

Retraction

Retracted: The Evaluation Method of Community Emergency Resource Allocation Based on Coordination Sensor Information Collection

Journal of Sensors

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Manipulated or compromised peer review

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

- [1] P. Wang, F. Wang, and Z. Zhu, "The Evaluation Method of Community Emergency Resource Allocation Based on Coordination Sensor Information Collection," *Journal of Sensors*, vol. 2022, Article ID 8715028, 12 pages, 2022.

Research Article

The Evaluation Method of Community Emergency Resource Allocation Based on Coordination Sensor Information Collection

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This paper analyzes the information collection data of coordination sensors and designs a corresponding evaluation method to conduct an in-depth assessment of the configuration of community emergency resources. Based on the principles of assessment index system construction and the actual research, an assessment index system of community emergency resource allocation level is established. In this paper, the G1 method was selected to determine the weights of the evaluation indexes, and the gray clustering method was applied to construct the whitening weight function, determine the gray level to which each index belongs and the affiliation degree of each gray class, and establish a comprehensive evaluation model of the community emergency resource allocation level. In response to the problem that the increase of state variables leads to a decrease in real-time map building, a dynamic local window size mechanism is proposed, which can reduce the time consumption and save computational resources under the condition of ensuring the accuracy of positioning and map building. Therefore, it is urgent to design an efficient self-interference cancellation mechanism to resist the influence of self-interference on the signal-to-noise ratio of the first-hop link. For example, the IMU pre integration theory is combined with the wheel range method to solve the problem of frequency synchronization; An initialization algorithm is proposed to recover the scale information of the camera and optimize the external parameters; Design a graphic optimization framework integrating IMU, wheel range finder and camera. The monitoring terminal sends the data information of coordination transportation to the monitoring platform in real-time, and the monitoring platform is responsible for storing and displaying the data information, thus realizing the real-time monitoring of the coordination transportation process. Finally, the functions of the monitoring terminal and the display system of the monitoring platform experiment, respectively, and the test results verify the effectiveness and integrity of the system data communication, which proves the correctness of the terminal design of the integrated coordination monitoring system based on multidimensional information and has practical engineering value.

1. Introduction

The perfect allocation of community emergency resources is related to whether the best rescue can be achieved and is a strong guarantee for communities to cope with security risks. However, due to the neglect of the role played by emergency resources in emergency rescue, a series of problems such as improper allocation of community emergency resources and lack of expertise of personnel in community emergency management have led to further expansion of

accidents and even affected the efficiency of emergency rescue. As a grassroots unit organization, the community is the backbone of the organization and mobilization of the people, with a variety of service functions of safety risk identification, resource reserve publicity, and education, and is a solid cornerstone of urban emergency management [1]. When an emergency comes, the community is the direct carrier of the accident and disaster and is also the first to respond to the emergency rescue work of the accident and disaster, playing a vital role in the whole emergency rescue

process. When an emergency comes, the shortage of resources will lead to a series of chain reactions, which will further worsen the accident. As a fundamental guarantee for communities to effectively respond to emergencies, emergency resources can determine the time and efficiency of rescue and are indispensable in emergency rescue work. To establish a perfect community emergency resource allocation system, the focus is to maximize the role of community emergency resources, and the core content is to fundamentally solve the problems of community emergency resource allocation [2].

Due to the rapid development of coordination transportation and the low threshold of the industry, most coordination companies lack monitoring methods in the process of coordination transportation. Very few coordination companies have their monitoring means, but there are still problems such as a single monitoring method, no real-time synchronized information, and no classification monitoring of items. Captured in most images, the positioning algorithm using this road sign is more intelligent and convenient, which is of great significance for the realization of intelligent in the future. AGVs rely on a single sensor to obtain only specific environmental or motion information; so to have more accurate and stable positioning and navigation, it is necessary to use multiple sensors to fuse positioning. The characteristics of each sensor are different, and the sensors are not independent of each other, so it is of great value to study how to effectively combine the sensors and how to collect, process, and calculate multiple data to achieve more accurate positioning [3]. In addition, the use of the multisensor fusion positioning method can increase the environmental perception dimension of AGVs, which is of great value in reducing environmental interference and improving the robustness of the system. It can not only improve the monitoring of items during the development of the coordination and transportation industry, but also improve the system construction of monitoring and management of coordination and transportation industry, solve the development problems brought by the explosive growth of the coordination and transportation industry, and improve the quality of coordination and transportation while improving the number of coordination and transportation [4].

In order to further improve the system structure of coordination transportation monitoring system, this paper divides the monitoring system into two parts: The hardware platform of monitoring terminal is composed of core controller, data acquisition unit, and wireless communication unit. Therefore, the elastic element is deformed, and this deformation will be captured by the sensitive element, and the acceleration information of each axis can be obtained through certain conversion and calculation. The software system of monitoring terminal is composed of data acquisition module, data processing module, management mechanism, and network communication module, which work together to realize the terminal's sensor data processing. Security risk identification is the basis for the demand for community emergency resources, and emergency resources are the action guarantee for preventing and resolving secu-

ity risks. In this paper, we address the situation that different types of communities face different security risks, which lead to different needs for emergency resources, and the problems of current community emergency resource allocation. Firstly, by analyzing the security risks of communities, we point out the main security risks faced by different communities, analyze the security risks of communities, and grasp the emergency resource needs of communities. The model will be validated by example to provide a scientific assessment basis for community emergency resource allocation.

