources for human survival, but also enable people to understand the dialectical relationship between natural environment and human resources more deeply. At the same time, it also has certain operability,

which can guide relevant departments to formulate relevant policies and measures more scientifically. It is conducive to achieving the objectives of resource conservation, environmental protection and sustainable development, and improving the quality of natural environment.

4. Results of Cultural Benefits of Natural Conservation Based on Association Rules

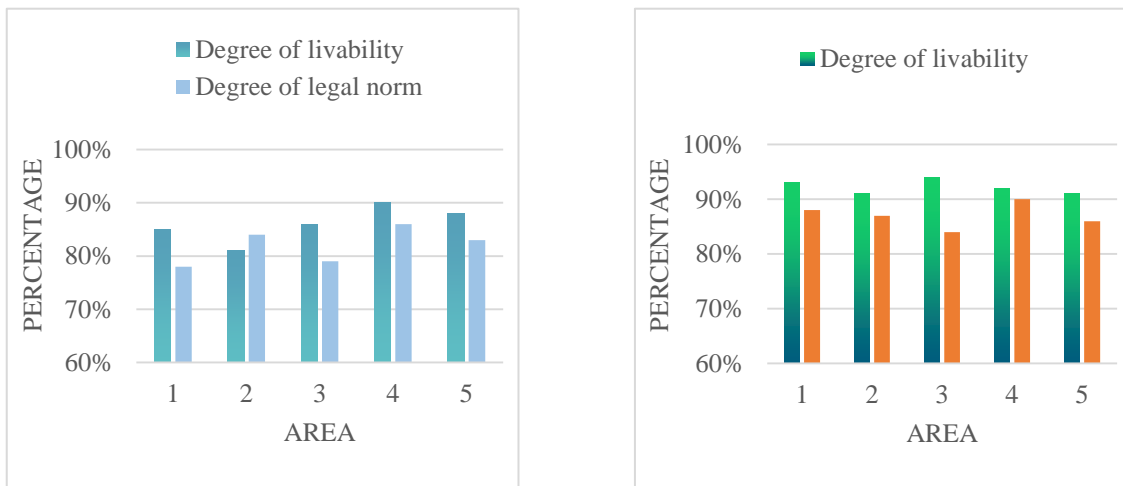
Five natural reserves were randomly selected, and the questionnaire survey was used to conduct empirical research on the cultural value evaluation of natural reserves. According to the cultural benefit indicators, the evaluation index system was constructed from three aspects: material, spiritual and institutional. The results are shown in Table 1.

Table 1. Evaluation index of cultural benefit of nature protection environment

Classification	Index	Description
Substance	Medical recuperation	The number of people in recuperation
	Physical fitness	Number of participants in physical activity
	Livability	population
Spirit	Social harmony	The relationship between man and nature
	Science education	Number of teaching and research activities carried out
System	Degree of legal norm	The number of relevant regulations
	Fiscal expenditure	The cost of protecting the natural environment

The cultural benefits of natural protection are mainly to provide people with ecological awareness and environmental protection knowledge, which is conducive to the effective maintenance and management of natural ecosystems, and promote sustainable and stable economic growth. However, its fundamental purpose is to achieve the coordinated development between man and nature. From the material aspect, the evaluation indicators mainly include medical recuperation, sports and fitness, and livability. These three dimensions are related to the health of human society, which can reflect the survival state of human society in the natural environment, and also reflect the dependence of human beings on the nature. From the spiritual level, the indicators include social harmony, scientific research and education level, etc. Through these quantifiable factors, people’s sense of identity with nature has been improved, which contributes to the formation of good social fashion and lifestyle. By meeting the growing needs of the people for a better life as the main line, a perfect ecosystem function has been built. Finally, in terms of system, the degree of legal norms and the intensity of financial expenditure are important safeguards to achieve the goal of ecological civilization construction. They lay a solid foundation for the implementation of the ecological civilization construction of coexistence and co-prosperity between man and nature, and also provide strong support for promoting high-quality economic development.

In order to facilitate comparison, “livability” and “legal norms” were selected as the final evaluation indicators from the above indicators, and the five natural reserves were evaluated respectively according to the association rule model and traditional analysis methods. The results are shown in Figure 4.



a: Traditional analysis method

b: Analysis method based on association rules

Figure 4. Comparison of two methods of cultural benefit analysis

As shown in Figure 4, Figure a is the traditional analysis method, and Figure b is the analysis method based on association rules. In terms of livability, it is obvious that all the data in Figure a are below 90%, while the livability of the five regions in Figure b is above 90%, and the data distribution is more centralized and stable. It shows that the data of livability in Figure b is better than that in Figure a. After calculation, the average livability of the five regions in the traditional analysis method is about 86%, and the average value based on association rules is about 92.2%, which is about 6.2% higher than the traditional analysis method. Therefore, the cultural benefits of natural conservation relying on association rules are higher and can better reflect the environmental problems caused by human activities, which is convenient to predict the trend of environmental change and the impact of related factors on the environment in the future.

5. Conclusion

For the sustainable development of human society and biodiversity, the protection of nature is not only a problem. More importantly, it should be realized through effective management. The nature protection based on association rules can use the existing knowledge to predict the target, determine the required data points without changing the existing information, and carry out reasonable planning and design for the entire ecosystem, so as to maximize the utilization of resources, optimize the ecological environment, and give full play to its cultural benefits. In view of the phenomenon that the contradiction between the environment and economic development is becoming increasingly prominent, this paper studied the evaluation index of ecological civilization construction with association rules as the core, and applied it to the current natural environment protection to explore a harmonious coexistence model between human and nature that conforms to the natural ecological laws and can meet people’s living needs.

Funding

This article is not supported by any foundation.

Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this

study.

Conflict of Interest

The author states that this article has no conflict of interest.

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