Research Article

Nonlinear Random Matrix-Based Intelligent Management Model for Swimming Place Waters

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In this paper, a nonlinear random matrix approach is used to analyze the management of swimming place waters, and in this way, an intelligent management model is designed and applied to the actual swimming place waters management. Firstly, some basic small deviation results of the random matrix are presented. Then, several types of small deviation inequalities are obtained for the maximum eigenvalues of independent stochastic semi-positive definite (PSD) matrices. These small deviation inequalities are independent of the matrix dimension, and the results apply to high-dimensional and even infinite-dimensional matrices. For the inverse eigenvalue problem of higher-order doubly random matrices, the conclusion that two symmetric doubly random matrices are combined into a higher-order symmetric doubly random matrix is proved. In other words, the method of constructing new symmetric random matrices using smaller matrices with known spectra is applied to the inverse eigenvalue problem of higher-order symmetric random matrices, and sufficient conditions for the existence of the solution of the inverse eigenvalue problem of higher-order random matrices are derived, avoiding the discussion of the parity of the number of eigenvalues. This paper focuses on realistic management, to explore the standardization of safety management of swimming venues, and is based on modern management theory, risk management theory and methods, using research integration method, fieldwork method, questionnaire survey method, expert interview method, and other research methods, detailing the methods and conclusions of risk identification in safety management of swimming venues, and further exploring the safety management standards of swimming venues on this basis. And, combined with risk management theory, depending on the probability of occurrence and the degree of harm of risk, four basic disposal methods such as risk avoidance, risk control, risk transfer, and risk self-retaining are proposed.

1. Introduction

Matrix equations are an important area of study in linear algebra. Various disciplines involve matrix-related concepts, such as circuitry, mechanics, optics, and computational mathematics, among others, and can use matrix operations to solve many complex problems [1]. One important concept in matrix operations is the eigenvalue of a matrix. We have previously studied the eigenvalue of a matrix problem, which is a class of problems in which the eigenvalues and eigenvectors of a matrix are known. In contrast to this type of problem, the problem of constructing the corresponding matrix from the given eigenvalues or eigenvectors is called the inverse eigenvalue problem of a matrix. Due to its inherent complexity and perturbation, the inverse eigenvalue problem of matrices has attracted the attention of many mathematicians, and related problems have been discussed one after another since the last century. A random matrix is a matrix whose elements are random variables, and can also be said to be a random variable in the matrix space [2]. With the swimming project being loved by the public, to meet the consumption needs of the people and to ensure the safety and health during the project activities, vigorously developing and building artificial pools is an important step to
promote the development of swimming projects. Artificial swimming places are mainly distributed in community residences, schools, large urban hotels, and hotels supporting indoor and outdoor swimming pools, as well as indoor swimming pools in some clubs. On top of this, the public awareness of fitness has increased, and the concept of sports consumption has changed with the increase in consumption ability. Now the social trend in Shanghai is to pursue a healthier lifestyle, whether it is competitive swimming or mass swimming, the number of participants is increasing, and the future swimming market in Shanghai is unpredictable. However, behind the booming swimming program, there are still many problems such as personal safety risks, education safety risks, and venue safety facilities risks.

Swimming has become one of the survival skills that the public is happy to master, and the effect of swimming in physical exercise is also very significant. At this stage, some cities have gotten a lot of results in the promotion and practice of swimming. However, theoretical development is left behind by the rapid development of reality. At present, swimming venues do not have a scientific guidance system in terms of safety management, and most managers lack professional experience in education and training. Therefore, we must step up the research on the safety management of swimming venues, analyze the safety management problems of swimming venues, explore, and develop the safety management mode of swimming venues with special features, and eliminate the threats for the safety of swimming venues [3], so that swimming venues can fully guarantee the safety of swimming sports, do not let safety accidents become an obstacle in the implementation of national fitness, and strongly promote the healthy development of swimming venues and the rapid popularization of national fitness activities. The safety management of swimming venues is related to the health and interests of swimmers and promotes the healthy development of mass swimming and fitness, to contribute to the development of the national fitness movement. The study of the current situation of safety management of swimming venues, in-depth analysis of the problems in the safety management of swimming venues, and the corresponding proposals for the problems of safety management of swimming venues, to promote the construction and healthy development of swimming venues and to improve the current situation of safety management of swimming venues has certain theoretical guidance, practical reference value, and important practical significance [4].

