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Research Article

Mathematical Model and Algorithm of Multi-Index Transportation Problem in the Background of Artificial Intelligence

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The development of artificial intelligence has brought rapid changes to human life and brought great convenience to human activities. The development of various modes of transportation has also brought convenience to people's travel and commodity transactions, but it has also added more issues that need to be carefully considered. Because of the diversification of transportation methods, transportation problems also arise many fields, such as air transportation, water transportation, and land transportation. The development of mathematical models and algorithms for transportation problems is also in full swing, and it is a major trend to introduce mathematical models and algorithms into the solution of transportation problems. This paper deals with the multi-index transportation problem by establishing a multi-index mathematical model and algorithm to find a scientific transportation method for the goods to be transported, so as to save the cost and time of transportation. Experiments show that the mathematical model established in this paper has high efficiency for solving the multi-index transportation problem. At the same time, the most suitable transportation method can also be selected for the transportation of goods, and the route planned by the mathematical model and algorithm can reduce the risk to 12.34%.

1. Introduction

The transportation problem is a special form of common linear programming, which has both the common properties of linear programming and its own characteristics and algorithms. It is a problem that needs to be solved according to a certain algorithm, and it means mainly to solve the problem of high freight in the transportation route. And, with the improvement of the economic level, the transportation problem has also begun to receive extensive attention. Nowadays, the production of commodities is often divided into multiple places. Therefore, based on the current transportation network, it is one of the problems that need to be solved to make a reasonable plan to transport the goods to various sales places and reduce the transportation cost [1, 2]. The competition in today's transportation market is also extremely fierce, such as the logistics industry and the transportation of fruits and vegetables. Therefore, it is very necessary to choose a reasonable transportation solution to ensure the transportation time and safety. Today's commodities need to face a lot of transportation, and the number of production and sales places is also large. For the transportation problems that need to be faced with a lot of transportation and a large number of production and sales places, a method is needed to establish a new model to solve the problems of how to allocate and transport materials and rationally arrange transportation capacity. This is because the theoretical and practical significance of the traffic problem is very important [3, 4].

By establishing mathematical models to solve traditional transportation problems, artificial intelligence technology is used to make multi-index decisions for the transportation of goods, so as to choose the best route for transportation of goods, improve the efficiency of transportation, and improve the problem of unbalanced production and sales. At the same time, it can also reduce the cost of transportation, reduce the damage of goods during transportation, and ensure the quality of goods [5, 6]. Artificial intelligence technology plays a major role in the transportation problems of the logistics industry. Because the goods transported by logistics are of various types and sizes, the use of artificial intelligence can quickly classify these goods and provide suitable transportation solutions to promote the efficiency of commodity transportation and ensure the integrity of the goods. At the same time, it can also strengthen the control of transportation time and provide scientific and quantitative decision support for transportation. At the same time, through artificial intelligence technology and mathematical models and algorithms, the multi-index experimental transportation problem can ensure the quality of the goods during the transportation and reduce unnecessary losses.

In order to improve the transportation problem, many scholars have done research on it. Among them, Hu et al. studied the mathematical model of container transportation planning in the port area and proposed a tabu search algorithm to establish this model. The findings show the extent to which internal (ITT) and external transport processes interact and the potential to improve overall operations when using the proposed comprehensive optimization [7]. Borndoerfer et al. proposed the development of mathematical models and optimization methods for railway transportation to solve many related problems in the railway planning process. They introduced a new sorting method, and an example shows that the new projection method provides a good method for fuzzy algorithms to deal with transportation problems [8]. Kawa and Anholcer presented the results of a quantitative study with a random sample of 300 cargo service transport providers in Poland involving exclusion constraints in transport, which confirms that exclusion factors are an important part of the activities of freight transport enterprises [9]. Kukharchyk discussed solving cost optimization problems in transportation problems with mathematical models, noting that all these criteria are meaningful in such tasks where the traffic volume is predetermined [10]. Although their research has a certain reference for the solution of transportation problems, Hu et al.'s research has no specific data and Borndoerfer et al.'s research lacks specific examples. Although the research of Kawa et al. has examples, it only considers one factor that affects the transportation problem. The research of Kukharchyk has not written specific research results and is not convincing.

The mathematical models and algorithms established in this paper have the following innovations: (1) This paper uses the genetic algorithm to build the model, which helps the mathematical model to make multi-index decision-making, so that it can quickly and accurately find out the transportation problem, so as to seek the optimal solution to the problem. (2) This paper fully considers various uncertain factors and certain factors that affect transportation and grasps transportation problems through mathematical models, so as to make the most accurate multi-index decision-making. (3) This paper combines artificial intelligence technology with mathematical models and algorithms of multi-index transportation problems. Artificial intelligence can be described as mathematical models and algorithms that provide accurately implemented data, so that the freight and risk factors of each route can be calculated.

2. Mathematical Model-Building Method for Multi-Index Transportation Problems

2.1. Artificial Intelligence and Transportation. Transportation is one of the important factors of economic development. Good transportation can promote economic development and strengthen business exchanges between regions [11–14]. Just as the current international trade can be completed by air transportation, railway transportation, and other transportation methods, its transportation time will be greatly shortened, convenient, and fast. The current development of artificial intelligence technology also provides a good opportunity for the development of transportation. The current application of artificial intelligence in the transportation industry is shown in Figure 1.

