Research on China's International Political Economy based on International Regional Economic Cooperation

Tianjie Yang

University of California- San Diego, La Jolla, US

763572511@qq.com

Abstract. At present, the international economic situation has undergone profound changes. With the globalization of economy, risks are also globalized. At present, regional integration or regionalization has become an important phenomenon in international political economy. The deepening of regional interdependence and the growth of globalization have promoted the expansion of regionalism political and economic perspectives. The "the Belt and Road Initiative (B&R)" strategy is an important decision made by China to adapt to the new normal of economy and face the weak pattern of world economy and trade. In the future, this strategy will be an important supporting point for China's stable, open and efficient economic growth. Based on the new situation of international regional economic cooperation, this paper puts forward an international regional economic decision-making model based on artificial fish swarm algorithm (AFSA), and discusses the selection method of parameters in the model, so as to study the international regional economic cooperation and its effects under the "B&R" strategy. In order to solve it easily, it is transformed linearly and a new model with smaller scale is obtained. The experimental results show that the international regional economic intelligent decision-making model based on AFSA has high stability. The results show the feasibility of the proposed method. The research results have certain theoretical and practical significance for analyzing international political and economic issues, and have certain reference value for international and regional economic cooperation.

Keywords: International Regional Economy; Economic Cooperation; Economic Projection.

1. Introduction

With the deepening of globalization, China's economy has become more and more closely linked with the world economy. At present, regional integration or regionalization has become an important phenomenon in international politics and economy. The European Union, APEC, ASEAN, NAFTA and other regional groups show a world composed of regions [1]. Like globalization, regionalization is also an important part of global transformation and domestic structural change. Due to the impact of the international financial crisis, trade protectionism is more serious, China's external economic environment is more severe, and export trade has been seriously impacted [2]. In this situation, China must maintain its overseas market share with a more positive attitude and take more practical actions, and realize the coordinated promotion of domestic demand and external demand [3]. In the study of regionalism, political scientists pay more attention to power politics and regional framework between countries, while economists pay attention to regional economic flows and the economic consequences of policy changes [4].

Regionalization and regionalism have become one of the important topics that scholars at home and abroad have been paying attention to continuously. The deepening of regional interdependence and the growth of globalization have promoted the expansion and deepening of regionalism's political and economic perspective, and accurate prediction of economic indicators is a necessary prerequisite for the state to correctly regulate and control the international regional economy [5]. But the economic system, especially the international regional economic system, is a very complicated system [6]. Among them, there is a wide range of nonlinear time-varying and uncertain interaction relations. Most of the international regional economic models established on the basis of econometric theory are linear models. While the linear models play a great role, they gradually expose their defects, that is, it is difficult to grasp the nonlinear phenomena in the international regional economic system, which will inevitably lead to an increase in the error in economic forecasting [7].

The "B&R" strategy is an important decision made by China to adapt to the new economic normal and face the weak world economic and trade pattern. In the future, this strategy will be an important support point for China's stable, open and efficient economic growth [8]. Looking at the current global economic growth pattern, we can see that although the overall economic situation is grim, regional economic cooperation has been liberalized and facilitated, and regional economic cooperation has ushered in a new situation, which is both an opportunity and a challenge for the growth of China's open economy [9]. Lutz et al. established a China international regional economic decision-making model with dynamic input-output equations as the core constraint and a set of social and economic growth goals as the objective function under the background of China international regional economy and under the guidance of sustainable development strategy, and verified the rationality of the model [10]. This paper puts forward an international regional economic decision-making model based on AFSA, and discusses the selection method of parameters in the model, so as to study the international regional economic cooperation and its effects under the "B&R" strategy.