With the popularization of swimming technology and the expansion of swimming pools, increased numbers of people who love swimming are coming. To ensure the safety and health of swimming events, it is very necessary to keep abreast of swimmers' dynamics and intelligently manage the swimming pool. Matrix equation is an important research field in linear algebra. In this paper, nonlinear random matrix is used to study the intelligent management of swimming pool waters, and an intelligent management model is designed to be applied to the actual swimming pool water management. The model can always pay attention to the dynamics of swimming places, and can timely report swimming accidents. This research has practical significance for the safety management of swimming places. To address the above problems, this paper takes random matrix theory as the main tool and combines regular correlation techniques to conduct an in-depth study on the target detection method of MIMO radar in the correlated noise background. The RMT methods for MIMO radar target detection in spatially correlated noise background and time correlated noise background will be investigated separately, which for transmitting diverse MIMO radar systems and considering large array systems with the number of array elements and the number of snapshots in the same order of magnitude, and the results are of great significance for improving the MIMO radar target detection performance [5]. The development of national fitness activities is bound to bring the swimming project gradually into the vision of the masses, the swimming project has a considerable mass base, most of the major universities in the city have swimming pools, and some universities are planning to build swimming pools. The advantages and disadvantages of swimming pool construction and management are not only related to the sports of university teachers and students but also related to the surrounding people's sense of access in the process of swimming exercise [6]. The practical significance of this study is to explore reasonable and efficient ways of swimming pool construction and management, to provide a reference for the construction and development of management and operation of swimming pools in other universities in the future, and to promote the improvement of economic and social benefits of swimming pools.

2. Related Works

By definition, a swimming facility is a physical activity venue where the public participates in swimming, sports, and recreational programs. Both indoor and outdoor swimming facilities are designed to accommodate different competition and recreational needs. At present, swimming still receives a great deal of attention from many countries, especially the more economically developed countries, and regions, which attach great importance to the development and popularization of swimming [7]. Management refers to the systematic organization, direction, and coordination to achieve set goals, and its key elements include management content and management tools. Management content includes human, financial, and physical resources. Management tools include information, time, organization, organization, etc. And, safety management is developed with the development of social production. A survey on burnout of swimming social sports instructors by Chang et al. found that burnout of social swimming instructors could be predicted by their work stress, and therefore, the burnout of sports instructors could be reduced by intervening in the stress factors in swimming education instruction [8]. Farid conducted a causal analysis through the direction of swimming places, staff, and swimming consumers, and concluded that there is a close connection between various factors that endanger safety [9]. It was concluded that during training, students'
awareness of risks should be improved and the operational capacity of staff should be enhanced. Lay et al. pointed out that the causes of safety accidents in swimming venues are diverse. A complete safety management system consists of both internal and external systems, and a new safety management system will add maximum value and maximize benefits with safe operations [10]. Managers need to improve safety management methods on a case-by-case basis and increase the utilization of swimming venues; establish and improve a rescue worker training system to optimize the use of training facilities at all levels and reduce idle resources; and establish a comprehensive worker management evaluation system to provide a basis for effective monitoring and management.

For the large array radar system where the number of array elements is comparable to the number of snapshots, a new method of blind target detection based on linear shrinkage-standard condition number is proposed by combining the shrinkage algorithm of covariance matrix estimation with the large dimensional random matrix theory. Using the particle filtering method, the particles are randomly selected according to the probability density distribution function of the parameters, and the summation operation is used to find the likelihood function instead of the hard-to-solve integral operation, and a target likelihood ratio detection algorithm based on the radar model is proposed, which solves the problem that the classical detection statistics cannot be used in the non-Gaussian clutter environment [11]. The resource allocation problem in the correlation link under automatic request retransmission feedback is considered, and the optimal allocation of resources is achieved by using random matrix theory. The problem of target detection in interference consisting of low-order Gaussian clutter and white Gaussian noise is discussed, and a new approach is proposed based on the conventional low-rank normalized matched filter detector using random matrix theory. Using the noise as the reference signal, a detector based on the asymptotic spectral distribution of random matrix theory is proposed, and its performance is significantly better than that of the conventional mutual correlation detector.