2. Related Work

Sood et al. proposed a multiconstrained integer linear programming model for complex emergencies and developed a differential evolutionary algorithm-based incident disaster response system to effectively solve the problem of emergency response time and resource cost [5]. Dong et al. proposed a network generation analysis method based on emergency response tasks, using the weighted neighborhood prestige index (WPP) to evaluate the criticality of tasks and determine [6]. Kumar et al. used survival analysis (Kaplan-Meier estimator and hazard model) to identify fire areas with the highest risk of multiple emergencies and the most likely types of incidents, which can effectively allocate emergency response resources [7]. With the development of AGV positioning and navigation technology, the research of single sensor positioning has been at the bottleneck stage, and the development trend of vision, laser, and other positioning and navigation methods is gradually moving toward multisensor fusion positioning and navigation methods [8]. In the context of the application of coordination monitoring systems, the software architecture of real-time coordination monitoring management system is proposed. Zhang believes that coordination transportation should determine its specific map positioning through location information, and the integrated electronic map embedded technology can indirectly display the coordination transportation location information in the electronic map, and thus, draw the complete movement track, which can monitor the coordination transportation location in real time and accurately [9]. The combination of electronic map and coordination location information extends the concept of coordination transportation monitoring system, which is the overall orientation of the development direction of coordination monitoring system and a milestone in the development of coordination monitoring system.

The overall structure of coordination is analyzed and studied, and it is believed that communication should occupy the main position in the coordination monitoring system, real-time feedback of coordination monitoring information is the inevitable result of the development of the Internet of Things in the coordination field, and the combination of electronic positioning technology can realize more reliable monitoring measures for coordination, and the positioning information is updated on the electronic map synchronously, which can display the location of coordination transportation in real-time [10]. The proposed scheme

completely introduces the monitoring platform system and clearly divides the coordination monitoring system into two parts: coordination transportation terminal and coordination monitoring platform, which clarifies the components of the coordination transportation monitoring system [11]. Avoid correlation and overlap between indicators, so that the evaluation results of community emergency resource allocation level are accurate. With the monitoring platform as the total control terminal and the coordination monitoring terminal as the subordinate receiver, the total control terminal can control multiple subordinate receivers to monitor the coordination transportation system as a whole and make the product applied in the process of transporting valuable items in commercial coordination, while using multiple sensors for real-time data collection and data aggregation and analysis of the coordination monitoring terminal utilizing cloud computing to determine the coordination monitoring status and judge the usage pattern [12]. The visualization technology of collaborative monitoring platform is studied, and the location information, transportation trajectory and path comparison in the collaborative transportation process are displayed on the IOT terminal, so as to strictly monitor the collaborative transportation.

At present, the application technology of coordination monitoring system has been discussed and studied in detail, but rarely, the monitoring platform and monitoring terminal are studied and designed at a comprehensive system-level without specific analysis of the hardware platform and practical application of the monitoring terminal, and the main function of the monitoring system is determined in the study of the positioning system, rather than the actual multidimensional information synthesis study, which has a relatively single function and cannot be used for coordination under different environments. The monitoring system functions need to be further improved and expanded. The hardware platform of the terminal selected and the scheme is determined, and the hardware schematic design of the core controller, data acquisition unit, and wireless communication unit are carried out, respectively.

3. Coordination Sensor Information Acquisition Design

The multidimensional information integrated coordination monitoring system consists of a monitoring terminal and monitoring platform. In the process of coordination transportation information collection, the monitoring terminal sends the acquired positioning data, image photo information, and temperature and humidity sensing information to the monitoring platform through the wireless communication module after data processing by the DSP core controller, and the monitoring platform stores the current data information after acquiring the data.

Wireless communication technology has developed from the initial analog communication era to the present, and the radio waves carrying signals mainly use the ground channel for information transmission. In D2D communication with the short-range transmission or power limitation, the short communication distance makes the signal attenuation small,

to obtain better channel conditions [13]. When the wireless signal needs to be transmitted over a long distance to reach the receiver, it suffers from severe signal fading due to the blockage of buildings or other surrounding infrastructure, resulting in a low peak signal-to-noise ratio at the receiver, and the received signal needs to be denoised and filtered to recover the original signal to the maximum extent possible. Community grid workers play a vital role in emergency management as grassroots workers. The process of denoising and filtering depends largely on the received signal performance, and when the wireless channel conditions are good, a relatively simple denoising algorithm can be designed to recover the original signal, and vice versa, a relatively complex algorithm needs to be designed to achieve the denoising process. The whole process of wireless communication can be regarded as a game between source, channel, and host, where better wireless channel conditions can transmit more source code words to reduce the transmission delay, and the host can obtain better-received signals to achieve simple and reliable decoding to reduce the decoding complexity. Therefore, the exploration of wireless channels has always been the focus of research in communication-related fields.

In IoT communication, many sensor nodes are usually deployed in infrastructure-free areas, so there is no dedicated communication link for sensor data backhaul. Many sensor data only need to be collected periodically, so a temporary sensor data relay link can be constructed using UAVs, as shown in Figure 1.

Figure 1 illustrates a standard half-duplex unidirectional relaying approach, which includes a pair of source and destination nodes and a relay node. There are two basic forms of half-duplex unidirectional relaying, which avoid self-interference from the relay transmitter to the receiver by at least one orthogonal resource; i.e., the first-hop link and the second-hop link transmit signals by distinguishing the scheduled carrier frequency resources under the same time slot resources, or the first-hop link and the second-hop link transmit signals by distinguishing the scheduled time slot resources under the same carrier frequency resources. When half-duplex relaying is used, the relay node can work in single-antenna mode, using only one antenna to distinguish between transmitting and receiving signals in terms of time or frequency resources [14]. Since there is no loopback self-interference in half-duplex relaying, the signal processing module configured in the relay node is mainly designed according to whether to achieve decode-and-forward or amplify-and-forward function.

$$f(h) = \frac{e^{h^2/\gamma^2} h}{\gamma^2}. \quad (1)$$

Loopback self-interference reduces the channel capacity of the first-hop link by affecting the first-hop signal-to-noise ratio of the relay link. Considering the causal effect of wireless relay transmission, the throughput of the whole relay system depends on the first hop with lower channel capacity, and there is also an urgent need to design an

