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The Development of Intelligent Optimization Algorithm Art and the Competition Cooperation and Win-win of Natural Protection Environment

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Abstract: Ecological governance and environmental protection are effective means to understand whether a region's political, economic, cultural and other elements are practiced, while art's involvement in the natural environment is a concrete manifestation of human spiritual civilization and economic foundation. In order to solve the shortcomings of the existing research on competition, cooperation and win-win of art development and natural protection environment, this paper discusses the competition and cooperation mode and natural environment, the combination of art field and environmental protection, and intelligent optimization algorithm, and investigates the neighborhood space evolution of intelligent optimization algorithm and experimental parameter setting. A win-win decision-making model of art development and natural protection environment based on intelligent optimization algorithm is established. The experimental data show that. The fitness value and optimal solution time of the corresponding solution of the co evolutionary hybrid optimization algorithm (CEPSO) proposed in this paper are 71.9 and 21.4 respectively. The algorithm has good performance.

1. Introduction

The construction of a win-win mode of competition and cooperation between art development and natural environment protection is conducive to giving play to the function and role of art development and protection in the field of natural environment protection, and laying a solid foundation for China's art development and ecological civilization construction.

Nowadays, more and more scholars have conducted a lot of research on the win-win cooperation between art development and natural protection environment through various technologies and

system tools, and have also made certain research achievements through practical research. Sarma D takes ecological environment protection as the starting point of practical research, and builds a new environment-friendly public art form by establishing a close relationship between public art and environmental protection. Through the actual questionnaire survey method, this paper analyzes the problem of public art's involvement in natural environment protection and rural construction, and discusses the relationship between public art and natural environment protection in the new rural construction. Based on its value analysis, it provides some enlightenment for the development of new public art in rural construction, and promotes the sustainable development of public art [1]. Rjabova discussed the similarities and differences of environmental art design and development between China and Malaysia. The dialectical relationship between environmental art design and ecological philosophy is discussed in detail. It is believed that the concept of sustainable development has a certain impact on the development of environmental art. Some excellent environmental art works can guide people to establish the theory of natural environment protection, improve people's environmental awareness and achieve the goal of sustainable development while improving people's aesthetic level. This research promotes the further connection and combination of environmental art and natural environment protection [2]. In order to solve the problem that environmental benefits are easily affected by subjective factors in the development of traditional art, Smiraglia proposed a new environmental benefit model of public art landscape construction, and analyzed the destructive effect of public art landscape construction. From the perspective of art and environmental protection theory, build a model framework of environmental protection benefits, and build the environmental benefits of public art landscape [3]. Although the existing research on the competition, cooperation and win-win of art development and natural protection environment is very rich, there are still some limitations in its practical application.

In view of the problems existing in the competition and cooperation between art development and natural protection environment, this paper proposes a particle swarm optimization algorithm based on cooperation and collaboration to establish a decision-making model for the competition and cooperation between art development and natural protection environment. In this algorithm, the extremum mutation method is used to effectively avoid the shortage of premature PSO algorithm. At the same time, through the neighborhood space evolution method and the setting of experimental parameters, the shortcomings of traditional coevolutionary algorithm in sampling and global search are overcome. The experimental results show that this algorithm has obvious advantages in convergence speed and solution accuracy compared with other algorithms.

2. Research on Win-Win Design Relying on Intelligent Optimization Algorithm Art Development and Natural Protection Environment

2.1. Competition and Cooperation Mode

Here, competition and cooperation refers to the organic combination based on fair competition. The essence is to promote and realize the unity of artistic development and natural environment [4]. Under the condition of socialist market economy, the power of space competition and cooperation is based on the development of art and the overall development of nature. On the basis of realizing the characteristics of art development, the goal of natural environmental protection is finally realized. Space competition and cooperation model can play an important coordination function in coordinating the relationship between space competition and environmental space cooperation for art development [5].

2.2. Natural Environment

The natural environment, also known as geographical environment, existed in nature before the emergence of human beings. It is not only all on the earth but also the space above the surface [6]. Natural phenomena, natural energy and natural resources, including atmosphere, water, soil, solar energy, water cycle, are the material resources on which human survival depends. They provide basic material needs for human beings. In other words, the sum of all natural factors that directly or indirectly affect human activities [7].