Risk management, its scientific nature requires that the process should be structured. Thus, the process of risk management has long steps, including six steps in total, which can be perfected to produce scientific risk management results. In practice, the steps of risk management can be integrated to improve efficiency. This paper combines the real-life case of swimming pool teaching with the need for risk management cycle theory for the practice of safety risk management [12]. At the same time, the author believes that they are not perfect in the swimming training safety process involving safety management research. There are so many safety factors involved in swimming places that there are many defects in the prevention and pre-control of safety accidents. There is an urgent need to establish reasonable, feasible, and effective safety management theoretical guidance to maximize the prevention and mitigation to reduce safety accidents and protect the lives of swimmers. Therefore, this study will actively explore the influencing factors and response methods to help the popularization of swimming teaching, training, and programs.

3. Nonlinear Random Matrix Design

Matrix equations are an important field of study in linear algebra. Matrix-related concepts are involved in various disciplines, such as electrical circuits, mechanics, optics, computational mathematics, etc., and matrix operations can be used to solve many complex problems. For the problem of specific expressions of matrices, this paper also gives the construction form of sufficient conditions and solution matrices for the inverse problem of low-order symmetric double random matrices and verifies its feasibility by examples. Set an arbitrary random vector \( x \in C_m \), if its real imaginary part obeys the Gaussian distribution. For the symmetric doubly random matrix inverse eigenvalue problem, to determine whether a set of data can be used as the eigenvalue of a symmetric doubly random matrix, sufficient conditions are given in this paper, but in the process of proving the corresponding theorem, some conclusions are needed as a basis, and firstly, several relevant lemmas are proposed to provide a basis for the subsequent proof process.

\[
P_{\text{hm}} \leq \sum_{k=1}^{2} X_k \in C_m, 0 < k \leq 2, \tag{1}
\]

where \( \det() \) denotes the value of the determinant of the square matrix in parentheses. Set a \( m \times n \) dimensional random matrix \( A \). If each column vector of \( A \) is a Gaussian vector with zero mean, covariance matrix \( \Sigma^{1/2} \), and two are independent of each other, then the square matrix \( HW = AA \) is a Wishart random matrix with covariance matrix \( \Sigma \) and degrees of freedom \( n \), which can also be expressed as \( m = \sum_n N \). When \( n > m \), the probability density function of the matrix \( W \) can be expressed as

\[
f_w(B) = \exp \left( \det \sum_{i=1}^{m} (n-i) \right)^{1/2n}. \tag{2}
\]

If each element of the matrix is independent and follows a statistical distribution with mean \( 0 \) and variance \( 1 \), then there are.

\[
Y = AA^H + AA. \tag{3}
\]

The random matrix \( Y \) is the standard Wishart matrix. According to the definition of the Wishart random matrix, it is known that each element of the Wishart random matrix does not need to satisfy the condition of independent and identically distributed, so it is more suitable for signal processing in an unknown environment and has a very important role in the field of wireless communication [13]. The Hermitian matrix is characterized by its real eigenvalues and the eigenvectors corresponding to different eigenvalues are orthogonal. In this paper, the analysis of the echo
samples is the key to performing the detection work. The covariance matrix of the sample represents some characteristics of the detection target, and the analysis of some extreme values in the sample covariance matrix can give information about the existence of the target, so the study of this matrix is very important in this paper.