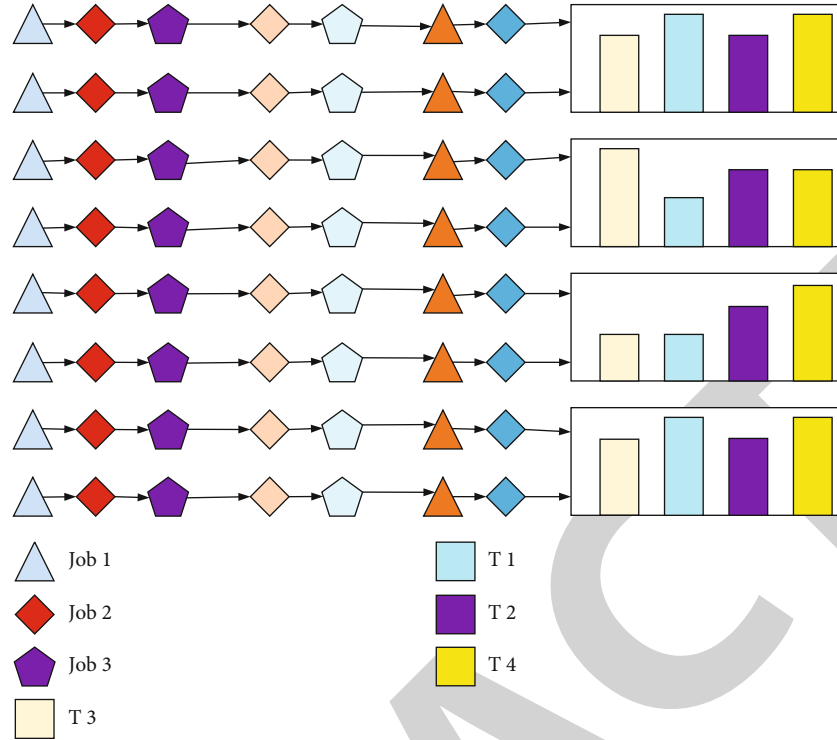


FIGURE 1: Coordination sensor information collection system framework.

efficient self-interference cancellation mechanism to counteract the effect of self-interference on the signal-to-noise ratio of the first-hop link.

$$P_n = \int_0^h f(h) dh = 1 + e^{h^2} h^2. \quad (2)$$

One way to passively compress the self-interference is to increase the physical distance between the transmit and receive antennas at the relay node, which can reduce the self-interference to the first-hop link by increasing the path loss of the interfering signal. Compact devices are limited by their operating space and can use physical antenna isolation combined with orthogonal polarization of the transmitting and receiving antennas for self-interference cancellation. In addition, an efficient planar wave trap design can also improve the isolation effect of compact in-band full-duplex antennas. Process and receive the encapsulated data information, and set up the SMS communication service for network communication; the database system mainly includes the storage and backup of monitoring data and image data, which can cooperate with the display system to call historical data and arrange the stored data. In addition to passive self-interference cancellation methods designed for wireless signal propagation, analog domain compression and digital domain compression are two other ways to achieve active self-interference cancellation. The analog domain compression is achieved by both RF interference cancellation and baseband interference cancellation, and the digital domain compression further eliminates the

residual self-interference after performing the analog domain compression.

$$Z_c \begin{pmatrix} u \\ v \\ 1 \end{pmatrix} = K \begin{bmatrix} X_c \\ Y_c \\ Z_c \end{bmatrix}. \quad (3)$$

The visual localization algorithm is a popular research in recent years, and it has the characteristics of being low cost, having large amount of data, and having good development prospects [15]. According to the different visual observations, road signs can be roughly divided into two categories: artificial road signs and natural road signs. Artificial road signs are special signs and labels that can be visually recognized, such as two-dimensional codes, combined color blocks, placed in a specific place, and the camera obtains positioning information by reading the recognized signs. Artificial road signs have many advantages, such as the possibility of global positioning, high accuracy, and reliability. However, the visual positioning method based on artificial road signs needs to lay additional markers and change the path needs to be relayed, and the positioning can only be achieved when the markers are recognized, and this nonflexible positioning method can no longer meet the requirements of future intelligent positioning.

Another kind of roadmap is a natural roadmap, which refers to extracting feature information in images, and this feature information is universal and can be captured in most images. The localization algorithm using such road signs is

more intelligent and convenient, which is important for future intelligent implementation. The visual localization algorithm using natural road signs generally calculates the relative motion by computing the match between two different images of the camera, which is called visual odometry.

Although the optimization of the back-end part can effectively reduce the cumulative error, it is still inaccurate for long time bit estimation [16]. That is, the cumulative error cannot be eliminated when only inter-adjacent data are available. However, loopback detection can provide a more long time constraint other than adjacent moments. The performance improvement of a multisensor combination positioning system cannot be solved by the infinite stacking of sensors. Sensor combinations should minimize the number of combinations to reduce cost while maintaining high performance in positioning, and should minimize the use of high-cost single sensors. The high cost is not conducive to the production and mass use of AGVs, as shown in Figure 2.

Motion measurement sensors mainly measure the relative motion of the device and complete the positioning by deducing the state of the current moment to the next moment; however, such sensors often have cumulative errors in long-term operation, and there is no way to eliminate such cumulative errors by themselves. IMU is a device to measure the three-axis angular velocity and three-axis acceleration of the object. IMU is widely used because of its low cost, small size, and high accuracy for attitude measurement.

The gyroscope can also be used to maintain the orientation of the device according to its axis fixation. It is widely used in modern aerospace and marine applications. Since the rotation information provided by the odometer is inaccurate in the case of wheel slip, the method proposed in this paper adds observation information and gyroscope measurement based on motion measurement. The integration of the angular velocity allows the calculation of the angle turned by the device, and there will inevitably be integration errors. Currently, even the most common gyroscope sampling rate has been up to 8kHz and has been able to meet most of the accuracy needs.

The acceleration sensor is mainly used to detect the acceleration of the three axes when the device is running and usually consists of a mass block, elastic element, dampers, sensitive elements, and other parts. When the accelerometer is accelerated, the mass block will remain motionless due to inertia, thus causing the elastic element to deform, and this deformation will be captured by the sensitive element, and through certain conversion and calculation, the acceleration information of each axis can be obtained. The accelerometer can project the operating state of the device and play a certain navigation and positioning effect. However, the accelerometer of the IMU is affected by the acceleration of gravity, which needs to be accurately removed in the calculation. The need for quadratic integration of acceleration when estimating position makes any small measurement noise produce large errors in the positional estimation. This effect is more pronounced on some inexpensive IMUs. In addition, accelerometers suffer from

zero-point drift and temperature drift. These issues make the use of IMUs for motion measurements challenging.