2.3. Combination of Art Field and Environmental Protection

When environmental problems affect people's production and life, people begin to realize the seriousness of ecological problems and start to solve them. Human beings are entrusted with the mission of lifelong environmental protection [8]. Environmental protection is not the responsibility of individuals, but the responsibility of people all over the world. Therefore, when the development of art begins to involve in the transformation of the natural environment, first of all, we should follow the requirements of environmental aesthetics without destroying the natural environment, and then complete a landscape art work [9]. In a work of art, people will think about whether there is damage to the environment in the creation process of the works of art with nature as the creation object, and when the works express their concept of caring about nature, they use the function of art to cause social reflection, and then play a warning role [10].

2.4. Intelligent Optimization Algorithm

The Basic Framework of Particle Swarm Optimization

In particle swarm optimization algorithm, particle swarm is represented as potential solution, and each particle x is associated with two vectors, namely velocity vector $k_x = (k_{x1}, k_{x2}, ..., k_{xA})$ and position vector $U_x = (u_{x1}.u_{x2}, ...u_{xA})$, where A represents the dimension of solution space [11]. During the evolution, the velocity and position of particle x in dimension a are updated as follows:

$$k_{xa} = \phi k_{xa} + b_1\alpha(pbest_{xa}) + b_2\beta(gbest_a - u_{xa}), u_{xa} = u_{xa} + k_{xa} \quad (1)$$

Where k_{xa} is the velocity of particle x in the a dimension, ϕ is the inertia weight, and β and α are two uniformly distributed random numbers [12] independently generated in the A dimension space [0,1]. $pbest_{xa}$ is the best fitness position of the x particle found so far, and $gbest_a$ is the best position searched by all particles [13]. b_1 and b_2 are scaling factors that determine the relative "pull" of $pbest$ and $gbest$ [13].

(1) Convergence analysis of particle swarm optimization

The basic particle swarm optimization algorithm converges globally with probability 1, so this paper proves it step by step according to the added operations [14]. When the extreme stagnation algebra w_s fails to reach W_s, the algorithm is a basic particle swarm optimization algorithm, which can converge to the global optimum with probability 1 [15]. When the extreme value stagnation algebra w_s reaches W_s, the two extreme values need to be mutated, so the position change before and after the mutation is:

$$\Delta u_u^v = b_1 \cdot k(Bpbest_{uv}^w - pbest_{uv}^w) + b_2 \cdot k_2(Bgbest_v^w - gbest_v^w) \approx B \tag{2}$$

Where, B is a constant, that is, the mutated displacement is a constant, and the algorithm will eventually converge to the global optimum with probability 1 [16].

(1) Algorithm performance analysis

Rosenbrock function:

$$s_1 = \sum_{u=1}^{m} (100(u_{x+1} - u_x^2) + (u_x - 1)^2) \tag{3}$$

The value range is [- 15,30], and the minimum value is 0.

3. Investigation and Research on Competition Cooperation and Win-Win of Relying on Intelligent Optimization Algorithm Art Development and Natural Protection Environment

3.1. Neighborhood Space Evolution of Intelligent Optimization Algorithm

In order to improve the overall optimization effect of the algorithm, this paper expands the neighborhood space function to have a certain evolutionary function, as shown in Figure 1 [17].