With the booming of computer technology, the era of big data has quietly arrived, which makes large dimensional statistical analysis an important part of mathematical statistics nowadays. While classical statistical tools cannot meet the needs of big data processing, fortunately, random matrix theory provides a solution.

$$S = \frac{n}{n+1} \sum_{i=1}^{n} (x_i + \bar{x})^H (x_i - \bar{x}). \quad (4)$$

Most of the target detection algorithms are performed against an ideal Gaussian white noise background, and when the colored component of the noise is increased, these classical algorithms cannot perform proper detection. Canonical correlation technique (CCT) is a multivariate statistical analysis method that uses the correlation between two pairs of variables to reflect the overall correlation between the two sets of indicators. It is widely used in array signal processing and other fields.

$$S = \frac{n}{n+1} \sum_{i=1}^{n} (x_i + \bar{x})^H (x_i - \bar{x}). \quad (5)$$

EXCEL software was used to summarize the data collected and then the data were analyzed for statistical calculations. SPSS22.0 was also used to analyze the organized data. Hierarchical analysis was used to assign indicator weights, and a matrix was built two by two for the corresponding subsidiary inter-level indicators, and the data obtained from the weight coefficient expert questionnaire was processed using Matlab R2014a to finally calculate the corresponding weight coefficients for each level of
indicators. In this paper, the collected questionnaires are statistically analyzed as data for this paper’s research and combined with relevant theories as materials to support the conclusions of this paper.

\[ p_f = F_2(\sigma_{M,N} + \mu_{M,N}). \]  

(6)

Safety management theory is a core theory, that takes certain measures to eliminate safety hazards, can reduce the probability of accidents, improve the ability to judge the safety of sports venues, and avoid safety accidents. Management comprises four steps of planning, implementation, evaluation, and summary interlocking, the degree of operation of each step directly affects the target results [15]. Enterprise safety production management is mainly composed of four processes: safety decision-making, safety production management plan, safety production management implementation, safety production management evaluation and supervision, and the main contents are:

1. Safety decision-making: For specific safety issues, using scientific theories and methods, formulate various safety plans, and make satisfactory choices from them, to better achieve safety goals.
2. Safety production management plan: Safety production activities need to determine the safety work objectives before the safety work starts, and make corresponding arrangements for the quantity, quality, and consumption of the required resources before the safety activities, so that the safety activities can be carried out in an orderly manner.
3. Implementation of safety production management: refers to the use of practical actions to realize safety decisions, safety instructions, etc.
4. Safety production management supervision: In the process of safety production management, to ensure the smooth realization of safety production management objectives, all elements, links, and stages of safety production management are inspected, and deviations in the process of safety production management are found and corrected. Identify the causes of deviations and develop measures to prevent the same deviations from recurring.

At present, people have basically mastered some common sense of sports safety activities. However, in the changing sports environment, new challenges continue to emerge, which puts forward higher requirements for safety management. Safety management theory plays an important guiding significance for the safe development of sports activity places. Verify the validity of the distribution function. Firstly, we test whether the probability distribution function of the proposed CCT-GLRT algorithm can be replaced by the Tracy-Widom second distribution function, and the probability density functions of both are shown in Figure 2.

Life-saving equipment is an important tool for lifeguards to use indirectly to rescue people drowning in the pool. Commonly used life-saving equipment include life-saving poles, life-saving rings, life-saving balls, life-saving buoys, etc. In swimming accidents, life-saving equipment plays a decisive role in the implementation of life-saving work [16]. In practice, single life-saving equipment cannot properly deal with various types of swimming accidents, the absence of life-saving equipment will seriously affect the life-saving operation of swimming lifeguards. Once the accident occurs, the prime time for rescue is crucial.

Safety management is one of the most important components of management science. It achieves safety goals through activities in decision-making, planning, organization, and supervision; safety management uses strong technical, organizational, and management measures (mainly using modern safety management principles, methods, and tools) to deal with and eliminate the existing unsafe factors by analyzing and studying the causes of unsafety, to prevent the occurrence of various safety accidents.

It is very important to optimize the talent structure, give full play to personal expertise, maintain operational efficiency, and build a scientific post management system. The lifeguards in swimming places are generally equipped in two ways according to the water area and the required posts. According to the water area, one lifeguard shall be provided for every 250 square meters. That is, swimming pools are equipped with standards for swimmers. A section of a nonstandard swimming place is set up on demand, and the principle is that there are no blind spots and dead spots in the observation area for lifeguards. There should be increased mobility of lifeguards during peak tourist hours.

