

The Optimized Allocation of Coal Transportation Research

Jinze Li, Yan Yan*, YongZeng, YajuanQiao, Baosheng Jiang, Jianjian Zhang

North China University of Science and Technology,
Tangshan, 063000, China;
*Email: yanjxky@126.com

Abstract

Under the high efficiency theme of energy development trend in the 21st century. The coal transportation in our country is facing the problem of dust pollution in the surrounding environment. It causes the Waste of coal resources, and Road safety problem, and all these problem need to be solved. Based on the evaluation of coal mine, we need to establish efficient transport scheme optimization to solve the problem of optimization of transportation.

Keywords: Entropy Weight Method; Grey Correlation Analysis Method, Antcolony Algorithm.

1. Introduction

Under the high efficiency theme of energy development trend in the 21st century. The coal transportation in our country is facing the problem of dust pollution in the surrounding environment. It causes the Waste of coal resources, and Road safety problem, and all these problem need to be solved.^[1] Based on the evaluation of coal mine, we need to establish efficient transport scheme optimization to solve the problem of optimization of transportation. Coal transportation is one of the most important aspects in the coal industry, it is the most basic aspects of coal utilization too. However, as one of the difficult and key points, coal mine transportation inevitably has a variety of efficiency issues. So it is the most important problem to improve the Coal transportation efficiency.^[2]

2. Using the Clustering Analysis Method to Analyze Index Variables

2.1 The Entropy Weight Method for Data Processing

Based on the evaluation of the data obtained, using entropy method to calculate index level indicators is equivalent to a subgoal layer of the constraint conditions of objective weight.

Using standardizing transform, which is used to remove the data in the extreme value of the results, the influence of the index number.^[3]

$$j = 1997, 1998, \dots, 2008; i = 1, 2, \dots, n; \quad (1)$$

for a constraint conditions and then use the $z_{ij} = K + u_{ij}$ to coordinate translation amplitude panning coordinates, get rid of the negative impact on operation result in the operation.

The use of information entropy probability variable

$$p_{ij} = z_{ij} / \sum_{j=1}^{12} z_{ij} \text{ to keep the proportion of the relationship}$$

between data, using $e_i = -(\sum_{j=1}^{12} p_{ij} \ln p_{ij}) / \ln n$ through

calculating the size of the index information entropy is used to evaluate the amount of information.^[4]

Using

$$a_{km} = \frac{[1 - e_k]}{[1 - e + 1 - e_m]}, k, m = 1, 2, \dots \quad (2)$$

to construct the fuzzy complementary judgment matrix. $A = (a_{km})_{n \times n}$, to establish the consistency of the relationship between initial weights of every index, at last, through the objective weights are calculated. Integrated weights according to the principle of minimum relative entropy comprehensive the same constraints the first $iw, (i)$ indicators of subjective weight and objective weight^[5] $w, (i)$ get changes under the constraint condition of integrated weight^[6].

Tab. 1 The information entropy

	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	X ₈	X ₉
The information entropy	0.95	0.87	0.84	0.96	0.94	0.96	0.96	0.96	0.96

$$w(i) = \frac{\sqrt{w_x(i)w_e(i)}}{\sum_{i=1}^n \sqrt{w_x(i)w_e(i)}} \quad (3)$$

2.2 The Safety Index Model was Established Based on the Weighted Average Method

Weighted average method is used to establish safety production model of security index. The traffic circulation index is a composite of dimensionless index^[7]. Through integrated horizontal comparative analysis of the region and industry in theory, we can understand the dynamic continued to improve the level of safety production and help us to make better decisions. (1) Y-index (Chain price)^[8] the Y-index is the longitudinal comparison index, can reflect the enterprise region itself (accident) the status of the production safety (continuous) to improve the level. Its mathematical model is:

$$K_y = (R_1 / R_0) \times 100 \quad (4)$$

X index is horizontal comparison, reflect the safety production condition of the enterprises, regional, national level relatively. To enterprise, integrated safety index to compare between regions or countries. Composite index is the first kind of calculation model of enterprise, regional, or national model^[9]

$$K_x = (R_2 / R_3) \times (W_0 / W_1) \times 100 \quad (5)$$

Pairwise comparisons between composite index of the second kind of calculation model is an industry, region or country, the comprehensive comparison between the evaluation model is established

$$\lambda_i = \frac{1}{n(n-1)} \left(\sum_{j=1}^n r_{ij} + \frac{n}{2} - 1 \right) \quad (6)$$

2.3 Using the Regression Analysis of Smooth and Efficient Transportation Model coal Green Logistics Transportation Allocation Optimization Model