There are many applications of artificial intelligence in transportation, such as traffic lights in Figure 1, GPS positioning and navigation systems during travel, and intelligent communication within vehicles, all of which belong to artificial intelligence technology. The unmanned driving technology currently under development needs to be controlled by artificial intelligence technology. When we need to reach a new destination in the process of traveling, we need to use navigation. Usually, artificial intelligence technology and algorithms are used to determine the optimal route. At the same time, this method can also be used to avoid traffic-congested road sections, save travel time, and reduce the energy consumption of travel tools [15].

Intelligent transportation is a hot spot in the development of transportation in the world today [2, 16, 17]. It aims to build a safe, convenient, efficient, and green transportation system, relying on the existing transportation infrastructure and means of transportation, through the integrated application of modern information, communication, control, and other technologies. It is an important symbol of the modern transportation industry to fully meet the diverse needs of public travel and cargo transportation [18]. In the process of aircraft transportation, the communication between the air and the ground is always maintained, so as to know the status of the aircraft during transportation, and it is also convenient for the airport staff to prepare for the response when it is about to arrive at the airport. These all need to rely on artificial intelligence technology and communication technology [19].

AI technology can also provide better transportation decisions based on the size and nature of the cargo. It is possible to arrange and schedule the whole road transportation more reasonably and effectively adjust the traffic density, so as to maximize the utilization of the line and avoid traffic congestion [20]. In air transportation, artificial intelligence technology can also be used to check before the take-off of cargo transportation, which can more accurately identify whether the air transportation means is faulty, so as to reduce the possibility of risks. At the same time, it can also be used in the external fuselage wing structure system of the aircraft, the aircraft flight control system, and the electrical system to ensure the use time of air vehicle parts [21]. AI technology can also coordinate the transportation of various types of transportation, as shown in Figure 2.

Intelligent traffic lights GPS positioning system Intelligent communication equipment

Figure 1: The use of artificial intelligence in transportation.

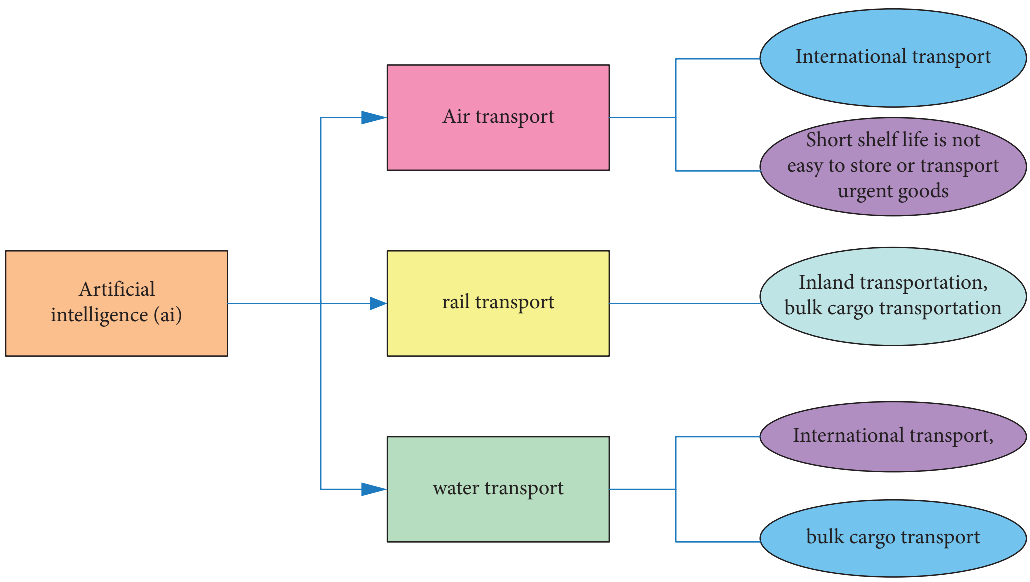


Figure 2: AI coordination of modes of transport.

Under the coordination of artificial intelligence, the problem of transportation of goods can be well solved and if the transportation of goods can be seamlessly connected to various modes of transportation, the time cost can be reduced. For example, in the transportation of some fresh vegetables, they can be transported by air to the city where the destination is located and then connected by road transportation through communication technology, which can save a lot of transportation time. At the same time, the transportation can also select the best running route in combination with the algorithm to ensure the quality of the goods. Therefore, the development of transportation under the background of artificial intelligence is faster, more practical, and safer, and the coordination ability of operation is also strong.

2.2. Transportation Issues. The transportation problem is the problem of solving the transportation route of the commodity between the place where the commodity is produced and the place where the commodity is needed and getting the commodity safely to the place of demand. In traditional transportation problems, all supply and demand related to transportation and transportation costs are already determined values. Because traditional transportation can only follow the traditional route, there will be no other running routes [22]. However, with the diversification of transportation modes and the development of transportation, the available routes are gradually increasing and transportation problems are also increasing. The existing transportation problems are divided into six types, as shown in Figure 3.