73.81% of swimming places can be equipped with full lifeguards according to the water area \( (N = 91) \); 26.19% of swimming places cannot have enough lifeguards according to the water area. In the investigation, it was found that in summer, as some educational systems, community outdoor swimming pools, and large-scale water entertainment venues have been opened to the outside world, there is an urgent need to recruit a group of lifeguards to fill up positions. Therefore, there was a situation in which the

![Figure 2: Probability density distribution function.](attachment:image2.png)
relationship between supply and demand was tense and lifeguards were difficult to find.

The survey found that before the beginning of the summer, 58.24% (N = 91) of swimming places found it difficult to recruit lifeguards; 1538% felt that it was difficult to find lifeguards; accounting for 26.38% (21.98% and 4.40%, respectively).

The smooth implementation of swimming place waters swimming movement brings great potential danger, as shown in Table 1.

From the table, 25 people (12.5% of the total sample) thought that management factors did not influence the safety of swimmers in swimming waters; 20 people (10% of the total sample) thought that management factors had a small impact on the safety of swimmers in swimming waters; 37 people (18.5% of the total sample) thought that management factors had an average impact on the safety of swimmers in swimming waters; 46 people (23% of the total sample) thought that management factors had a large impact on the safety of swimmers in swimming waters. More than three-fourths of the people thought that management factors had an impact on the safety of swimmers.

### 4. Analysis of Intelligent Management Model of Swimming Place Waters

Management risk factors are the management conditions that cause or increase the risk of accidents or enlarge the degree of loss and are the direct or indirect causes of accidents and accident risk losses. Management conditions are first reflected in the quality of the manager [17]. The manager is responsible for the planning, organization, and supervision of the swimming pool operation and management activities to ensure the normal operation of the swimming pool, create a good safe environment, and better serve the swimming consumers. Therefore, the risk awareness, management ability, and professional level of the manager are crucial for the safe operation of the swimming pool [18]. As a good manager, you should not only have the organization, leadership, and decision-making ability to quickly solve the safety problems of the venue but also have the business knowledge and professional skills to deal with safety management promptly. In recent years, the number and scale of swimming venues have gradually expanded, but some managers have a low level of education, a weak sense of responsibility, a weak sense of safety, and a lack of management ability to match the work of swimming venues, and all these are likely to lead to the occurrence of safety accidents in swimming venues.

Swimming venues are more functional, more complex structures, and involve more types of internal facilities and equipment, any one of which can lead to venue safety accidents due to mistakes in the design, construction, acquisition, use, and maintenance of any part of the building [19]. The design and construction of the swimming pool are the bases for the safe use of the building, the effective configuration of the facilities and equipment guarantees the safety of swimmers, and the complete configuration of various emergency rescue drugs and equipment will help to reduce and avoid the risk of sudden accidents. Therefore, it is necessary to start from the swimming pool facilities and equipment factors and conduct a comprehensive and systematic analysis of the resulting accident risk sources.

Some swimmers have weak safety awareness, blind self-confidence, and enter deep water by mistake, which has great potential safety hazards [20]. Although some parents are at the poolside, due to chatting or gazing at mobile phones, they are negligent and cannot monitor their children, which also poses a threat to the safety of children. Swimmers comply with rules and regulations: Due to many swimmers, some young people ignore the rules and regulations set by swimming venues, dive illegally or dive for a long time, or enter the pool drunk, or even chase and fight in the pool or play in the water, causing swimmers to choke and face the risk of drowning [21]. Due to the negligence of parents, they cannot monitor the entire process of their children, so there are certain potential safety hazards, as shown in Figure 3.

