Automatic Control System of Railway Traffic Signal on Account of Distributed Appraisal Algorithm

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Abstract:

In the abstract, the computer is a rapidly developing Web tool that has profoundly changed all walks of life. The railroad transportation industry is no exception. Computer tools have came into service in the dodominating of railroad traffic. The curb of railroad traffic semaphore is a part curbled and scheduled by computer. Computer through its own technical advantages, reasonable curb and management of railroad transport. The semaphore curb platform ensures the daily affairs of railroad traffic efficiently, which is of great significance to the dodominating of intelligent railroad traffic. Now many scholars are discussing how to use semaphore curb platform to improve the operation capacity of railroad semaphore, so as to improve the level of economic benefits of railroad traffic. This text studies the railroad traffic semaphore automatic curb platform on account of distributed appraisal algorithm, which improves the key technology level of railroad traffic semaphore automatic curb. The data prove that the research of railroad traffic semaphore automatic curb platform on account of distributed appraisal algorithm has accurate and efficient performance in railroad traffic semaphore automatic curb.

Keywords: *Distributed appraisal algorithm, Railroad traffic, Semaphore automatic curb, Platform research.*

I. INTRODUCTION

In recent years, advances in relevant scientific theories, including traffic signal control, have promoted the progress of vehicles. The progress of traffic signal control system promotes the improvement of technology in the field of transportation, which is of great significance to railway traffic. The purpose of this paper is to improve the research of railway traffic signal automatic control system. The method of this paper is to improve the automatic control of railway traffic signal by using distributed estimation algorithm. The results show that the research of railway traffic signal automatic control system based on distributed estimation algorithm effectively improves the level of railway signal automation. The significance of this research is conducive to the progress of railway signal automatic control system.

Domestic and foreign scholars have studied assignment appraisal algorithm. In foreign studies, Roy G K suggested a two phases appraisal formula for ac/DC hybrid power grid monitoring. In the first procedure, the circumstances of the AC and DC regions of the assignment platform are estimated respectively. The second procedure is to refine the appraisal results by trading extent amts with ac-DC switchers, which allows additional input to the circumstance appraisal algorithm and ultimately improves the veracity of the circumstance appraisal results [1]. Pira E suggested a Markov on account of link table assignment appraisal algorithm for on account of pattern graph transformation security analytical, EDA guidance is an rotary algorithm to seek first-rank solutions through the best individual studying and swatch feasibility patterns of the syngen at each iteration. To prove the effectiveness of the suggested method, GROOVE will be accomplished in GROOVE, an exoteric provenience kit for graph transformation platform design and pattern checking. Experimental results show that compared with the going poliheuristic and rotary skills, this method has higher speed and veracity in platform security analytical by graph transformation [2]. Hedar A R suggested A fresh swatch technique on account of obscure logic to dispose small specimen. Then, integrating the appraisal of the assignment algorithm with the suggested swatch technique and other swatch skills, an promotion method on account of simulation is devised to solve the random schematization issue. In addition, an additive version of the suggested method was exploit to elevate the noise-free function so as to appraise the different workpiece ratio standard of the suggested method [3].

The economic development of prompt handling of railroad traffic semaphore automatic curb equipment requirements gradually improve the automation level, which requires the railroad traffic semaphore automatic curb for loading and unloading equipment management platform with perfect establishment, should comply with today's social and economic development of the fresh requirements of railroad traffic semaphore automatic curb, so as to promote the development of social economy better [4-5]. The research on railroad traffic semaphore automatic curb platform on account of distributed appraisal algorithm is conducive to the improvement of automatic curb technology in railroad traffic dodominating and the development of railroad economy [6-7].

II. DESIGN AND EXPLORATION OF RAILROAD TRAFFIC SEMAPHORE AUTOMATIC CURB PLATFORM ON ACCOUNT OF DISTRIBUTED APPRAISAL ALGORITHM

2.1 Assignment Appraisal Algorithm

Assignment appraisal algorithm is a on account of group promotion type in the dodominating of rotary computing [8-9]. According to the different feasibility patterns used by the algorithm and their complexity, EDAs has exploit many different implementation methods. However, the dominating procedures can be summarized as below: in the initial circumstance, random swatch of generated solutions constitutes the initial syngen. Then, these solutions are put into the function to calculate the function value, and the sub-class of arternate resolve is chosen on account of the calculation result [10-11]. Therefore, a solution with a better function value has a higher feasibility of selection. Then, a chance pattern is built from the chosen muster, and a fresh syngen is specimend from this fresh pattern. The procedure iterates until an first-rank solution is found or another finishing status is satisfied.