The transportation problems shown in Figure 3 include general transportation problem, network transportation problem, maximum flow problem, shortest path problem, task assignment problem, and production planning problem. The general transportation problem refers to conventional ordinary transportation methods, such as railway and road transportation, as well as transportation modes that require transshipment of combined vehicles. We need codistribution optimized for overland transport to achieve the best route and save as much cost as possible. The network transportation problem generally refers to the problems in the logistics industry, and network transportation generally refers to logistics distribution and express delivery [23]. For example, the things purchased on the current online shopping platform need to be shipped by express. Because of the convenience of shopping on the platform, this is generally a

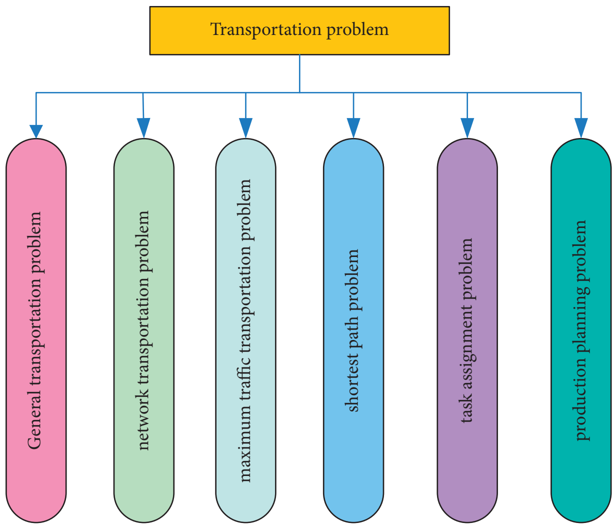


Figure 3: Shipping issues.

multimodal transportation method with various types and needs. The schematic diagram is shown in Figure 4.

It can be seen that the multiple categories in Figure 4 refer to different kinds of commodities. Multidemand means that buyers in different places may need the same kind of goods or different kinds of goods, and they need to take different transportation methods for this. In the choice of transportation modes, it is necessary to determine the optimal relationship between transportation cost, transportation efficiency, and transportation mode through the model and, at the same time, the optimization problem of reverse logistics transportation should be considered in the optimization of logistics transportation from the demand place to the supply place and the best transportation route should be found based on the back-and-forth transportation route, which improves the efficiency of logistics network transportation [24].

The maximum flow problem, also known as the F problem, is a problem of using an algorithm to allocate the traffic size of the transportation network, but it does not consider the most distributed problem of the amount of traffic, so it is insufficient to a certain extent. The maximum flow problem provides a theoretical basis for the actual transportation network, and a reasonable and convenient transportation route can be formulated by analyzing the flow in the running route. By studying the maximum flow problem, we can get a good understanding of the risk in the actual transportation, so as to avoid the loss caused by the risk as much as possible [25]. In the logistics transportation, not only the route selection but also the centralized transportation is required, so the shortest path and the centralized transportation mode are considered [26]. Due to the particularity of the transportation of dangerous and hazardous goods, the problem of transportation routes is very important and the time risk must also be considered.

2.3. Mathematical Model and Algorithm of the Transportation Problem. The mathematical model in the transportation problem is used for the final determination of the low-cost and high-safety transportation route by measuring the cost of transportation, time cost, and other costs between the production and sales places. Simply put, it is a means to improve transportation safety and reduce costs by controlling some factors. This provides a better proposal for transportation between the production and sales locations. Multiobjective decision-making of transportation problems is carried out through artificial intelligence technology, mathematical model, and genetic algorithm. Among them, artificial intelligence technology enables mathematical models and algorithms to autonomously make predictions based on actual conditions and plays a solid role in the process of planning paths of mathematical models and algorithms [27]. Of course, artificial intelligence technology also needs to navigate the transportation between production and sales to avoid deviating from the original transportation route. The ultimate goal of the multi-index transportation problem is to minimize the total transportation cost [28].

To this end, we need to understand the main sources of transportation problems, places of demand, transportation costs, output, demand, etc. [29]. The schematic diagram of transportation problems is shown in Figure 5.

In Figure 5, if there are i production places, $S_i\,(i = 1, 2, 3 \ldots .)$ for a commodity, and the output of each production place is $U_i\,(i = 1, 2, 3 \ldots .)$, and there are j demand places, $Q_j\,(i = 1, 2, 3 \ldots .)$ for this commodity, the required quantity of commodities in each demand place is $G_j\,(i = 1, 2, 3 \ldots .)$. Then, there is a need for transportation between the place of origin and the place of demand. The transportation cost and the amount of transportation in the transportation problem will be generated, which are represented by T_i and M_j, respectively, and the matrix of the total transportation cost is expressed as follows:

$$[T] = \begin{bmatrix} T_1 & \ldots & T_i \\ \ldots & T_{2i} & \ldots \\ T_i & \ldots & T_1 \end{bmatrix}. \tag{1}$$

And, the matrix of shipping quantities is expressed as follows:

$$[M] = \begin{bmatrix} M_1 & \ldots & M_j \\ \ldots & M_{2j} & \ldots \\ M_j & \ldots & M_1 \end{bmatrix}. \tag{2}$$

To this end, we need to establish a mathematical model of multiple indicators as follows:

$$\sum_{j=1}^{i} T_e \geq M_j, \quad (j = 1, 2, 3 \ldots ..). \tag{3}$$

Formula (3) represents that the production quantity T_e of the production place exceeds the shipped quantity of this production place, which is also a phenomenon under normal circumstances. However, usually, the quantity of a commodity shipped will not exceed the production quantity of the origin. The quantity of products arriving at the place of demand will not be lower than the quantity of commodities required by the place of demand, so its mathematical model can be expressed as follows:

supplier	demand	type of merchandise
Shanghai	Beijing	Inclined shoulder bag
	Zhengzhou	Beauty makeup products
Hong Kong	Xi 'an	
	Nanchang	basketball