Some swimmers have great enthusiasm for swimming, but due to the lack of scientific swimming skill guidance, there are generally some bad sports habits, such as swimming when hungry, swimming after satiety, and not warming up before swimming. These behaviors and habits can easily lead to safety accidents [22]. Swimmers’ self-help ability. Many swimmers love swimming and have become an important group of fitness and leisure in swimming venues, but these people have not undergone systematic swimming training, most of them have poor swimming skills, especially the ability to rescue in the water and rescue ashore is quite lacking, and they are often helpless to rescue themselves when they encounter unexpected events, and some even cannot call in time, so they lose the time to be rescued in time.

The basic methods of dealing with the safety risks of swimming venues usually include risk avoidance, risk control, risk transfer, and risk management. As a control type risk management method, risk evasion, and risk control are mainly used to reduce losses, while as a financial type risk management method, risk transfer and risk retention are mainly used to provide compensation after accidents [9]. In actual management, because the risk management situation of different swimming pools is different and the ability and psychological tolerance of managers to resist risks are different, in actual operation, different management methods can be used, or the optimal combination of multiple management methods to maximize the benefits of risk management is used, as shown in Figure 4.
The early construction of swimming pools did not fully consider social development and the surrounding environment, and most of them only focused on indoor teaching, resulting in a mismatch between the construction of swimming pools and the surrounding environment [10]. Under the government’s policy of promoting the opening of stadiums to society, the functions of the stadiums themselves cannot be well played. Even if they are open to the public in their spare time after the teaching is over, there are not many surrounding people who come to the swimming pool for leisure and exercise. The layout and planning of the swimming pool were considered during the construction, and the location was no more than 500 m away from the peripheral path. The convenience of transportation made surrounding residents choose to come to the stadium for physical exercise when the swimming pool was open to the public.

The development of water swimming in swimming pools has been developing for more than ten years, and it has begun to take shape, cultivating many swimming enthusiasts in swimming pools. However, due to the poor management of swimming participants in sports management departments, most of the swimming participants in such swimming places are hovering between indoor swimming and outdoor swimming activities, and there is no specific classification of a department to manage.. [23].

5. Analysis of Results

5.1. Performance Analysis of Nonlinear Random Matrix Algorithm. The main functional modules of the data editing module include the card selling system, the entry and exit system, the financial inquiry and analysis management system, the card management system, and the system data
management system. The data list view lists a certain range of data, which is convenient for users to quickly view the value of the data and select data for editing. Parameter settings are set to manage the mode of data editing and some parameters. The mainframe window provides menus for all commands, command buttons for reading and writing disk files, IC card, data, etc.

The effect of the size of the snapshot number, the number of transmitting arrays, and the number of receiving arrays on the detection performance are observed in the spatially correlated noise background. The effect of the number of snapshots on the detection probability is discussed in Figure 5. Let N and M be on the same order of magnitude, and assume that the number of snapshots is N = 50, 60, 70, 80, and the simulation results are shown in Figure 5.

By comparing the curves in Figure 5, it can be found that the detection probability increases as the number of snapshots increases, and although the number of snapshots only increases sequentially by 20, the detection performance varies greatly, indicating that in the large array MIMO radar system, although normal detection can be performed when the number of snapshots and the number of arrays are in the same order of magnitude and the performance is better compared with the traditional algorithm, the algorithm in this paper still has the higher number of snapshots in a limited range [24]. The relationship between detection probability and signal-to-noise ratio is simulated for a different number of transmitting diversities. Without affecting the detection performance, we set the number of transmit diversity K = 2, 3, 4, respectively, and see that the larger the number of transmit diversity, the better the detection performance. In other words, the radar system is more capable of detecting the target when transmitting signals from more angles toward the scatterer.

First, before the test, the swimming pool was evenly divided into 10 areas, an underwater alarm signal receiving device was placed in each area, and then a swimmer was called to issue an alarm signal in turn in these 10 areas. In the end, the test result of the positioning function of the drowning alarm system is better than the previous assumption. There is no situation where multiple alarm signals receive a device’s alarm at the same time. The positioning function of the alarm system accurately realizes the positioning according to the design algorithm of the positioning system.