2. Methodology

2.1 Regional Economic Cooperation Mode under "B&R" Strategy

In the process of regional economic cooperation and development, because most countries along the bilateral and multilateral preferential treatment are developing countries, if the free trade agreement is directly signed, it will affect the growth of countries along the route to a certain extent, and will also affect the enthusiasm of countries along the route to participate in the "B&R" strategy. Therefore, in the process of implementing the "B&R" strategy, it can be carried out with the help of bilateral and multilateral preferential treatment. "B&R" is helpful to adjust and optimize the structure of China's medium industries, and gradually change from labor-intensive to technology-intensive and capital-intensive, and orderly transfer industries with excess capacity, which do not meet the requirements of economic growth and have no economic benefits, so that these production capacity and industries can be transformed into economic factors for the economic growth of developing countries [11]. In the growth of "B&R" strategy, bilateral or multilateral preferential trade agreements can be signed through the cooperation of relevant countries from the perspective of cooperation benefits between the two sides. In this process, preferential tariffs are needed to reduce the adverse effects caused by trade barriers. "B&R" has achieved industrial upgrading and formed a new industrial pattern in China. At the same time, it can provide countries around the world with a good environment for rational allocation of resources, reduce trade frictions with other countries, conduct more open and harmonious trade and economic exchanges between countries, and improve the quality of China's open economy to a certain extent.

Under the "B&R" strategy, international regional economic cooperation needs to choose the scientific development mode from the development characteristics of each country. Therefore, it is difficult to solve all development problems only by preferential economic cooperation mode. Therefore, in the process of multi-dimensional cooperation, we should actively realize industrial cooperation and mutual benefit. Under regional agreements, the depth and breadth of trade liberalization and facilitation of goods and services among countries are constantly improving. Countries in the region are adjusting to be more open and non-discriminatory in terms of tariffs, non-tariff measures, service market access, trade and investment facilitation, etc. The vertical production relations between countries within the agreement, intra-enterprise, intra-industry and intra-regional trade and investment are increasingly becoming the mainstream, and enterprises in a country can no longer enjoy the comparative advantages of their own resource endowments, and they can invest globally through intra-industry and intra-enterprise trade and investment.

In order to better help the implementation of the "B&R" strategy, it is necessary to further innovate and diversify the mode on the basis of traditional financing means. Because "B&R" countries are mostly developing countries, their infrastructure construction mainly depends on the World Bank. However, due to the impact of the whole world financial crisis, countries along the route have certain

bottlenecks in terms of funds. Therefore, many developing countries began to seek financial support from China. In the growth of "B&R" strategy, China signed free trade agreements with Arab countries, which better promoted the interaction and cooperation between the two sides in energy and infrastructure construction. Especially with the increasing cooperation between China and the Middle East, the two sides will continue to improve the depth and breadth of cooperation.

2.2 International Regional Economic Decision-making Model

There are many factors affecting regional economy, and the relationship between them is complicated, showing an extremely complicated high-dimensional nonlinear relationship. On this basis, it is very difficult to establish a prediction model with traditional measurement methods, and it is difficult to get satisfactory results. Therefore, this paper puts forward the application of AFSA to predict the international regional economy. An important reason why it is difficult for a system to predict economic behavior to achieve satisfactory results is that the system is "chaotic", that is, the system may be too sensitive to initial conditions when judging, so that it is impossible to predict for a long time. AFSA has simple structure, good nonlinear quality, flexible and effective learning mode, and completely distributed storage structure, so that it can easily introduce various types of information and adapt to various complex environments. The international regional economic optimization model based on AFSA is shown in Figure 1.