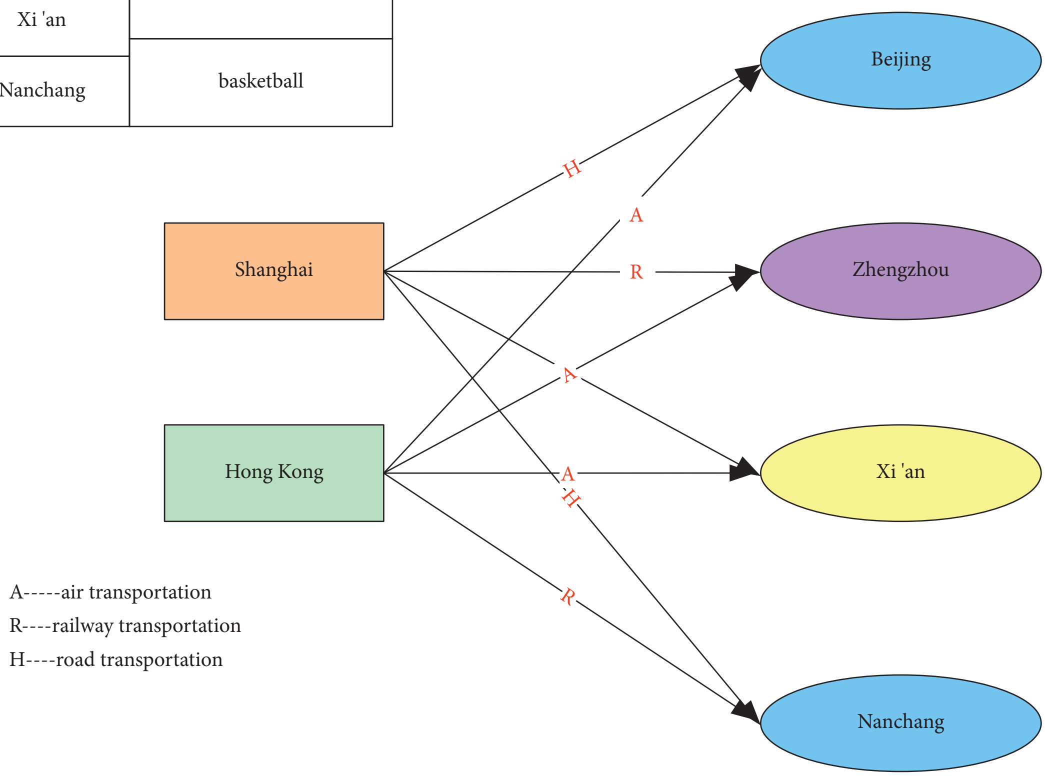


Figure 4: Multimodal transport with multiple types and demands.

$$\sum_{i=1}^{j} M_j \geq Y_e, \quad (j = 1, 2, 3 \ldots .). \tag{4}$$

Here, Y_e represents the total quantity of goods required by the demand place. So, in general, the mathematical model of the transportation problem is as follows:

$$\begin{aligned}
&\min T * M = \sum_{j=1}^{i} \sum_{i=1}^{j} T_e * Y_e, \\
&\text{s.t.} \sum_{j}^{i} G_1 \leq U_1 (i, j = 1, 2, 3 \ldots), \\
&\sum_{j}^{i} G_1 \geq T_e, \\
&\text{s.t.} \sum_{i}^{j} M_j \geq G_1 (i, j = 1, 2, 3 \ldots), \\
&\sum_{i}^{j} Y_e \leq G_1, \\
&T_e \geq 0, M_j \geq 0, U_1 \geq 0, Y_e \geq 0 (e = 1, 2, 3 \ldots i, j).
\end{aligned} \tag{5}$$

For the multi-index transportation problem, it is necessary to achieve multiple goals in transportation; that is, to find the optimal node in the case of multiple goals, the linear programming function of the multi-index transportation problem is as follows:

$$\begin{aligned}
&F(x) = 1, \left(M_j \geq Y_e\right), \\
&F(x) = \frac{T_i - 1}{M_j - Y_e}, \left(Y_e \leq M_j \leq M_{2j}\right), \\
&f(x) = 0, \left(Y_e = M_j\right).
\end{aligned} \tag{6}$$

Through the above-mentioned explicit planning, the initial optimal nodes of the timeline multiobjective transportation problem are obtained and then the genetic algorithm is used for further calculation. In transportation problems, it is also necessary to use intelligent algorithms to calculate the variables in the model. Transportation problems mainly include products, vehicles, demand locations, time, constraints, and objective functions [30]. The algorithm in the transportation problem is mainly divided into the genetic algorithm and the Hopfield neural network algorithm. The genetic algorithm is a global optimal search optimization algorithm. The flowchart of the genetic algorithm is shown in Figure 6.