4. Community Emergency Resource Allocation Assessment Analysis

Based on the risk identification of the community, combined with the community emergency plan and the actual research, a comprehensive assessment system of the community emergency resource allocation level is established, and the complex system is decomposed into 3 levels of index levels. To apply it to real life, it is necessary to rely on scientific and reasonable principles of assessment index construction and further determine the size of index weights [17]. Community emergency resource allocation is a system project, and emergency resources involve a wide range and many kinds. Therefore, the assessment of community emergency resource allocation level should adhere to the principle of comprehensiveness, consider the assessment index system of emergency resource allocation level from different perspectives, and make a comprehensive assessment of it.

Each level of indicators in the community emergency resource allocation index system should be independent and representative of each other to avoid correlation and overlap among indicators so that the results of the community emergency resource allocation level assessment are accurate. Since the construction of the community emergency resource allocation assessment system must be in line with the actual situation of Chinese communities, it should be developed after integrating the characteristics of Beijing's urban communities, rural communities, and communities in urban-rural areas, and after consulting community managers and experts, the indicators should be scientifically analyzed and selected to meet the characteristics of the communities and best reflect the characteristics of community emergency resources, to ensure the feasibility of the assessment indicator system [18].

The assessment index system should ensure that each index reflects the current situation of community emergency resource allocation in Beijing and is in line with the current emergency resources allocated in the community. Finally, according to the assessment results, the community emergency resource allocation can be adjusted in a targeted manner and applied to each community in Beijing for emergency resource allocation level assessment. The comprehensive assessment of the community emergency resource allocation level cannot be accurately derived through qualitative methods. However, the evaluation index of the community emergency evacuation manual has a low score, indicating that there is a lack of publicity of emergency evacuation knowledge to residents. Therefore, in this paper, when assessing the level of community emergency resource allocation, a qualitative method was first used to calculate the weights, and on this basis, a quantitative calculation method of gray clustering was used to conduct a comprehensive analysis. According to the basis, principles, and methods of the index system, combined with the characteristics, connotation, and content of community emergency resources, the preliminary design consists of 6 primary indicators, 23 secondary

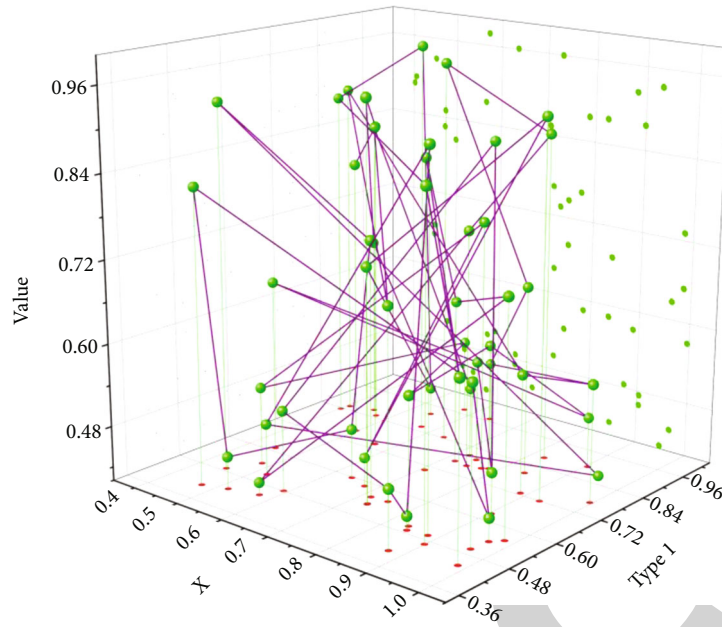


FIGURE 2: Local probability distribution in two directions.

indicators, and 73 tertiary indicators, which initially constitute the assessment index system of community emergency resource allocation level, as shown in Figure 3.

Through consulting experts and community managers, the initially established assessment index system was revised, and community grid staff and emergency experts were added to the three-level indicators corresponding to the second-level indicators of community professional emergency personnel, and the building group leaders were added to the three-level indicators corresponding to the second-level indicators of the community volunteer team, medical masks were added to the three-level indicators corresponding to the second-level indicators of protective equipment, and medical masks were added to the three-level indicators corresponding to the second-level indicators of community information platform [19]. A community emergency shelter manual is added to the three-level indicators corresponding to the second-level indicators. The indicator system consists of 6 primary indicators, 23 secondary indicators, and 73 tertiary indicators, which have been increased to 78 tertiary indicators, constituting a community emergency resource allocation level assessment indicator system. With the gradual realization of grid-based management in cities, communities are the first line of grassroots, and community grid staff play a vital role in emergency management as grassroots workers. As representatives of residents, community building group leaders connect community workers with most residents, so that community workers and residents can grasp information firsthand and assist the community in emergency management.

Since the allocation of community emergency resources needs to consider the dynamic emergency management work, different kinds of resources are needed to cooperate to play the function of community emergency resources. In the era of rapid information development, information

resources become an indispensable part and play an important role in community emergency management.

Community emergency facilities are divided into five categories: emergency shelter, emergency transportation, medical facilities, life support facilities, and emergency rescue facilities, based on their uses and types of accidents and disasters. Given the safety risks faced by different types of communities, emergency shelters, emergency access, emergency parking, emergency health station, water supply, and power supply facilities, garbage disposal facilities, intelligent emergency rescue stations, and micro fire stations were set as the three-level evaluation indicators based on the emergency facilities in Appendix A and the actual situation of the research and interviews. The main test is whether the number of emergency facilities in the community is equipped and whether the quantity meets the requirements, as shown in Table 1.