Eliminate it does not affect the overall trend of monitoring data formation of time series, therefore, holt double parameters of linear exponential smoothing method is used to deal with. For a smooth trend directly. The principle of linear exponential smoothing is the difference between the primary and secondary smooth value added on a smooth value, to be revised the trend, namely

$$S'_t = ax_t + (1-a)S'_{t-1} \quad (7)$$

$$S''_t = aS'_t + (1-a)S''_{t-1} \quad (8)$$

$$a_t = 2S'_t - S''_t \quad (9)$$

$$b_t = \frac{a}{1-a} (S'_t - S''_t) \quad (10)$$

And trend prediction first to ensure the processing to improve prediction accuracy, therefore, this paper adopts the suit to holt double smoothing parameters, the calculation formula is as follows:

$$S'_t = ax_t + (1-a)(S'_{t-1} + b_{t-1}) \quad (11)$$

$$b_t = \gamma(S'_t - S'_{t-1}) + (1-\gamma)b_{t-1} \quad (12)$$

$$F_{t+m} = S'_t + b_t m \quad (13)$$

Among them, two parameters values generally take 0.5, can be adaptive to choose in the actual calculation, according to the characteristics of the transportation data, give abnormal monitoring data. For monitoring data were collected by the time series is established. If at some time in which appeared abnormal monitoring values, such as monitoring data is zero or beyond the normal range of great value, the sequence by calculating the first number 1 step to replace smooth values, its replacement value can pass before the moment of the data to calculate, smooth calculation using the determination of the length of time series to choose measured data as far as possible, as little as possible include smooth data, to avoid the error in the calculation of smooth transfer. If appear multiple consecutive zero value, and lack of data processing, and adopt the following methods for smoothing.^[11]

3. The Realization of Basic Ant Colony Algorithm Model

$$\min Z = f(x) \quad x \in [a, b] \quad (14)$$

If m only artificial ants, at first is located in the range of m section, such as the transfer probability of ant is defined as:

$$p_{ij} = \frac{\tau_j^\alpha \eta_{ij}^\beta}{\sum_{j=1}^m \tau_j^\alpha \eta_{ij}^\beta} \quad (15)$$

Thus, when the number of ants enough, the search radius is small enough, this optimization method is equivalent to a group of ants do exhaustive search to define interval, gradually converge to global optimal solution of the problem^[12]

The above function optimization process is not affected by whether optimization function is continuous and differentiable constraints, such as the search method has obvious superiority and stability.

Thus, when the number of ants enough, the search radius is small enough, this optimization method is equivalent to a group of ants do exhaustive search to define interval, gradually converge to global optimal solution of the problem. The above function optimization process is not affected by whether optimization function is continuous and differentiable constraints, such as the search method has obvious superiority and stability.

4. Conclusions

Thus, when the number of ants enough, the search radius is small enough, this optimization method is equivalent to a group of ants do exhaustive search to define interval, gradually converge to global optimal solution of the problem. The above function optimization process is not affected by whether optimization function is continuous and differentiable constraints, such as the search method has obvious superiority and stability.

Acknowledgments

Work is supported by College Students' Innovative Project in North China University of Science and Technology(CX 2014031).

References

[1]Zhenghong Guo ,Jie Yang ,Yang Zhao. "Double image multi-encryption algorithm based on fractional chaotic time series",Open Mathematics, Vol13,n1,2015, pp.868-876.

[2]Yong-Mei Guo,Yang Zhao,Yao-Ming Zhou,Zhong-Bin Xiao,Xiao-Jun Yang."On the local fractional LWR model in fractal traffic flows in the entropy condition",Mathematical Methods in the Applied Sciences, 2015, PP.1-7.

[3]Jin-shuan Peng, Yang Zhao, Lizong Lin, Bin Gao."Experiment and simulation research on sound insulation performance of magnesium alloy dash panel",Journal of Vibroengineering, Vol.17 n7, 2015,pp.3404-3414.

[4]J Xie, Y Zhao."STABILITY AND BIFURCATION OF A FOUR-NEURON NETWORK WITH MULTIPLE DISCRETE DELAYS",International Journal of Innovative Computing, Information & Control, Vol.11 n5, 2015,pp.3404-3414.

[5]Q Ge, S Zheng, Y Zhao, M Chen."Detection method of PCB component based on automatic optical stitching algorithm",Circuit World, Vol.41 n4, 2015, pp.133 - 136.

[6]X Wang, T Zhou, Y Zhao, J Feng, J Zhang, H Zhang."Multilevel Inverter Compensation System of the Single-phase Based on Instantaneous P-instantaneous Real Power and Q-instantaneous Virtual Power Theory",International Journal of

Online Engineering,vol.11 n7, 2015,pp.47-50.

[7]Yunyan Huang, Zhaoling Wang, Yang Zhao, Ning Hao."Numerical Simulation of TSP Tunnel Fault Model of Seismic Prediction",International Journal of Earth Sciences and Engineering,Vol.8, n1, 2015, pp.633-637.

[8]Liya Wang,Yang Zhao."Research on the Dynamic Vibration Control of Underwater Robot",Open Automation and Control Systems Journal,Vol.7,2015, pp.1231-1236.

[9]Xinya Chen,Zhen Chen, Yang Zhao."Analysis of Sheet Fracture Failure Based on XFEM",Open Mechanical Engineering Journal,Vol.9,2015, pp.887-891.