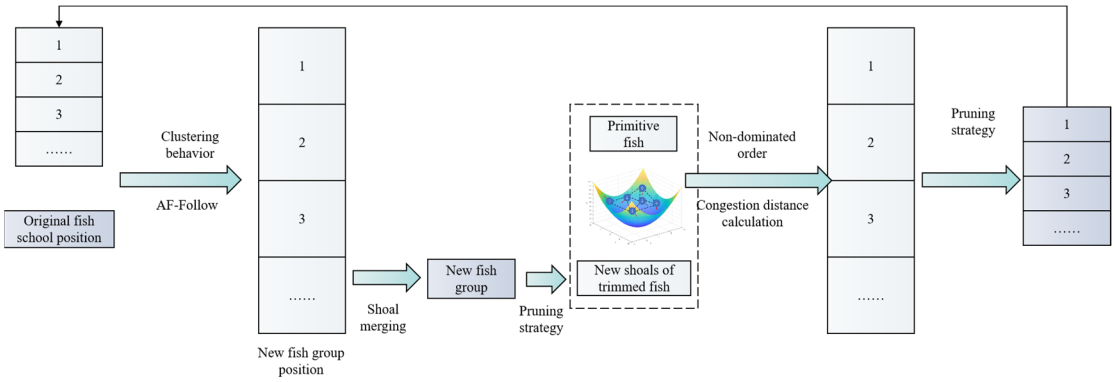

Figure 1. International regional economic optimization model

By establishing the model of coordination and coupling relationship between environment and socio-economic system, and quantitatively judging its coordination degree, the regional development coordination can be intuitively obtained, thus providing services for policy decision-making. In order to realize the sustainable growth of social environment and economic system in international regions, it is necessary to understand the respective development status and existing problems of the two systems first, and then evaluate whether the two systems develop harmoniously, and then put forward feasible suggestions and countermeasures to ensure the balanced, coordinated and sustainable growth of regional social, economic and environmental systems.

For a country, to achieve the maximum output value of its economic region, the key is to solve the optimal situation. An economic zone is usually composed of several independent regions, which constitutes the so-called event set, which can be recorded as:

$$A_1 = \{a_1, a_2, a_3 \ldots, a_m\} \tag{1}$$

Where A_1 refers to the event set of the first layer. The situation is as follows:

$$\begin{aligned} S_1 &= \{(a_1, b_1), (a_1, b_2), (a_1, b_3) \ldots, (a_m, b_1), (a_m, b_2), (a_m, b_3)\} \\ &= \{s_{1,1}, s_{1,2}, s_{1,3}, \ldots, s_{m,1}, s_{m,2}, s_{m,3}\} \end{aligned} \tag{2}$$

Its corresponding situation matrix is:

$$S_1 = \begin{pmatrix} s_{11} & s_{12} & s_{13} \\ s_{21} & s_{22} & s_{23} \\ \cdots & \cdots & \cdots \\ s_{m1} & s_{m2} & s_{m3} \end{pmatrix} \tag{3}$$

In order to eliminate the influence caused by different dimensions and orders of magnitude, it is necessary to carry out dimensionless processing on the data and treat each index as a numerical value. Commonly used dimensionless processing methods include range method, standardization method and so on. In this paper, the influence of various dimensionless methods on the assessment results is comprehensively considered, and the standardization method is selected to dimensionless the indicators. According to the characteristics of each index reflecting the regional social environment, different formulas are selected to standardize the indicators.

Let y_t be a $k \times 1$-dimensional observable variable containing k economic variables. These variables are related to $m \times 1$ dimension vector a_t. The measurement equation is defined as:

$$y_t = z_t \times a_t + d_t + \mu_t \quad t = 1,2,\ldots,T \tag{4}$$

Where T represents sample length, z_t represents $k \times m$ matrix, and d_t represents $k \times 1$ vector. μ_t represents $k \times 1$ vector, which is a continuous uncorrelated disturbance term with mean value of 0 and covariance matrix of H_t:

$$E(\mu_t) = 0, \quad \text{var}(u_t) = H \tag{5}$$

In general, the element of a_t is unobservable, and the equation of state is defined as:

$$a_t = T_t a_{t-1} + c_t + R_t \xi_t \quad t = 1,2,\ldots,T \tag{6}$$

Where, T_t represents the $m \times m$ matrix, c_t represents the vector of $m \times 1$, and R_t represents the $m \times g$ matrix. ξ_t represents the mean value 0 of $g \times 1$ vector, and the random uncorrelated disturbance term whose covariance is Q_t:

$$E(\xi_t) = 0, \quad \text{var}(\xi_t) = Q_t \tag{7}$$

In the calculation process of the prediction model, firstly, the indexes are determined and put into their respective input mode text files. When the forecasting program is running, the index data in the text file is automatically called, and then the data is preprocessed. Finally, through learning, the network calculates the forecast results for the next year, and then stores the data in another data file, and repeats the above process to obtain the forecast results year by year.

3. Result Analysis and Discussion

The competition between regional investment and market forces the change of national structure, but the existing systems and social forces also affect these changes. Political factors have an important influence on regional groups, international politics and domestic political processes, thus affecting the emergence and changes of regional systems. Then the political analysis of various regional institutional arrangements has become an important research topic, involving the influence of political factors on regional groups and the influence of these groups on international politics and domestic politics. In AFSA model, if the fluctuation of input is too large, AFSA can reach the ideal learning error value within the sample interval, but there is a big error when forecasting outside the sample interval. Therefore, in order to reduce the fluctuation of economic variables and remove the time trend of economic input, polynomial fitting error is used to remove the non-stationary change process of each variable in the model. The international regional economic decision support system has a large number of non-standardized, non-standardized or incomplete data. In order to optimize the performance of analysis and processing, it is necessary to denormalize the data structure. Compare the output data of this model with the real international economic data, as shown in Figure 2.

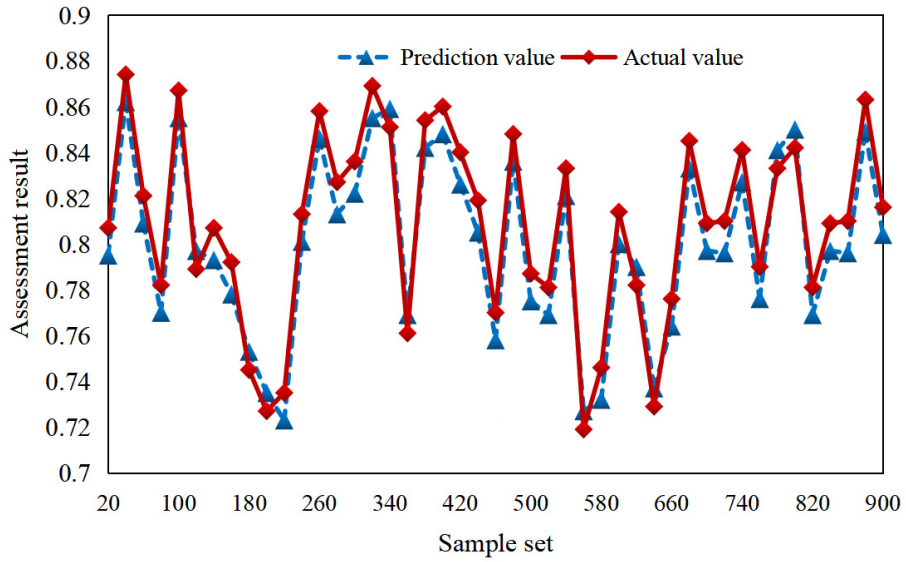

Figure 2. Learning results of this model

It is not difficult to see that the results of international regional economic forecasting are convergent, which can approximate the original data well and have the basis for forecasting future data.

The economic significance of regional integration has aroused scholars' concern and disagreement. Some scholars worry that the regional system will destroy the multilateral system and lead to trade protectionism. Regional arrangement is consistent with multilateral trade liberalization, and even opens the way for trade liberalization. Figure 3 shows the accuracy comparison of different algorithms for international regional economic forecasting.