Firstly, the gray class interval and the range of values of assessment indicators are determined; secondly, the type of whitening power function is selected according to the type of assessment indicators; and finally, the turning point of the whitening power function is determined according to the actual situation of the research object [20]. Community emergency evacuation manuals should be distributed to most residents to improve residents' self-rescue and mutual rescue capabilities. This chapter combines the actual research on community emergency resource allocation and the principles of index system construction, establishes the index system for assessing the level of community emergency resource allocation, and after the expert interviews, revises the index system for assessing the level of community emergency resource allocation, and constructs the index system consisting of community human resources, community emergency facility resources, community emergency equipment resources, community emergency goods resources,

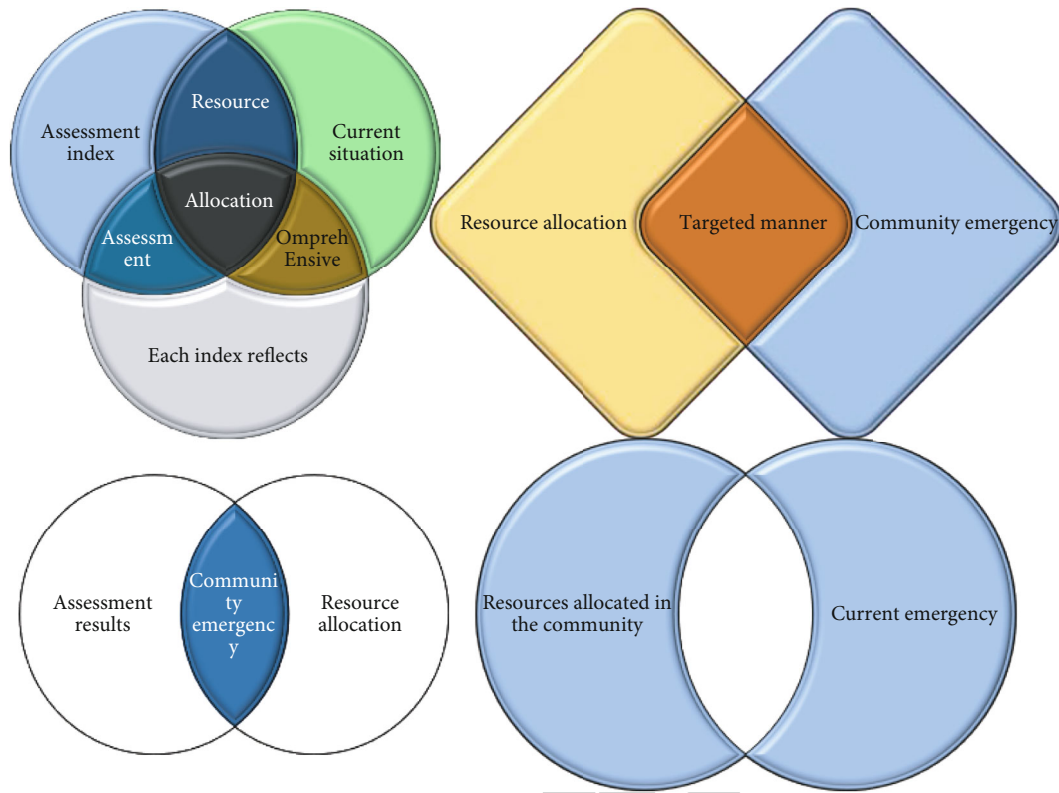


FIGURE 3: Community emergency resource allocation level assessment scheme.

TABLE 1: Community emergency resource allocation level assessment index system.

First-level indicator	Secondary indicators	Three-level indicator
Community human resources	Emergency shelter	Community property security team Street neighborhood rescue workers Community grid staff
	Emergency transportation	Community professional medical and fire brigade Community emergency specialist
Community emergency facilities resources	Medical facility	Community militia Civil society Social professional emergency rescue team
	Other facilities	Rescue teams of surrounding enterprises and institutions Party member emergency vanguard
	Emergency rescue facilities	Building group leader

community emergency financial resources, and community emergency. The evaluation index system of community emergency resource allocation level is composed of 6 level 1 indicator, 23 level 2 indicators, and 78 level 3 indicators, and each evaluation indicator is described.

5. Analysis of the Results

5.1. *Performance Analysis of Coordination Sensor Information Collection System.* The display system mainly includes the monitoring and display of environmental infor-

mation during coordination transportation, the display of basic status information of items, the display of real-time information on the location of items, the display of historical data of monitoring terminals, and the display of command and control operations of monitoring terminals; the communication system mainly includes the establishment of data transmission channels with monitoring terminals through TCP links, the processing and reception of encapsulated data information, and the setting of SMS communication service for network communication; the performance of the system is analyzed. The database system mainly includes

the storage and backup of monitoring data and image data, historical data recall with the display system, arrangement, and maintenance of the stored data and data search. The display system is the front-end operation interface display of the monitoring platform, the communication system is the link bridge between the monitoring platform and the monitoring terminal, and the database system is the back-end data guarantee of the monitoring platform; the three components work together to construct a complete system-level monitoring platform.

Since this paper is not equipped with motion capture equipment, the starting position is guaranteed to be the same as the ending position when using manual control of the trolley movement, and the positioning accuracy of the algorithm is verified by measuring the loopback error. The control trolley starts from the side of the coffee table and returns to the initial position by circling the coffee table for one week with a controlled speed of 0.3 m/s. It is also a member of the emergency rescue work for the first time to respond to accidents and disasters, and plays a vital role in the entire emergency rescue process. As can be seen in Figure 4, the visual positioning is a very small circle, which is because monocular vision has scale uncertainty; intuitively speaking, that is, the scene is enlarged or reduced by a factor of one, and then, the camera shoots the distance enlarged or reduced by the same factor; and the final image projected into the camera is the same. In this paper, when measuring accuracy, only rotational accuracy is measured because vision does not have scale information; the laser localization algorithm shows certain fluctuations in the initial moment, i.e., the localization trajectory at rest, and the localization stability is poor, but the trajectory is relatively smooth when it is dynamic; the odometer position estimation is shown in green, and it can be seen that the odometer shows high accuracy and smoothness in the normal environment on the wheeled trolley platform.