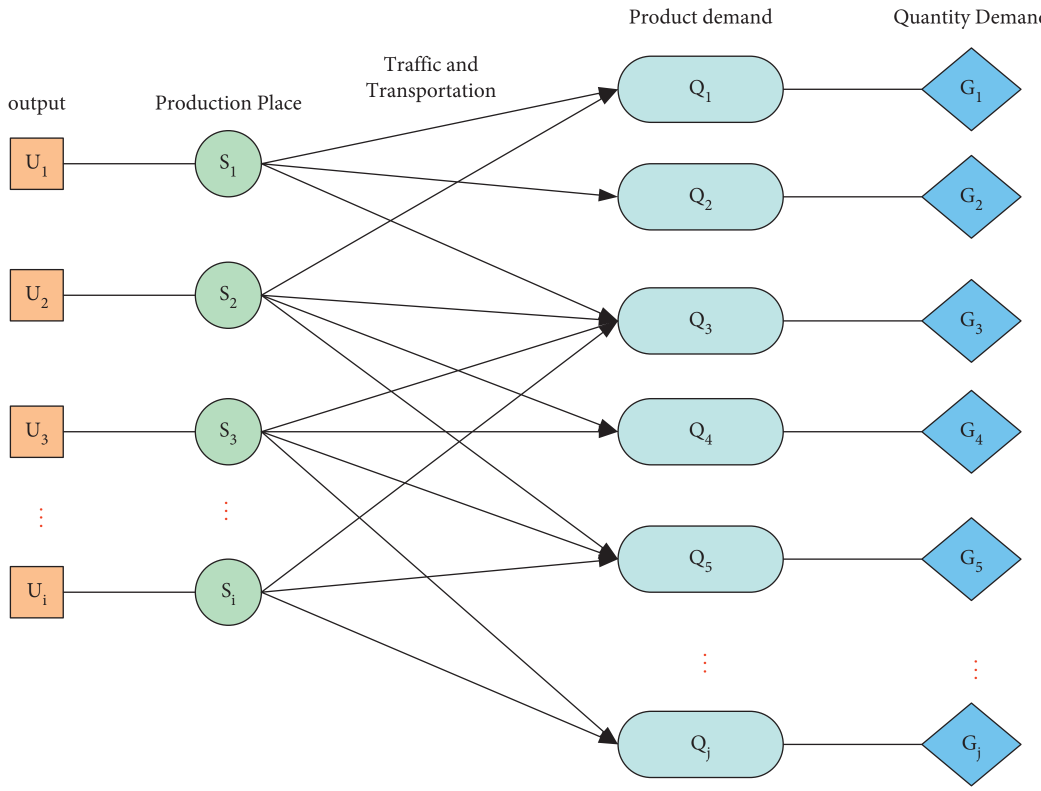


Figure 5: Schematic diagram of the transportation problem.

Assume that the output of the product production place is U, the production place is i, the quantity of products required by the demand place is G, and the demand place has j. When the quantity of demand places is greater than the quantity of production places, then the planning of transportation cost T and quantity M of products transported is as follows:

$$T = M * g. \tag{7}$$

Here, g is the unit price of commodity transportation. Then, the genetic algorithm is used to calculate the freight of multiple routes, and then, the transportation route is selected by comparing the freight. If there is only one production place X, but there are two demand places, there are two transportation routes Y_1 and Y_2 and the quantity of goods required by demand places Y_1 and Y_2 are G_1 and G_2, respectively. Then, there are two transportation schemes. The first is to ship all the commodities from the two demand places from the production place and then transport them between the two demand places. The second is to transport the goods to the two demand places. The ultimate goal of the transportation problem is to reduce the freight; then, the freight of the first transportation scheme is calculated as follows:

$$\begin{aligned} T_1 &= G_1 * g + G_2 * g, \\ T_2 &= M * g + (M - G_1) * g, \\ M &< U. \end{aligned} \tag{8}$$

In this way, if $T_1 < T_2$, the transportation route of option 1 will be selected, and if $T_1 > T_2$, the transportation route of option 2 will be selected for commodity transportation. Moreover, with the development of today's society, transportation problems are complex, so we need to combine artificial intelligence technology and establish mathematical models and algorithms to more efficiently solve multi-index transportation problems. At the same time, it can also ensure the quality of items in the process of transportation, so that the cost of transportation can be minimized [10]. Of course, some steep slopes and curves will be encountered during transportation, which will increase the risk of transportation. Therefore, the planning of the i transportation route also needs to consider the transportation risk. The calculation formula of transportation risk is as follows:

$$\text{Risk} = \frac{n + t}{L} * 100\%. \tag{9}$$

Here, n refers to the number of steep slopes encountered in the transportation route, while t represents the number of curves in the transportation route and L represents the total length of the transportation route. Therefore, the multi-index transportation problem should not only minimize the freight but also reduce the risk factor to ensure the least cost loss of goods during transportation.

3. Experiment and Analysis of the Multi-Index Transportation Problem

3.1. Statistics of Cargo Transportation Indicators

3.1.1. Experiment 1. This experiment assumes that there are 4 places of supply and 4 places of demand for a certain commodity. In the experiment, the mathematical model and