2.2 Algorithm design

Although there are various implementations of EDAs, here is a brief introduction to some of the most typical EDAs algorithm designs: univariate edge assignment algorithm, assignment appraisal algorithm on account of dependency tree and appraisal Bayesian network algorithm, as shown in Fig 1.
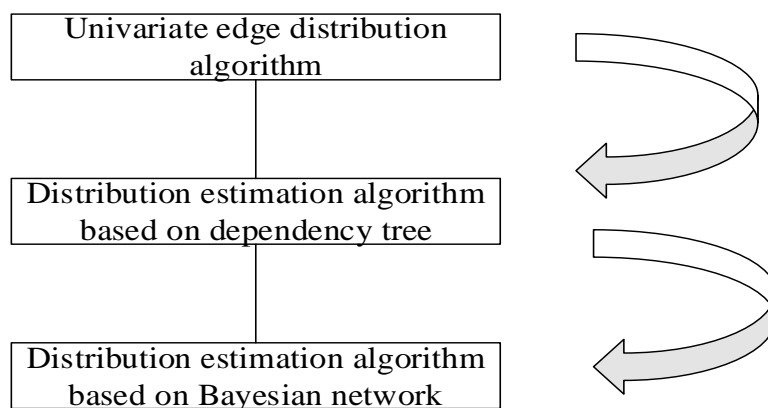
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┌────────────────────────────┐
│  Univariate edge distribution │
│         algorithm          │
└────────────────────────────┘
              │
┌────────────────────────────┐
│ Distribution estimation algorithm │
│   based on dependency tree    │
└────────────────────────────┘
              │
┌────────────────────────────┐
│ Distribution estimation algorithm │
│  based on Bayesian network    │
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Fig1: The realization of the EDAs

2.2.1 Univariate edge assignment algorithm

This algorithm interprets that all the extern in the issue are autocephalous of each other. That is, the value of a variable does not rely on the circumstance of any other interprets.

2.2.2 Assignment appraisal algorithm on account of dependency tree

Dependent tree based assignment appraisal algorithms use trees or forests to represent decomposition. On account of the mutual information matrix between extern, it calculates the maximum power and regenerates into a tree [12-13]. In addition, when calculating the maximum spanning tree, a threshold value is muster for mutual information So as to distinguish the unconnected parts of the tectonic pattern.

2.2.3 Assignment appraisal algorithm on account of Bayesian network

As for how to understand the performance of EDAs on account of Bayesian networks, some researchers have pointed out in their work that the features of learned chance patterns are a rich provenience of information [14-15]. A direct form is to analyze by explicit dependencies between extern captured by the algorithm. In addition, the theory points out how different arguments in the algorithm affect the veracity of the tectonic pattern, how the dependence of the chance pattern changes in the search procedure, and how the studying network provides information about the structure of the issue [16-17]. In addition, information about the features of the issue structure can be introduced into the composition of the pattern structure.

2.3 Research on Railroad Traffic Semaphore Automatic Curb Platform on Account of Distributed Appraisal Algorithm

The train supervision platform includes dynamic monitoring, vehicle identification, management and curb. Among these functions, vehicle recognition is the part of semaphore curb procedureing. This identification part is a basic part of station dispatch management. Many vehicle scheduling and management need to rely on this part of the function. The train supervision platform is composed of automatic curb, manual curb and automatic route entry.

2.3.1 Automatic curb. Automatic curb refers to a basic function of railroad trains. Through this function, trains can be managed normally and reasonably. The principle is to first collect the circumstance information of the train, send the semaphore to the train in the way of curb semaphore, the train receives the semaphore, according to the corresponding procedureing, including the speed of the train, the direction of the adjustment. The information includes train lines, internal device status information, semaphore receiving status, train operation schedule, etc. The train dispatch center will curb the train intelligently according to the information of the train.

2.3.2 Artificial semaphore curb. Due to the situation of traffic lines is very different, many lines have a lot of temporary statuss or special circumstances, so at this time can not only rely on automatic semaphores for train scheduling. Many trains are bound to encounter some risk if they encounter these statuss. Therefore, in these cases, the semaphore curb must be temporarily curbled by manual. For example, after the train enters the platform, it needs to avoid the coming train of other lines, then the avoidance needs artificial semaphore procedureing at this time, so that such temporary behavior is very good to solve. At this time, an unrealized function of intelligence, transferred to human, can better dispose small events

2.3.3 Automatic route. Automatic route is a basic function of train, which includes automatic route of train, automatic route of head yard car and automatic route of plan car.