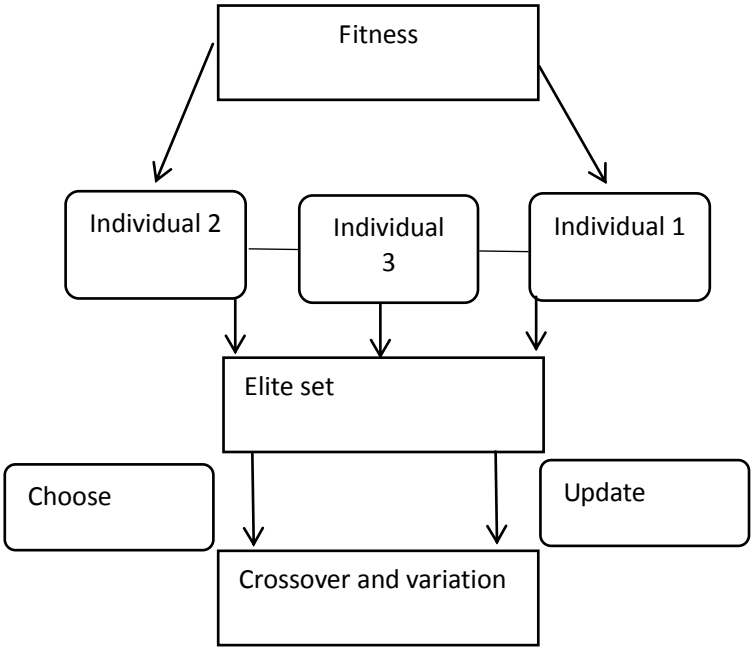

Figure 1. Neighborhood space diagram

The detailed evolutionary operations are described as follows:

(1) The n elite chromosomes retained in the domain space are taken as the initial solution set el (u), and u is its current iteration number;

(2) Calculate the fitness of individuals, and select all individuals for cross operation;

(3) The individuals produced by the cross were mutated, and the random mutation was used to update el (u);

(4)u=u+1; Exit if the end conditions are met; Otherwise, turn to Step 2.

3.2. Experimental Parameter Setting

This experiment mainly verifies the validity of the model and the application effect of the algorithm. The validity of the model mainly verifies whether the three rational factors proposed in the paper can reflect the impact on the process of competition and cooperation and win-win, and the application effect of the algorithm mainly tests whether the hybrid optimization algorithm of co evolution (CEPSO) can improve the accuracy of the search solution under the premise of ensuring the search efficiency compared with other algorithms. The issues of competition, cooperation and win-win involve two aspects: art development, environmental protection, competition intensity and cooperation opportunity analysis [18]. The parameter settings of the particle swarm optimization algorithm are shown in Table 1:

Table 1. Parameters of particle swarm optimization algorithm

The size of particle swarm	1000
Maximum number of iterations	00
Factor of acceleration	c1=c2=2.05
Inertia weight	ω=0.730

4. Research on the Application of Competition Cooperation and Win-Win of Relying on Intelligent Optimization Algorithm Art Development and Natural Protection Environment

4.1. Win Win Decision Model of Art Development and Natural Protection Environment Based on Intelligent Optimization Algorithm

This paper defines that the benefits that can be obtained by both parties in the win-win process include two parts: current benefits and long-term benefits. The degree of demand for the two benefits is measured by the strategic characteristics of the enterprise. In this paper, the strategic characteristics of art development and natural environment protection are divided into two types: short-term and long-term. Thus, a decision model NDM is constructed, which consists of five parts: competition and cooperation win-win historical record set (HRC), art development evaluation function (SU), natural protection environmental effect evaluation function prediction (OUP), success rate and maximum benefit and probability prediction (NFM), and co evolution based hybrid optimization algorithm (CEPSO). The relationship between NDM parts and the corresponding decision-making process are shown in Figure 2.