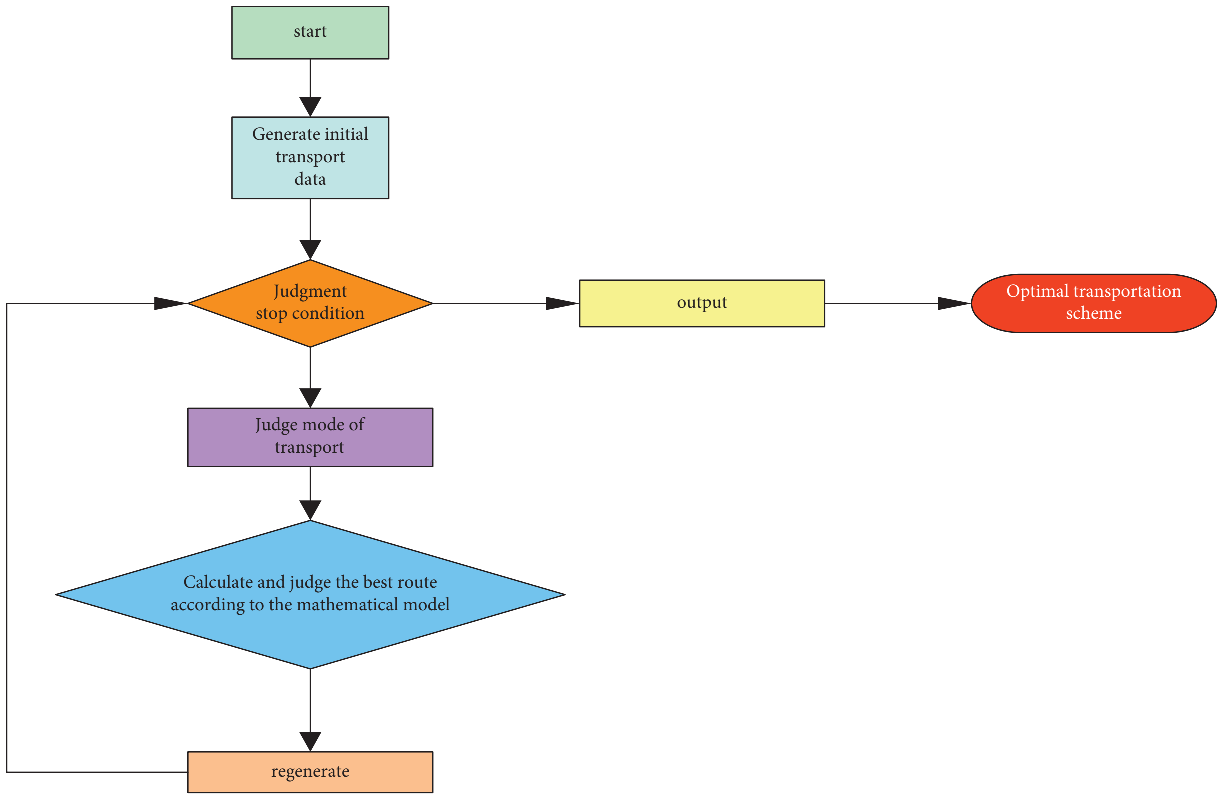


Figure 6: Genetic algorithm flow.

algorithm of multiobjective transportation problem and artificial intelligence technology will be used to analyze the freight, time, quality of goods, and transportation mode in the transportation process for statistics; while planning the best transportation route, it can also ensure the quality of the goods. In the transportation of goods, the means of transportation that need to be used will not be single, so there are many indicators that need to be considered. The means of transportation and related parameter assignments that need to be used this time are shown in Table 1.

Table 1 shows the maximum capacity and transportation costs of various means of transportation, which are used to calculate the transportation costs between the supply and demand locations in the later period and plan the optimal route between the supply and demand locations through mathematical models and algorithms. Among them, road transportation is the most flexible, so the planning of each transportation route requires road transportation, and the amount of commodities required between the supply and demand places is shown in Table 2.

In this way, it is necessary to plan the transportation route between the demand place and the supply place, and it is necessary to evaluate the freight, risk, and other indicators of the transportation route. According to the demand in the demand place in Table 2, the actual quantity of goods that the supply place needs to send is the supply quantity of the goods required by the demand place. For this reason, we need to calculate the transportation cost and transportation risk rate of various transportation methods. The freight rate of a single shipping method calculated by mathematical models and algorithms and the shipping risk rate identified by artificial intelligence technology are shown in Figure 7.

The risk rate is calculated by taking into account the curves, steep slopes, and other influencing factors that need to be passed in the transportation route. In Figure 7(a), the shipping cost is the lowest for the transportation mode from the supply place to the demand place, while the freight cost of air freight is the highest, followed by railway and expressway. From the point of view of freight, the best mode of transport for demand a is rail, and the best transport for demand b is air. In Figure 7(b), the risk of air transport is the lowest overall, followed by rail transport. From other perspectives, because the transportation routes between different supply and demand places will be different, the standard of risk assessment is to assess the required operation route between the two places. But from a single means of transport and risk, rail transport is the best mode of transport.

3.2. Planning of Combined Transportation Routes

3.2.1. Experiment 2. This experiment still uses the data in Experiment 1 and plans a combined route, in which the shipping cost of the combined route will be changed. For better calculation, we recalculated the freight of the combined route, and the freight of the combined route is shown in Table 3.

Table 1: Assignment of means of transportation and related parameters (units: t and yuan).

Way of transportation	Shipping	Highway	Railway	Airport
Minimum processing capacity (t)	10000	2500	8000	2000
The loading point disaster recovery limit (t)	8000	2000	4000	1000
Fixed charge for loading point (Wanyuan)	5	7	8	9
Variable cost per unit	1.2	0.7	0.9	0.5

Table 2: Quantity of goods.

Place of supply	1	2	3	4
Quantity delivered (t)	32000	23000	30000	19000
Place of demand	a	b	c	d
Quantity demand (t)	20000	14000	24000	15000

Then, the freight and transportation risk rates required by the supply and demand places of a and b are shown in Figure 8.

Shown in Figure 8(a) are the shipping costs and risks of various combined routes used in a supply location. It can be seen from Figure 8(a) that the combination of air and road transportation has the highest transportation cost, but the lowest risk rate, while road transportation has the highest risk rate among all transportation methods. Compared with other modes of transportation, such as the combination of shipping and road and the combination of rail and road, the combination of shipping and road is extremely risky. In general, it is most suitable to use railway and road transportation, where the freight is moderate and the risk is lower, the total loss will be smaller, and the quality of the goods will be guaranteed. What is shown in Figure 8(b) is the comparison of the transportation combination mode adopted by the demand place b from the supply place. It can be seen from Figure 8(b) that the cost and risk of road transportation are extremely high, while the cost of the combination of air and road transportation is slightly lower than that of road transportation, the risk is extremely low, and the time required for air transportation is shorter. Therefore, the transportation mode of the place of demand b can be a combination of air transportation and road transportation.

Then, the mathematical model and the algorithm are compared to the best transportation methods obtained by comparing the specific data as shown in Figure 9.