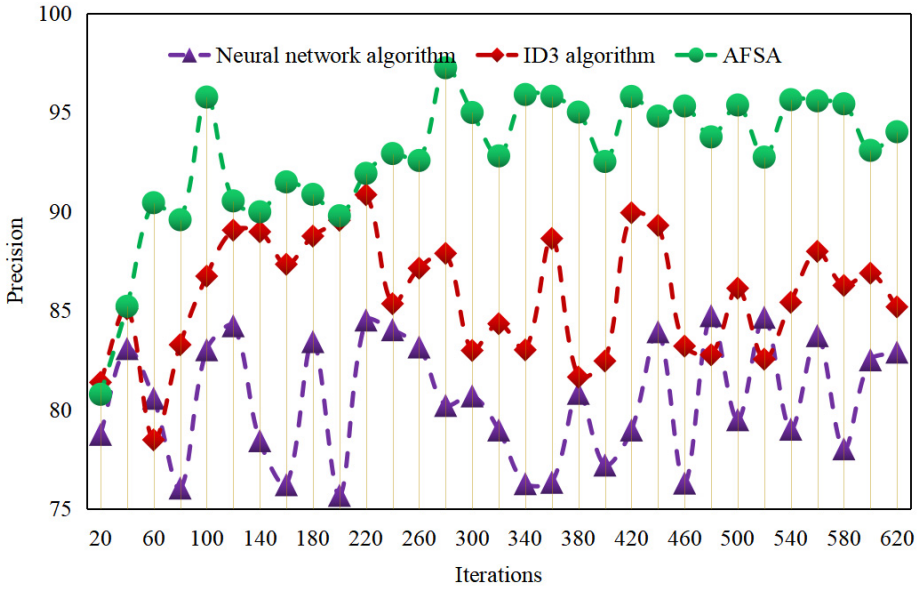

Figure 3. Accuracy comparison results of several algorithms

In order to get a comprehensive overall assessment of the evaluated thing, it is necessary to synthesize the indicators reflecting all aspects of the matter. In synthesis, due to the unbalanced growth of the physical object itself, some indicators should play a greater role in the formation of the comprehensive level, while others should be smaller.

This paper systematically introduces the current models in the study of the coupling relationship between economic growth and social environment from the aspects of development, mechanism, methods and application examples, and constructs an index system for the coordinated growth of

social environment and economy from the perspective of Scientific Outlook on Development, which provides a reasonable way to evaluate the comprehensive development level of social environment subsystem and economic subsystem. Figure 4 shows the running time comparison of different economic forecasting algorithms.