In terms of displacement accuracy, this algorithm is better than laser and odometry, and in terms of rotation accuracy, it is better than the pure vision localization algorithm. Moreover, the rotation accuracy of visual localization is higher than that of the laser localization algorithm, which is consistent with the results of the third theoretical analysis about accuracy.

The AD590 configuration circuit designed in this paper fully considers the influence of temperature and noise on the device and takes into account the selection of configuration circuit components, adding low-noise matching resistors and antialiasing stabilization capacitors, performing impedance matching calculations at the signal output when the operational amplifier performs the signal amplification, targeting to improve the impedance matching capability of the operational amplifier, and forming a self-loop equivalent kernel reduction in its own. The loop can be filtered for abrupt noise, while strictly matching the amplification circuit proportionality coefficients and performing the same proportional amplification operation for small signals.

During the experimental test, the data acquisition unit continuously charged and the terminal voltage of AD590 is measured by voltage clamps, and the signal side is shielded

to maximize isolation from noise interference. The core content is to fundamentally solve the problem of community emergency resource allocation. At the beginning of the experiment, the data acquisition unit is put into the temperature cycle experimental chamber, the temperature measurement range and holding time of the test chamber are configured, and the heating operation of the data acquisition unit is performed in stages. The voltage value information of AD590 in the data acquisition unit is measured from the starting point of 0°C and held for 3 min at each temperature point. After the temperature data is stabilized, the voltage value information is read three times and averaged, and the experimental data is recorded as shown in Figure 5.

The real running track of the trolley is a straight line, and the laser, odometer, and the algorithm in this paper can give accurate positioning, but the visual positioning gives completely wrong positioning results. When a person is moving slowly to the right in the camera field of view, most of the feature points in the field of view are focused on the person, and the person makes the feature points shift dynamically in the process of moving, resulting in data fluctuations in visual localization and serious deviations in the localization results. In contrast, the method used in this paper, by fusing IMU and wheeled odometer, which does not interfere with the dynamic environment, can effectively reduce the dynamic errors generated by visual localization and ensure stable and true localization data, as shown in Figure 6.

Since ORB-SLAM needs to check whether the observation points form a closed loop with the previous map points every two cycles, the loopback detection time increases gradually as the path increases, and the algorithm proposed in this paper is at a low level in the positional map correction part in most cases, and the processing time increases only in some places because the GPS is judged to be unstable in these places. The positional correction estimation is performed. Overall, the algorithm proposed in this paper shows a significant improvement in time consumption compared to the original ORB-SLAM algorithm.

In the actual operation, the trolley turns to the left after hitting the obstacle and goes straight after leaving the obstacle. As can be seen in Figure 6, the wheeled odometer shows a large localization error due to wheel slippage, giving incorrect estimates, and there is no effect for the laser and visual observation sensors. To be able to perform positioning and navigation more accurately and stably, it is very necessary to use a variety of sensor fusion positioning. Since the rotation information provided by the odometer is inaccurate in the case of wheel skidding, and the proposed method in this paper adds observation information and gyroscope measurement to the motion measurement, the system can still ensure accurate steering positioning information when skidding sideways, so the method in this paper can effectively reduce the large deviation generated when the wheel skids sideways and ensure the accuracy of positioning.

5.2. Community Emergency Resource Allocation Assessment Results. Since the original data of each indicator in the index system are not of the same scale, this paper adopts the

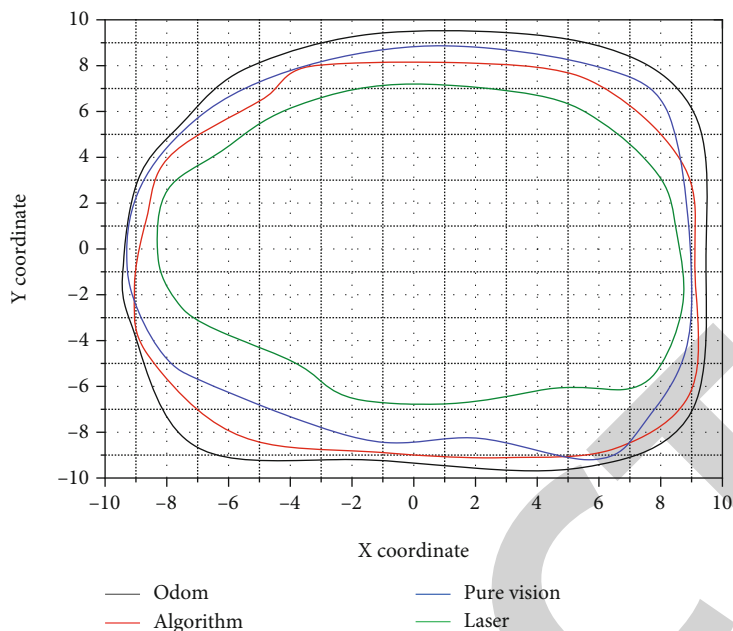


FIGURE 4: Trajectory map.

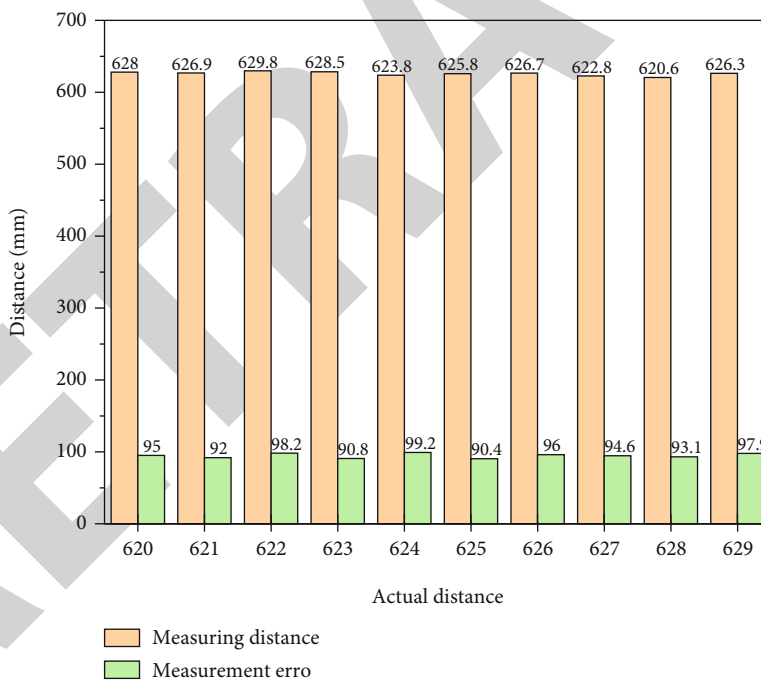


FIGURE 5: Measurement results.