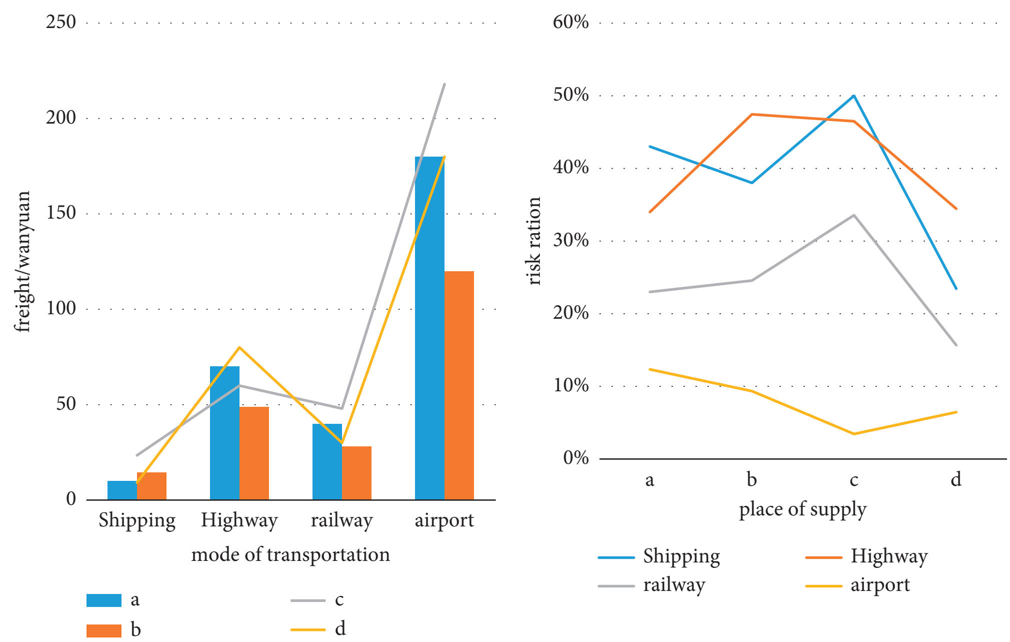
As can be seen from Figure 9, among the three modes of transport in a demand place, the combined transport mode of rail and road has the lowest risk and freight. Therefore, through the planning route a of the mathematical model and artificial intelligence technology, the transportation of goods in demand should be carried out by a combination of railway transportation and road transportation. And, the mode of transportation at the place of demand b should also be a combination of railway and road transportation, because the freight and risk rate of this combination are the lowest.

3.3. Experimental Summary. From the above experiments, in the solution of transportation problems that introduce mathematical models and algorithms of artificial intelligence technology, the freight and risk factors of various routes can be calculated more accurately. The optimal transport among these transport modes can be guided from the transport combinations verified in the experiments. In Experiment 1, the freight and risk rate generated by a single means of transportation were measured, and it was found that railway transportation is the most suitable for transporting commodities. Experiment 2 compared some of the combined transportation methods and found that the distance between each supply and demand location and the amount of goods transported will affect the level of freight and risk. Through the final comparison, it is found that the railway plus road transportation method has the lowest freight and risk and is the most suitable for transporting commodities.

4. Discussion

This paper has a certain understanding of the application of artificial intelligence technology in transportation, advanced traffic extends in all directions, and there are many intersections. These require traffic lights to coordinate, and artificial intelligence technology is involved in traffic lights [31]. The application of artificial intelligence technology in transportation can prevent many traffic accidents, so artificial intelligence promotes the development of transportation, for example, it can enter the station through face recognition at the gate channel of the entering station. And, it also improves the efficiency of people's travel and reduces the time cost of people's travel. To a certain extent, it has played a great role in the development of transportation. Artificial intelligence technology has also played an invaluable role in cross-border commodity transportation. It can plan transportation routes in advance, avoid unnecessary risks, reduce losses caused by accidental risks in the transportation process, and greatly promote the development of international trade.

This paper makes a certain analysis of the multi-index transportation problem. Multi-index refers to multiple goals, that is, multiple goals need to be achieved in the process of transportation. For example, minimizing the cost of transportation is the most important goal to consider in transportation issues. The second is to ensure the quality of the goods, ensure that the goods are in good condition during transportation, and reduce the damage of the goods caused by collisions. Then, there is the transportation time. The length of the transportation time has a certain relationship with the length of the transportation route. When planning a route, it is necessary to consider all factors of supply and demand, and in this process, it is also necessary to assess the risk of the route. Routes are planned to reduce transportation costs and avoid losses due to risks. The establishment of the mathematical model of the transportation