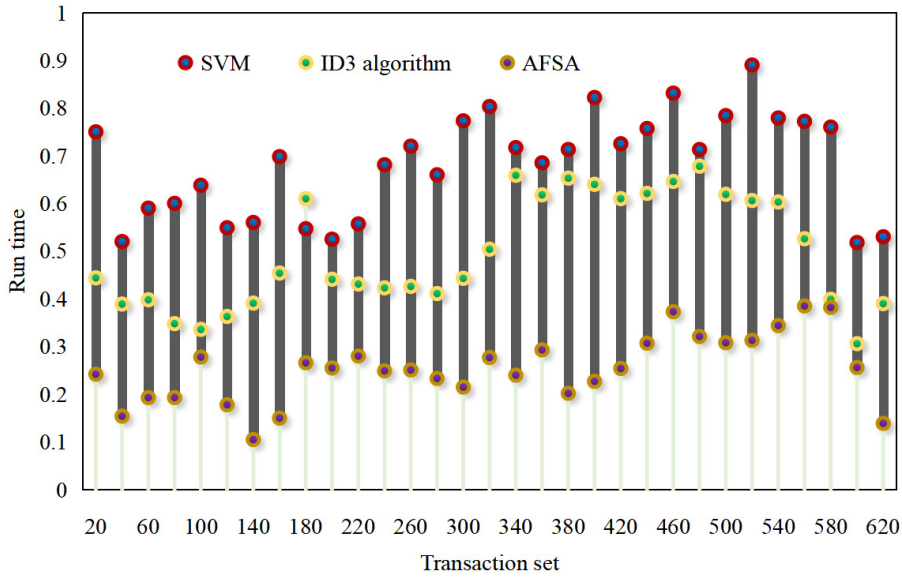

Figure 4. Comparison results of running time of the system

As can be seen from Figure 4, the model proposed in this paper has higher running efficiency than the traditional method. Economic integration system includes not only economic system, but also the influence of economic growth on various social environments in the region, as well as the constraint and promotion of social environment system on economic growth. Only on the premise of objectively assessing the coordination between social environment and economy can we find out the main factors that affect the coordinated growth of social environment and economy.

As a relatively complete organic system, the international regional economy is closely related to each other. Figure 5 shows the stability assessment of the constructed economic decision-making model.

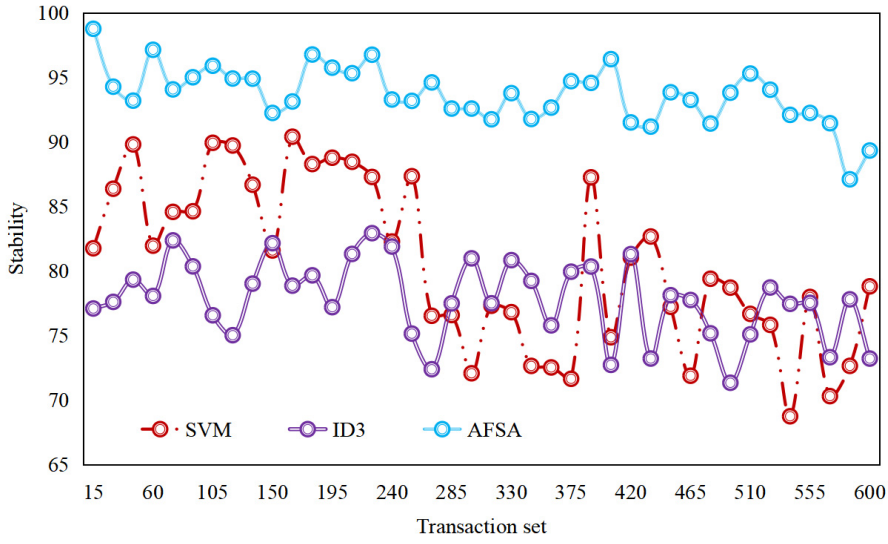

Figure 5. Stability analysis of the model

The simulation results show that the international regional economic intelligent decision-making model based on AFSA has high stability. The results show the feasibility of the proposed method. Scientific application of statistical analysis methods of big data is helpful to promote the growth of

international regional economy. Based on the results of big data analysis, reasonable planning of financial management can maintain the development vitality of the national economy.

4. Conclusion

Traditionally, international political economics is regarded as a branch of international relations, focusing on the study of the relationship between politics and economy, and between the state and the market. The integrated study of regionalism and international political economy is conducive to the comparison of regionalism and multidisciplinary analysis, and is also conducive to transcending the constraints of disciplinary barriers and narrow methodology. The construction of "B&R" will promote the steady growth of China and countries along the route in international regional economy and industry, and it is a pioneering multilateral win-win cooperation. This paper puts forward an international regional economic decision-making model based on AFSA, and discusses the selection method of parameters in the model, and then studies the international regional economic cooperation and its effects under the "B&R" strategy. The results show that the international regional economic intelligent decision-making model based on AFSA has high stability. Scientific application of statistical analysis methods of big data is helpful to promote the growth of international regional economy. Due to the impact of the international financial crisis, trade protectionism is more serious, China's external economic environment is more severe, and export trade has been seriously impacted. In this situation, China must maintain its overseas market share with a more positive attitude and take more practical actions, and realize the coordinated promotion of domestic demand and external demand.

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