standardization method of deviation to standardize the indicators. The existing emergency service facilities are set according to the constraint distance; i.e., 4 hidden spots can be covered within 5-8 minutes, and the coverage rate of the facilities is %, so the layout of the facilities fails to meet the demand for emergency shelter. The capacity of each facility site is relatively insufficient, and there is not enough space for expansion at a later stage, and the mismatch between supply and demand of emergency materials is seri-

ous, which makes it difficult to meet the demand for emergency shelter; thus, it is difficult to ensure the rationality and fairness of the location of emergency service facilities.

The calculation results show that 71% of the potential hidden danger spots can be covered when seven shelters are laid out, which is a substantial increase in coverage compared with the initial emergency shelter situation. Better wireless channel conditions can transmit more source characters to reduce transmission delay, and at the same time,

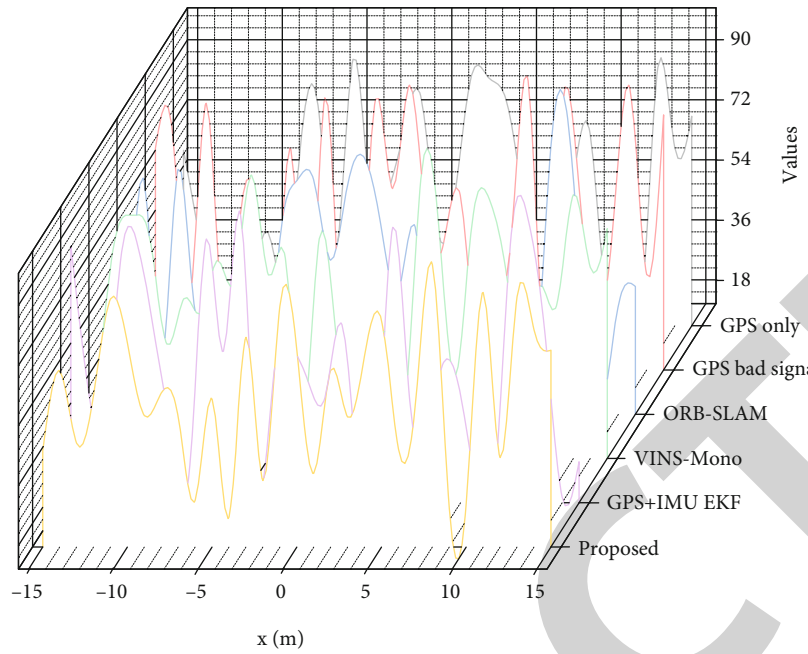


FIGURE 6: Comparison of path estimation results by algorithms.