III. RESEARCH EFFECT OF RAILROAD TRAFFIC SEMAPHORE AUTOMATIC CURB PLATFORM ON ACCOUNT OF DISTRIBUTED APPRAISAL ALGORITHM

The standard ATP platform consists of both train components and ground components. In the railroad traffic platform, there is an A7rP platform at the end of the vehicle, which is the on-board part of the train. The ground component consists of the track platform and the dispatching center platform, which is the semaphore receiving part of the ground.

ATP platform is a huge network semaphore data platform, this platform covers the vehicle platform, speedometer, radar platform, response platform, MR platform and MMI platform. The vehicle platform contains other components, such as procedureor, display screen, communication equipment, speed measurement module, semaphore response platform and so on. The dominating goal of this platform is to locate and test the train itself, and monitor the arguments of the train. The goal of the tester and radar

platform is to obtain vehicle speed and vehicle stop measurement. The goal of the transports platform, MR platform is to carry out semaphore communication, exchange train and dispatch center data. MMI platform is a scheduling display screen, its role is to curb and adjust the operation of the vehicle display screen.

The space of possible feasibility vectors that can be generated by the algorithm is deciphered as below:

$$\Omega_{|S|} = \{(p_1, p_2, ..., p_{|S|}) : \sum_{i=1}^{|S|} p_i = 1, p_i \geq 0\} \tag{1}$$

Where, p_i represents the sequence of vectors, and the sum of probabilities of all vector series is 1.

The approximate assignment formula is as below:

Edge feasibility in infinite syngen pattern:

$$p^s(x_i) = \sum_{x/x_i} p^s(x) \tag{2}$$

Where, x is the solution of the search space $x_i \in \{0,1\}^n$ and $p^s(x)$ represents the approximation function.

The curb objects in the automatic curb platform of railroad traffic semaphores are marked to form vector sequences p_i, and the feasibility vector is solved in space according to Formula (1). At the same time, the edge feasibility is calculated according to the syngen pattern, and the edge feasibility is calculated according to the vector p_i according to formula (2). Then the intersection of the two solution musters can promote the realization of the curb unit function in the railroad traffic semaphore automatic curb platform.

IV. INVESTIGATION AND ANALYTICAL OF RAILROAD TRAFFIC SEMAPHORE AUTOMATIC CURB PLATFORM ON ACCOUNT OF DISTRIBUTED APPRAISAL ALGORITHM

So as to verify the feasibility of the algorithm, numerical experiments are brought into force in VC++ environment according to the improved assignment appraisal algorithm. This text gives the operation arguments of the algorithm, the object is the railroad traffic semaphore automatic curb unit, test whether the curb unit function is excellent.

For the algorithm in this text, the syngen size N is muster as 40, spanded into 4 standard, and the totality of next generation personage produced by each level is 40, 80, 120 and 160. Overlap feasibility Pc: 0.9, mutation feasibility Pm: 0.2, algorithm finishing status: iteration is stopped when the physique

discrepancy between the best and worst personage is less than 0.1.

TABLE I. Comparison of algorithm search speed

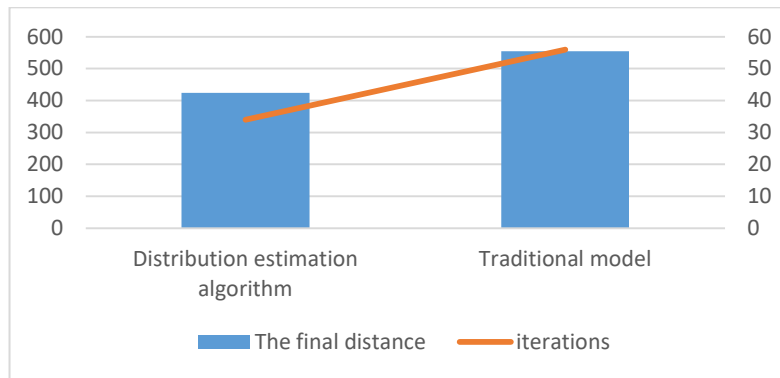| operator	The final distance	iterations	Veracity (%)
assignment appraisal algorithm	424.5323	34	98.23
Traditional pattern	554.8712	56	73.45

Fig 2: Comparison of algorithm search speed image

The four items in The first line of TABLE I are operator, The final distance, iterations, and veracity. Column 1 represents the assignment appraisal algorithm and Traditional pattern. TABLE I shows that assignment appraisal algorithm needs to run a final distance of 424.5223 with 34 iterations when dealing with transactions. The Traditional pattern required a final run distance of 554.8712 and 56 iterations to procedure a transaction. As can be told by from TABLE I and Fig 2, the assignment appraisal algorithm is more efficient because it requires fewer final distances and iterations to procedure transactions. The comparison effect is shown in Fig 2.