With the number of transmitting arrays, the number of snapshots, and the number of receiving arrays fixed, the detection performance decreases as the false alarm rate decreases, which indicates that the level of false alarm rate requirement has an impact on the stability of the algorithm’s detection. From the definition of false alarm rate, the false alarm rate is the probability of the opposite result of the assumption of no target; so for a good algorithm, the requirement of false alarm rate during detection should be as low as possible, so that the impact on the detection process will be smaller, as shown in Figure 6.

Depending on when risk control is implemented, it can be divided into risk control before a loss occurs, risk control when a loss occurs, and risk control after a loss occurs.

Among them, the purpose of risk control before a loss occurs is to prevent the loss, and the purpose of risk control at the time of loss and after a loss occurs is to reduce and contain the loss caused by the accident [11]. Insurance, as a method of managing risk by means of transfer of risk, can be considered a financial arrangement for managing risk. Insurance, as a rather mature and very special method of risk transfer, has developed a very well-developed system of elements in traditional risk management and is widely used in risk management.

Proactive self-risk management means determining risk management, assessing the probability of occurrence of risks and their possible losses, and then, after comparing and weighing various risk management criteria, deciding not to transfer the associated risk of loss, but to have specific reserves as an effective risk management measure to maintain planned and active risk management [25]. For example, there is a risk that the manager is not highly educated, but the manager believes that he or she has management experience that does not affect the safety management of the venue and uses active self-retention to spontaneously assume all consequences resulting from it, as shown in Figure 7. Proactive risk retention to manage risk proactively and actively is usually less costly to maintain from the perspective of reducing resource depletion.

However, it is recognized that the possibility and consequences of risk must be fully understood before such an approach can be taken; otherwise, the risk cannot be taken [26]. Passive risk retention refers to the risk manager’s failure to fully identify the risk and the worst loss consequences due to the lack of awareness of the existence and severity of the risk for subjective and objective reasons, and the lack of effective measures to manage the risk, resulting in the risk loss having to be borne by the operating unit or individual. Therefore, the passive self-retaining risk is a passive way to manage risk; in the absence of financial
resources, material resources, and human resources, and other preparations, and hasty management, it is difficult to effectively control the risk. It is very likely to cause serious consequences and the social impact is undesirable.

5.2. Model Performance Analysis. Through the analysis of the data of secondary indicators, the mean value of all indicators is greater than 4.15, which means that all indicators are more important; the standard deviation of all secondary indicators is between 0.37 and 0.91, which is less than 1, which means that experts’ opinions on them are more concentrated; in addition, all indicators show that the coefficient of variation is between 0.07 and 0.21, which reflects the concentration of experts’ opinions on this secondary indicator system [27]. In addition, all indicators showed coefficients of variation between 0.07 and 0.21, reflecting the high concentration of experts’ opinions on this secondary indicator system. Some experts suggested that it would be clearer to change the staff management objectives to staff standards. In the management of safety in operating places, some experts proposed that the concept of operating places is quite large and should be positioned from the objectives of the study, so it was changed to the safety management of swimming places. Supervision and management mechanism belongs to the government and other institutions or individual organizations to the management of the object of the approach, and government departments’ safety supervision is similar in meaning, so it is not repeated. All indicators are relatively important; the standard deviations of all secondary indicators are between 0.37 and 0.91, all less than 1, indicating that experts have concentrated opinions on them.

Practitioner safety management and swimming place safety management. Practitioner safety management and staff management objectives are not conceptually distinguishable, so practitioner safety management is eliminated here and incorporated into the staff criteria column. The standard deviations of other secondary indicators are between 0.37 and 0.91, and the coefficients of variation are between 0.07 and 0.21. The variation in the distribution of the scores and dispersion of each indicator is small, so no modification is made to the other second-level indicators, as shown in Figure 8.