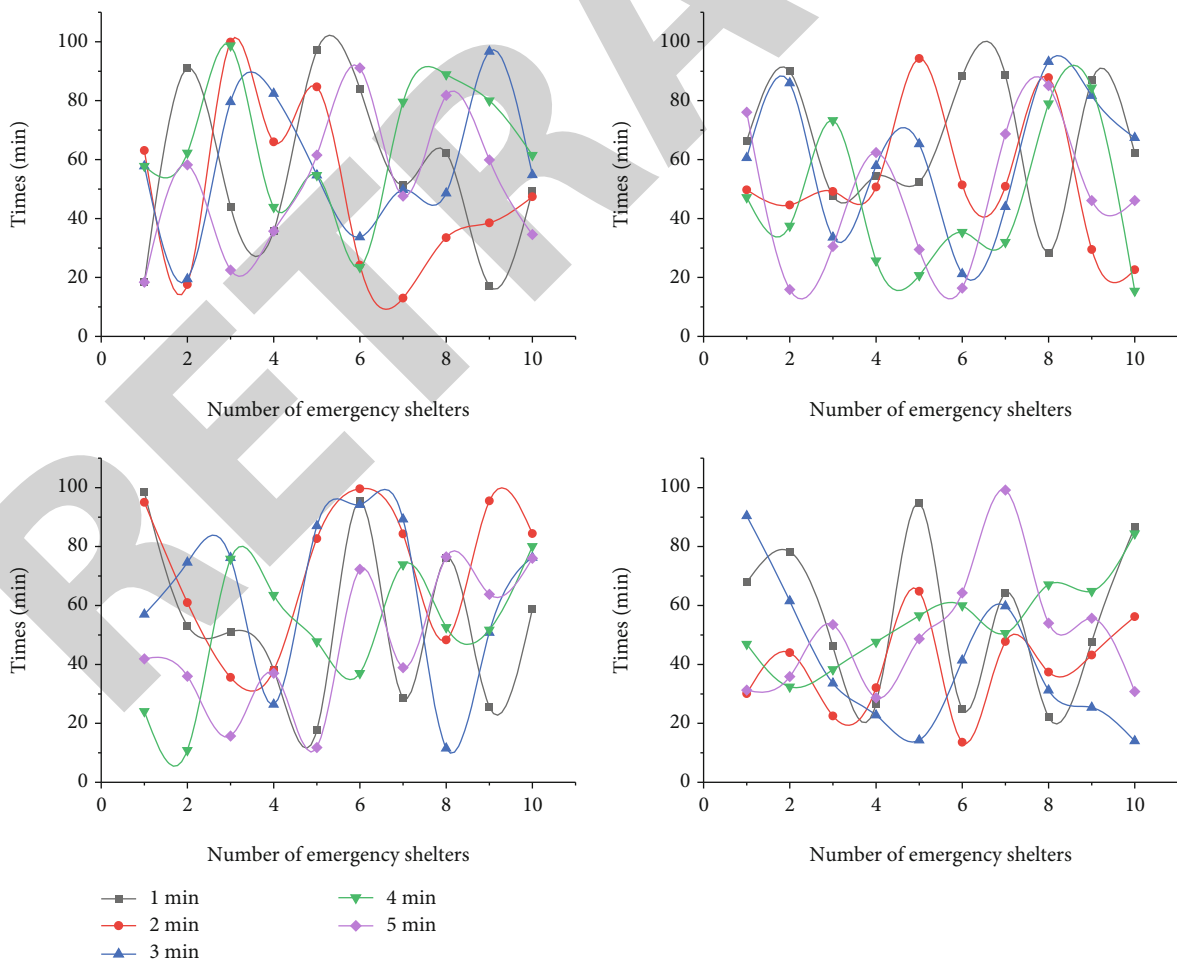


FIGURE 7: Results of the simulated layout of emergency shelters.

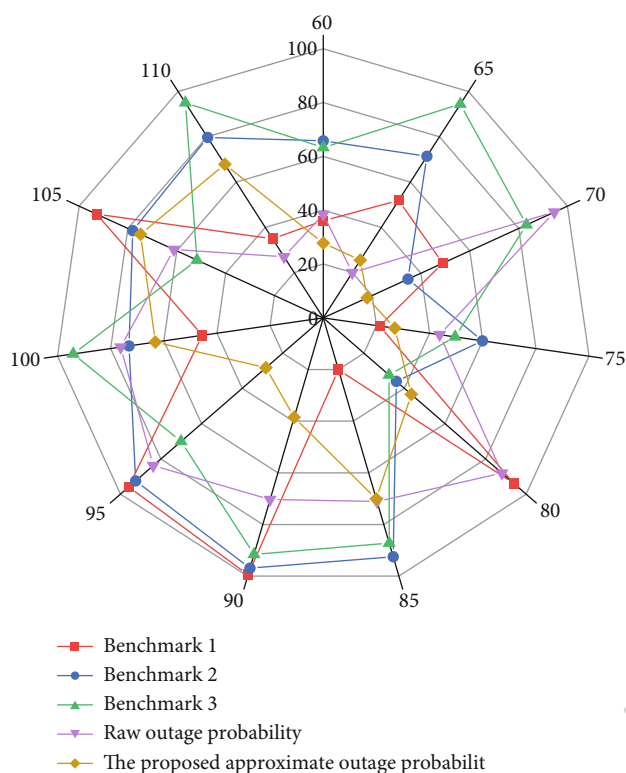


FIGURE 8: Average interruption probability of task length.

the sink can also obtain better received signals, to realize simple and reliable decoding and reduce decoding complexity. The average time to reach a covered site was reduced to 4.8 minutes, a significant reduction compared to the previous situation. The number of emergency shelters that can be served is 3 and 5, respectively, so 7 emergency shelters can meet the demand. When there are 8 emergency shelters, the coverage rate of the hidden spots increases to 86%, and the average time to reach the covered spots is further reduced to 2.4 minutes, as shown in Figure 7.

With the gradual implementation of grid-based management in the community, the community grid staff will report the disaster situation first and deal with it in time; at the same time, the community lacks emergency experts, and the community can find out the safety problems in the community and formulate effective emergency plans and prevention and control measures based on the professional risk assessment and hidden danger investigation by emergency experts, which is of great help to the community to improve the safety management level. Solve the development problems caused by the explosive growth of the coordination and transportation industry, and improve the quality of coordination and transportation while increasing the quantity of coordination and transportation. In the category of community emergency facilities, the weight of emergency rescue facilities is 0.2406, which is a relatively large weight, and the emergency rescue facilities include intelligent emergency rescue stations, while in the actual scoring by experts, this assessment index scores low, as shown in Figure 8.

In terms of community emergency items, the scores of various items are high, indicating that the community has

sufficient emergency items in reserve; in terms of information resources, the community has established platforms such as WeChat public number and community bulletin boards to communicate and notify information, meeting the needs of emergency information resources in emergency management, and the scores are high, but the evaluation index of community emergency evacuation manual has a low score, indicating the lack of emergency evacuation knowledge dissemination to residents. Different types of communities face different security risks, resulting in different emergency resource needs, as well as the current problems in the allocation of community emergency resources. The community emergency evacuation manual should be distributed to the residents to improve their self-help and self-help abilities and to understand the evacuation routes and emergency escape techniques.

6. Conclusion

In this paper, we chose the G1 method to calculate the weights of the community emergency resource allocation index system, which is an improved hierarchical analysis method, combined with the expert importance assignment table to calculate the weights, making the assessment results more scientific and accurate. The gray clustering assessment method is used to construct the whitening weight function, determine the gray level to which each indicator belongs and the affiliation degree of each gray class, and further conduct a comprehensive assessment of the community emergency resource allocation level. The data is sent to the monitoring platform through the wireless communication module, and the monitoring platform obtains the data and stores the current data information, and displays the decoded data content, temperature and humidity values, and map motion trajectory. The gray clustering assessment model was applied to evaluate the emergency resource allocation level of a community in Beijing, which further verified the feasibility of the assessment model and provided a scientific assessment basis for the community emergency resource allocation. Based on the assessment results, the problems of the current emergency resource allocation in this community are analyzed, and suggestions for optimizing countermeasures are given. The sensor mainly includes mechanical structure and software architecture, where the mechanical structure mainly refers to various sensor clamping devices and housings, and other components needed for the sensor are selected according to the actual situation. It combines system integration technology, DSP control technology, multidimensional sensing technology, and wireless communication technology to monitor the status of goods and environmental information in coordination transportation in real time and to improve the application scope of coordination monitoring system terminal by integrating multidimensional information.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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