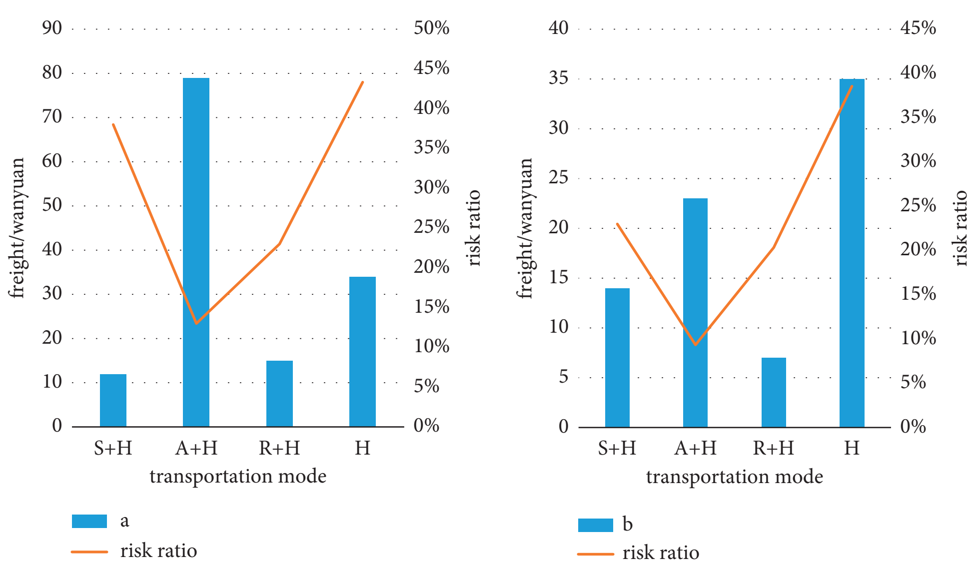


(a) (b)

Figure 7: (a) Freight and (b) risk rates for a single shipping method.

Table 3: Combined route freight (unit: yuan/t).

Array mode	$S+H$	$R+H$	$A+H$	H
Minimum processing capacity (t)	20000	14000	24000	15000
Fixed charge for loading point (Wanyuan)	6	7.5	8	7
Variable cost per unit	1.2	0.3	0.2	1.4



(a) (b)

Figure 8: Freight and risk rates for a and b. (a) a demand place. (b) b demand place.

problem is to better calculate the transportation cost in the intricate route map and then use the genetic algorithm to find the optimal words to filter the route, which is the most effective way.

The experiments in this paper have estimated the transportation costs and risks required by several transportation modes using mathematical models and algorithms. In the process of estimation, artificial intelligence

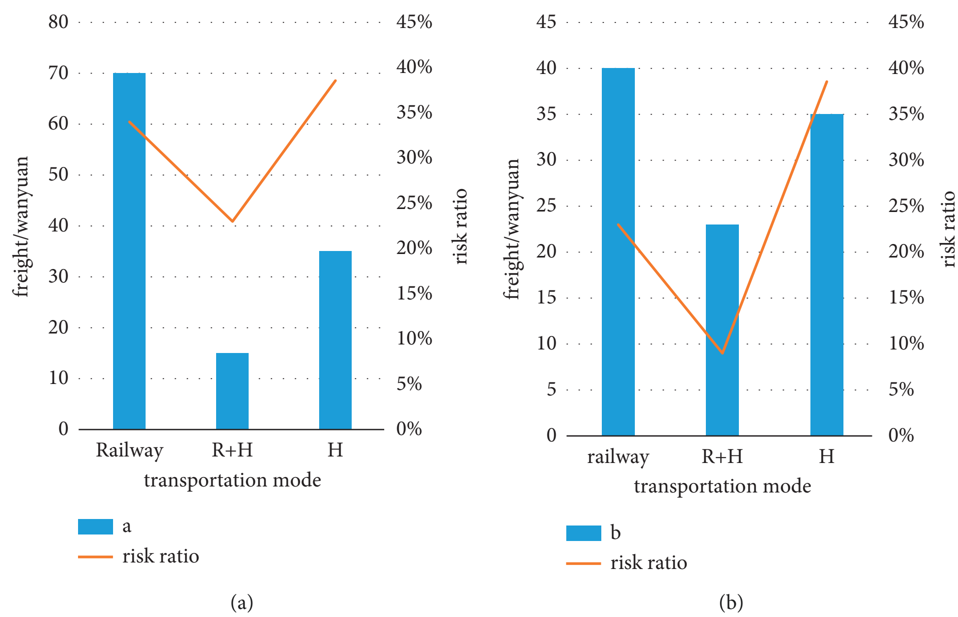


Figure 9: Optimal roadmap. (a) Route comparison of a demand place. (b) b demand place route comparison.

technology is also used to plan the route. Because the number of supply and demand places is different, there are many ways to combine various routes and the diversification of transportation means also increases the difficulty of route planning. Therefore, artificial intelligence technology can be used to list all passable transportation routes, and then, mathematical models and algorithms can be used to estimate the risk rate of transportation routes for transportation costs. This can greatly improve the efficiency of route planning and also provide a more reliable guarantee for the transportation of goods.

5. Conclusions

This paper combines mathematical models and algorithms for transportation problems with artificial intelligence. Artificial intelligence can facilitate the planning of transportation routes with mathematical models and algorithms in transportation problems and can also provide the data required in mathematical models and algorithms to estimate the freight and risks of transportation routes. In the multi-index transportation problem, the genetic algorithm can perform the optimal evaluation of the increasingly complex transportation routes and can accurately promote the estimated data of the mathematical model of the transportation routes. The experimental structure of this paper shows that the multi-index transportation problem model and algorithm combined with artificial intelligence technology can promote the planning of commodity transportation routes and minimize both freight and risk. And, it can also choose the optimal transportation route from the consideration of the sum and realize the multi-index problem of line transportation. Therefore, the research in this paper has great reference value for solving the problem of commodity transportation, which can promote the efficiency of upper-screen transportation, reduce transportation costs, and avoid some unnecessary losses. However, because the factors affecting the transportation problem are complex, the research in this paper still fails to take into account all the influencing factors. It is hoped that all the factors can be taken into account in later research to make the mathematical model and algorithm of the transportation problem more practical.

Data Availability

The data that support the findings of this study are available from the author upon reasonable request.

Conflicts of Interest

The author declares no conflicts of interest.

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