The division of security responsibilities is reasonably distributed and has a similar meaning to the specific and detailed clarity of security responsibilities, so it is eliminated to avoid repetition and redundancy. The staff’s conscientious and responsible attitude and the staff obedience to safety management is one of the concrete manifestations of the implementation of safety responsibility in the implementation of safety management, reflecting the staff’s cognitive degree of responsibility, so that it is eliminated. Practitioner system management and practitioner quality management are the criteria of the executive in the process of management implementation, which are inconsistent with the target subjects of our study on safety management, and therefore are eliminated. The high risk and suddenness of swimming places require the safety and security executors to have the qualifications recognized by the state, at the same time, to protect the health of the executors: the employees must get a health certificate from the health department every year, so we add a health certificate for the employees under the staff standard.

The time it takes for radar to detect a target is also about less than a second. All these technical indicators are still improving. Radar is always the first thing that comes to mind when using electromagnetic signals to obtain the location information of a target. There is one thing in common when radar detects a target, that is, an electromagnetic signal must be transmitted first, and what the radar detects is the reflected echo of the target to this signal. When people use

Figure 6: Performance of different operating parameters.

Figure 7: Cumulative percentage of risk factors.
biomimicry to study, radar locates targets like bats detect targets. Most creatures use their eyes to locate the target, which uses the target’s radiation to the outside world, and the target itself has no signal. In this sense, it should also be possible to use electromagnetic waves to locate targets. The position of the drowning person can be located through the sequence of receiving the alarm signals through the four-alarm signal receiving antennas.

However, in the multiple tests of the alarm system, none of them could be tested in the same swimming pool due to the limitation of the venue. Then, the problem arose, due to the difference in the water quality composition in different swimming pools (some swimming pools were disinfected with ionized NaCl and some with calcium hypochlorite), which caused the radio transmission distance in the water to vary. The water quality of the tested swimming pools is different, resulting in deviations in the positioning function algorithm of the original alarm system designed in the previous swimming pool. In addition, when the drowning alarm system performs a drowning judgment on a plurality of swimmers at the same time, the system may be easily paralyzed due to the excessive amount of returned information.

From Figure 9, we can see that $0.03096 < CR < 1$, the judgment matrix of the three levels of indicators under the safety management of swimming places passed the consistency test. In the evaluation index system of swimming place safety management, C13 has the largest weight of 0.545, which means that it is the most important among the corresponding three-level indexes; followed by C14, which has a uniform safety operation standard and a weight of 0.265; followed by C15, which weighs 0.120 for timely handling of emergencies; C16, which is relatively unimportant for proper safety rescue methods, weighs 0.070.

The three-level indicator judgment matrix under the safety hazard check passed the consistency test. Among the index dimensions of safety management in swimming places, C13 is the most important, with a weight of 0.513; followed by C14, with a weight of 0.275; followed by C15, with a weight of 0.138; and C16, with a weight of 0.074, is relatively unimportant, with no dead spots in lighting.

6. Conclusion
This paper combines the research results related to safety management to improve the current theoretical basis and system construction related to safety control of swimming places, which has a positive effect on the safety management of swimming places. In this paper, the random matrix theory and regular correlation technique are used as mathematical tools to conduct an in-depth study on the target detection method in the background of correlated noise. For the emission diversity system, the random matrix method for target detection in a white noise background is analyzed first, and on this basis, the random matrix methods for target detection in spatially correlated noise background and spatial-temporal correlated noise background are proposed, respectively, which apply to large array systems with the number of array elements and the number of snapshots in the same order of magnitude. Through the construction of swimming places to carry out sports industry safety management and security system, the current situation and problems of safety and security of swimming places are analyzed, and the problems of the actual situation are combined to point out the need to do a good job in the construction of the system management and security system and the construction of the system implementation system, which in turn strengthens the construction of safety
production in swimming places. The small deviation inequalities of the maximum eigenvalues of the random matrix are studied, and some basic small deviation results of the random matrix are presented. Then, several types of small deviation inequalities for the maximum eigenvalues of independent random PSD matrices are obtained under specific conditions. The various risk factors are then analyzed in more depth to quantitatively evaluate their potential impact on the teaching work in swimming pools and to develop appropriate countermeasures to control the negative impact to a minimum.

Data Availability

The data used to support the findings of this study are included within the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest or personal relationships that could have appeared to influence the work reported in this paper.

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