[10]N Qiang,Y Zhao."Improvement Multidisciplinary Collaborate Optimization based on Simulated Annealing and Artificial Neural Networks",Open Cybernetics & Systemics Journal,vol.9,2015, pp.2306-2311.

[11]Z Chen, X Chen, Y Zhao."Research on the Optimization of the Vibration Reduction Seat Based on Genetic Algorithm",Open Mechanical Engineering Journal,Vol.9,2015, pp.882-886.

[12]Y Hou, Y Zhao."Workspace Analysis and Optimization of 3-PUU Parallel Mechanism in Medicine Base on Genetic Algorithm",Open Biomedical Engineering Journal,Vol.9,2015, pp. 214-218.

[13]Yang Zhao, Defu Cheng."The Study of Uncertain Interval Nonlinear Optimization based on Genetic Algorithm",Pakistan Journal of Statistics 30 (6), pp.1541-1554.

[14]XF Niu, CL Zhang, ZB Li, Y Zhao."Local Fractional Derivative Boundary Value Problems for Tricomi Equation Arising in Fractal Transonic Flow",Abstract and Applied Analysis,2014,pp.1-8.

[15]C Zhang, Y Zhao, M Wang."Heterogeneity of Dynamic Allocation Promotes Cooperation in Networked Public Goods Games",International Journal of Applied Mathematics and Statistics™,43 (13), 110-116.

[16]Y Zhao."Robust Predictive Control of Input Constraints and Interference Suppression for Semi-Trailer System",International Journal of Control and Automation, Vol.7, n7, pp.371-382.

[17]Y Zhao, D Baleanu, C Cattani, DF Cheng, Y Xiaojun."Maxwell's Equations on Cantor Sets: A Local Fractional Approach",Advances in High Energy Physics,2013.

[18]Y Zhao, DF Cheng, XJ Yang."Approximation solutions for local fractional Schrödinger equation in the one-dimensional Cantorian system",Advances in Mathematical Physics,2013.

[19]Y Zhao, D Baleanu, C Cattani, DF Cheng, Y Xiaojun."Local fractional discrete wavelet transform for solving signals on Cantor sets",Mathematical Problems in Engineering,2013.

[20]Y Zhao, D Baleanu, MC Baleanu, DF Cheng, Y Xiaojun."Mappings for special functions on Cantor sets and special integral transforms via local fractional operators",Abstract and Applied Analysis,2013.

[21]GFAN Zhifeng YANG, Yang ZHAO.“A NEW ITERATION ALGORITHM FOR SOLVING THE DIFFUSION PROBLEM IN NON-DIFFERENTIABLE HEAT TRANSFER”,Thermal Science 19, 105-108.

[22]Feng Liu, Wengang Zhou,Yang Zhao.“A weighted value scheduling algorithm based onHadoop computer platform”,Metallurgical and Mining Industry,Vol.7, n4, 268-273.

[23]Huabei Nie,Bin Yang,Yang Zhao.“Construction and realization of the algorithm bootstrap on synchronization database”,Metallurgical and Mining Industry,Vol.7, n4, 256-261.

[24]Y Zhou, Y Zhao, Z Meng.“Design on low noise and lightweight of aircraft equipment cabin based on genetic algorithm and variable-complexity model”,Journal of Vibroengineering ,Vol.17, n4,2015.

[25]T He, XQ Ye, Y Zhao.“Optimization design for ultrasonic horn with large amplitude based on genetic algorithm”,Journal of Vibroengineering,Vol.17, n3,2015,pp.1157-1168.

[26]L Song, Y Zhao, Y Zhou, H Xiang.“Thermal-stress analysis and calculation of single and dual chip set double-sided circuit board based on three-dimensional finite element algorithm”,Circuit World, Vol.41, n2,pp.49-54.

[27]W Geng, Y Zhao, Q Cheng.“A method for designing the brushless direct current system using FPGA based on fuzzy set similarity algorithm”,Metallurgical and Mining Industry,Vol.7, n4, pp.56-63.

[28]W Geng, H Zhang, Q Cheng, Y Zhao.“Distributed embedded system for communication based on ant colony optimization algorithm”,Metallurgical and Mining Industry, Vol.7, n4, pp.262-267.

[29]M Liu, Y Xue, Y Zhao, H Guo.“Research on the Distribution and Self-Similarity Characteristic of End-To-End Network Delay”,International Journal of Future Generation Communication and Networking,Vol.8, n3,2015,pp.291-302.

[30]Y Zhao.“Study on Predictive Control for Trajectory Tracking of Robotic Manipulator”,Journal of Engineering Science and Technology Review ,Vol.7, n1, pp.45-51.

[31]Y Zhao.“Intelligent Control Technology Application Based on Wireless Sensor Networks”,International Journal of Digital Content Technology and its Applications,Vol.6, n23,2012,pp.81-87.

[32]Y Zhao, C Zhang.“A RBF network direct generalized predictive control based on tracking error adjustment”,International Journal of Applied Mathematics and Statistics™ ,Vol.43, n13, pp.126-133.