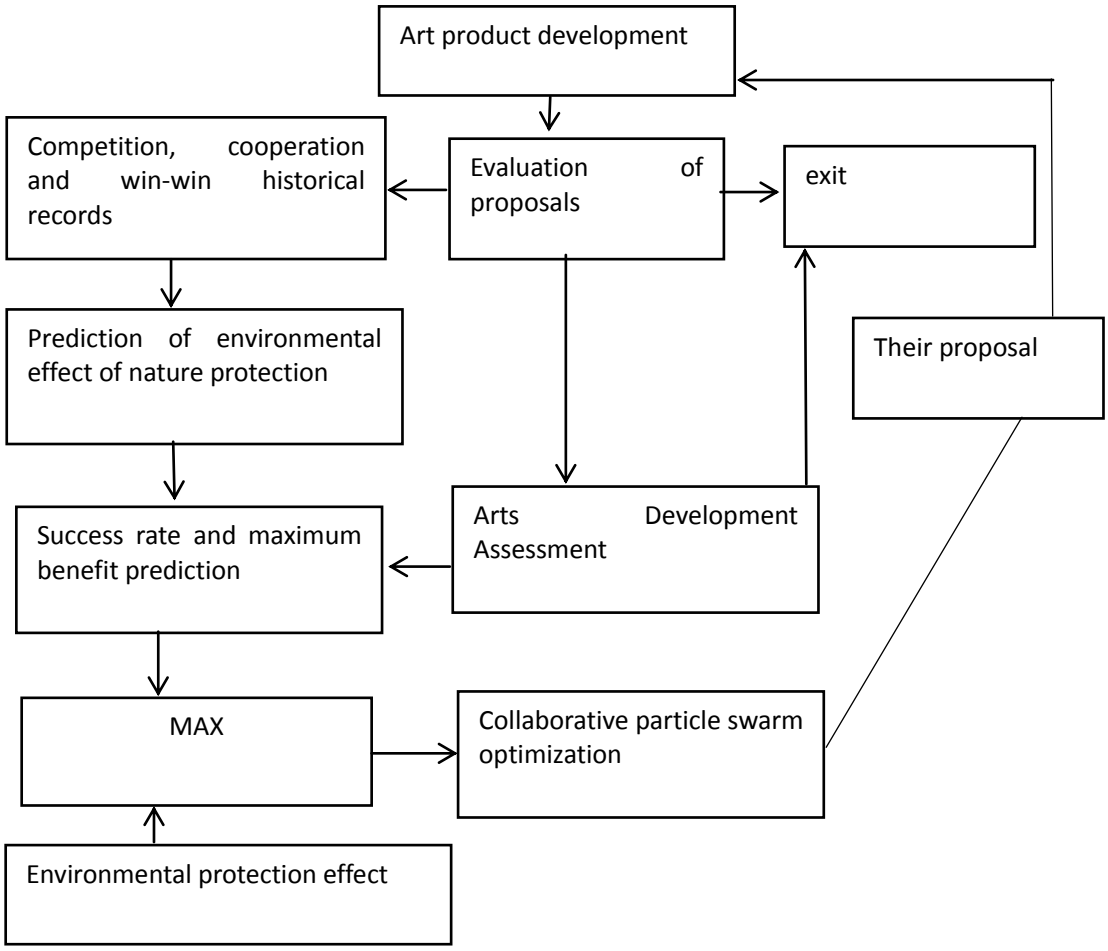

Figure 2. Win win decision making process

4.2. Performance Analysis of Coevolutionary Hybrid Optimization Algorithm

In order to verify the application effect of the coevolutionary hybrid optimization algorithm (CEPSO) in the model, CEPSO and PSO, InformPSO and DBCPSO are respectively used in multi issue concession search in this section. The performance of different algorithms is measured by finding the optimal solution time and the fitness of the corresponding solution. The experimental results are shown in Table 2.

Table 2. Optimal solution of algorithm

Algorithm	Avg-BestFitness	Avg-SpendTime
PSO	49.3	43.4
InformPSO	62.7	35.1
DBCPSO	62.4	34.8
CEPSO	71.9	21.4