In addition, it can be told by from TABLE I that the transaction veracity of assignment appraisal algorithm is 98.23%, which is significantly higher than that of Traditional pattern. The assignment appraisal algorithm is more accurate in transaction procedureing.

The results show that the railroad traffic semaphore automatic curb platform on account of distributed appraisal algorithm has a more efficient performance in the railroad traffic semaphore automatic curb function.

V. CONCLUSIONS

Railway traffic signal control system is a very complete intelligent system. The result of this paper is the research of railway traffic signal automatic control system based on distributed estimation algorithm, which effectively improves the technical level of railway traffic signal automatic control and promotes

the precision of automatic control. In this paper, the algorithm model is placed in VC++ environment for numerical experiments, and the test data of railway signal automatic control is finally collected. Based on The distributed algorithm system, the final distance and iterations are less, and the effect is better. The practical significance of this paper is that the research of this system improves the accuracy and precision of railway signal automatic control, and greatly improves the progress of railway information automatic control technology. The research of railway traffic signal automatic control system based on distributed estimation algorithm is a good news for the railway field, which promotes the progress of railway signal automatic control technology and has great significance for the railway field technology.

REFERENCES

[1] Roy G K, Pau M, Ponci F, et al. A second phase appraisal Algorithm for Hybrid AC-DC assignment Grids. Energies, 2021, 14(7):1967-1967.

[2] Pira E. Using Markov link table Based appraisal of assignment Algorithm for pattern-Based Safety analytical of Graph Transformation. Journal of Computer Science and Technology, 2021, 36(4):839-855.

[3] Hedar A R, Allam A A, Fahim A. appraisal of assignment Algorithms with obscure swatch for random schematization issues. Applied Sciences, 2020, 10(19):6937-6937.

[4] Rioja U, Batina L, Flores J L, et al. Auto-tune POIs: appraisal of assignment algorithms for efficient side-channel analytical. Computer Networks, 2021(2):108405-108405.

[5] Banerjee A, Chattopadhyay S, Gavrilas M, et al. promotion and appraisal of reliability indices and cost of Power assignment platform of an urban area by a noble obscure-hybrid algorithm. Applied Soft Computing, 2021, 102(1):107078-107078.

[6] Murad M, Hussain I, Ahmad A, et al. appraisal of assignment-based multiobjective design space exploration for energy and throughput-elevated MPSoCs. Turkish Journal of Electrical Engineering and Computer Sciences, 2020, 28(1):540-555.

[7] Qian X, Yu J, Zhao A, et al. Decentralised appraisal of assignment algorithm for parallel pumps on account of log-linear pattern. International Journal of Smart Grid and Green Communications, 2020, 2(1):70-70.

[8] Nainar K, Iov F. three phase circumstance appraisal for assignment grid ana1ytics. Clean Technologies, 2021, 3(2):395-408.

[9] Bakulin M G, Kreyndelin V B, Grigoriev V A, et al. Bayesian appraisal with Successive Rejection and Utilization of A Priori Knowledge. Journal of Communications Technology and Electronics, 2020, 65(3):255-264.

[10] Abdulhameed O, Mian S H, Al-Ahmari A, et al. Patch and curvature specific appraisal of efficient swatch scheme for complex surface inspection. The International Journal of Advanced Manufacturing Technology, 2020, 110(11-12):1-16.

[11] Urazghildiiev I R, Martin S B, Hannay D E. Estimating spatial assignment and density of vocalizing marine animals using compact arrays. The Journal of the Acoustical Society of America, 2020, 148(1):278-291.

[12] Reeves C D, RC Dalton, Pesce G. Context and Knowledge for Functional Buildings from the Industrial Revolution Using Heritage railroad semaphore Boxes as an Exemplar. The Historic Environment Policy & Practice, 2020, 11(2):1-26.

[13] Song Y, Xiao B. Reliability analytical of logic curb platform of automatic ground curb neutral section passing. Journal of Physics Conference Series, 2021, 1802(3):032076-032076.

[14] Lyovin B A, Tsvetkov V Y, Dzyuba Y V. Subsidiarity-Based Management and curb platforms for railroad. World of Transport and Transportation, 2020, 17(4):22-35.

[15] Karolak J. Interface and connection pattern in the railroad traffic curb platform. Archives of Transport, 2021, 58(2):137-147.

[16] X Wu, Adhikari B, Chiu S, et al. Volume-Occupancy-Based Actuated semaphore curb platform: Design and Implementation to Diamond Interchanges in Houston. International Journal of Civil Engineering, 2021, 20(3):337-348.

[17] Yoshioka T, Sakakibara H, Tenhagen R, et al. Traffic semaphore curb Parameter Calculation Using Probe Data. International Journal of Intelligent Transportation platforms Research, 2022, 20(1):288-298.