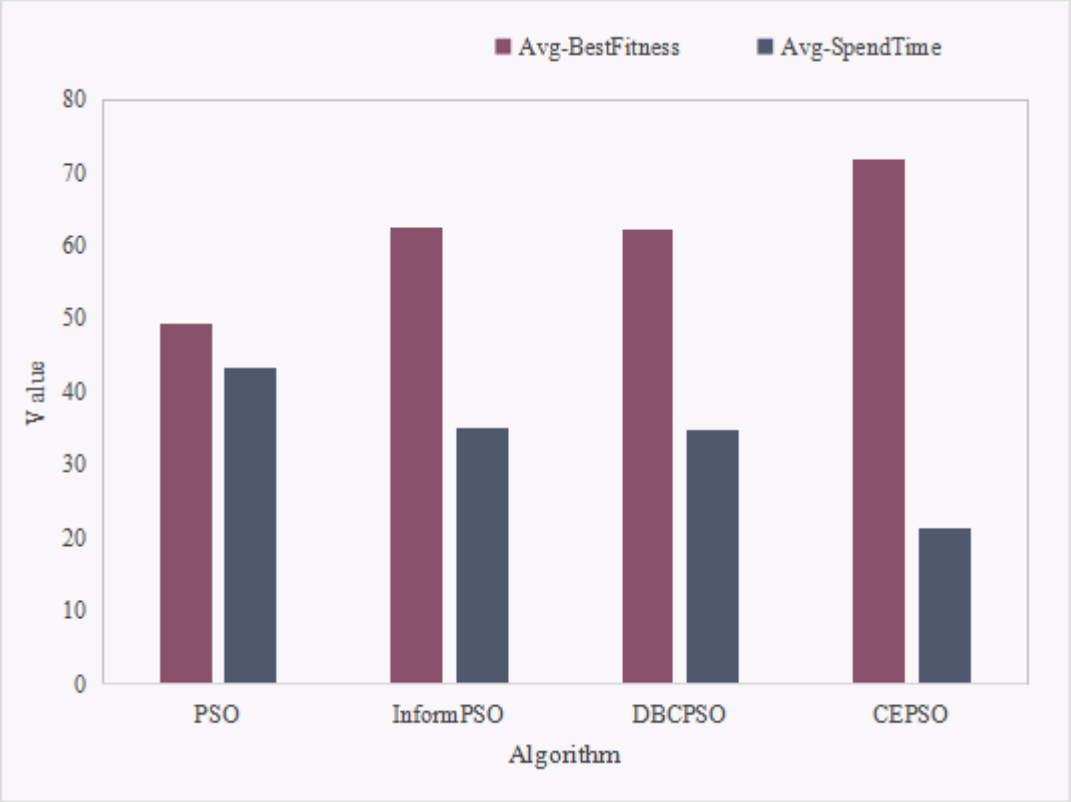

Figure 3. Comparison of optimal solutions

It can be seen from Figure 3 that compared with other coevolutionary algorithms, CEPSO algorithm has a higher fitness value when conducting concession value search, and it can effectively shorten the search time, improve the search efficiency of the algorithm, and make the competition and win-win more efficient. The fitness value and optimal solution time of corresponding solution of PSO are 49.3 and 43.4 respectively. The fitness and optimal solution time of the corresponding solution of InformPSO algorithm are 62.7 and 35.1 respectively. The fitness value and optimal solution time of the corresponding solution of DBCPSO algorithm are 62.4 and 34.8 respectively. The fitness and optimal solution time of the corresponding solution of the co evolutionary hybrid optimization algorithm (CEPSO) proposed in this paper are 71.9 and 21.4 respectively.

4.3. Win Win Strategy of Art Development and Natural Protection Environment

In order to promote the cooperation and win-win of art development and natural protection environment, and ensure the normal and stable implementation of the regional art development and natural protection environment integration strategy, the art development and natural protection environment cooperation organization should develop two mechanisms, soft and hard. The hard mechanism is mainly a constraint method by means of classical contracts, which mainly promotes the stability of cooperation through supervision, punishment and protection measures. Specifically, the collaboration organization can discuss the overall art development plan and the protection plan of the natural environment according to the specific situation of the region and the natural environment of both sides, and discuss the sanctions methods and the scope of strength for the violators, so that both parties can adhere to the cooperation agreement, develop in a planned and purposeful way, pay attention to the carrying capacity of the environment in the art development projects, protect the regional environment, and achieve the sustainable development of art. Soft

mechanism is mainly a kind of constraint method using psychological contract as constraint means. For example, outside of hierarchical control and contract control, social control can be used, such as implicit responsibilities such as belief shared within art development and natural protection environment, moral system, to strengthen the trust and interaction between the two sides of cooperation, so as to promote stable and coordinated cooperation.

5. Conclusion

This paper will provide a new win-win decision-making model for art development and nature conservation. In this model, we refer to the relevant theoretical knowledge of ecology, define the two sides in the competition and win-win as two groups, and redefine the analysis model of population competition and cooperation based on the self reproduction mechanism of the population and the characteristics of the competition problem; In order to adapt to the huge impact of environmental changes, a new decision-making model is provided. Based on the classification conclusion of population competition and cooperation, the model comprehensively examines the demand for long-term benefits and current benefits in the competition between the two sides, which not only improves the flexibility of the competition and cooperation model in decision-making in a dynamic environment, but also improves the benefits of natural protection environment; When determining the optimal concession value, the benefit level of natural protection environment is significantly improved; The experimental results show that the model can not only simulate the impact of the natural environment on the development of art, but also effectively deal with it on the basis of analyzing the development and changes of art.

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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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