# Effect Analysis of Functional Physical Fitness Training in Youth Amateur Track and Field Training Based on Improved Genetic Algorithm Under Functional Analysis

**Lei Wang[1], Tao Chen[2]***

**Abstract**

Athletics is in the basic position in sports, the improvement of sports quality, sports technology mastery is inseparable from athletics training, athletics training is an important way to improve the level of sports. China's amateur track and field training has played a major channel and role in the basic training of track and field, which has experienced nearly 50 years of development and achieved some excellent results, but it is not ideal. The economic development in the society has a great impact on the basic training of track and field, and only by solving the problems in the basic training of track and field well can we really improve the level of track and field in China. Youth amateur track and field training not only stimulates athletes' interest in sports and mastering track and field skills, but also lays the foundation for athletes' sports through physical training. At present, the physical training of our youth is not ideal. With the help of amateur training in track and field, it will bring continuous optimization to the athletes' physical training effect. To strengthen the attention and analysis of the basic and special strategies of physical fitness training in youth athletics amateur training, guide the development of the most reasonable physical fitness training plan and select the most suitable physical fitness training methods, so as to achieve the stable improvement of athletes' physical fitness and achieve the ideal goal of physical fitness training. Therefore, this paper introduces scientific quantitative and customized indexes into athletic training from the perspective of genetic algorithm, so as to improve the scientific and cutting-edge analysis of training effects.

**Keywords:** Adolescent, Amateur, Track and Field Training, Functional Fitness Training, Improved Genetic Algorithm

## 1. Introduction

The Circular of the General Administration of Sports and the Ministry of Education on Issuing Opinions on Deepening the Integration of Sports and Education to Promote the Healthy Development of Youth (Sports Development [2020] No. 1, hereinafter referred to as "the Opinions") requires strengthening the coordination and guidance of youth sports to promote the construction of a strong sports and education country (Schreiber et al., 2022). The state and governments at all levels attach great importance to students' physical exercise, and various sports in real life are shown in Figure 1. Track and field is the oldest sport in sports, known as the "mother of sports", any sports include walking, running, jumping, throwing and other track and field basic movement skills, track and field sports can help students to obtain basic motor skills and improve athletic ability (Kim et al., 2020). After-school track and field training is an important part of school sports and is a fundamental sport for after-school sports training in schools. Athletics is the sport with the highest number of medals set in world-level competitions. Throughout the world sports powerhouses, track and field programs have obvious advantages. In recent decades, China's sports have developed rapidly. Through the analysis of a large number of competition data, we found that as a large country with a population of 1.4 billion people, China leads the world in many sports, but track and field is a constraint to our development as a sports power. In this regard, it is important to study the current situation of after-school athletic training.

Physical fitness training is the focus of current physical education. Looking back at the history of physical training, it can be traced back to the medical gymnastics in ancient Europe and the ancient Dayin Gong in China. It was first used for medical rehabilitation and therapy. With the deepening of educational research, physical training also began to pay attention to physical fitness training. Physical fitness training gradually tilted toward the field of education (Bloomquist et al., 2021). In some developed countries in Europe and the United States, physical training has developed into a new kind of physical training,

[1]Beijing fangshan district sports school, Beijing 102401, China

[2]Beijing Sport University, Beijing 100084, China

* Correspondence: Tao Chen, Email: qazxs4erdft@163.com

which corresponds to a mature training concept and model. By strengthening physical training, the sports literacy of athletes can be improved. With the reform of quality education and the rise of the national fitness boom, physical fitness training has also received much attention (Nyarko et al., 2021). Major schools in China also use various amateur sports training to promote athletes' physical training. Through physical training, the basic posture and movement of athletes can be adjusted so that athletes have the best athletic ability and stable physical strength (Gomes et al., 2019).

***Figure 1*** Various types of sports in real life

Students are the future of the country, the builders and successors of the motherland, and their level of physical fitness is the Their physical health is the foundation of the country's prosperity and strength, and the junior high school stage is an important period for students' physical development, so scientific exercise is The scientific exercise is more important. The study of the current situation of after-school athletic training in junior high schools is important for improving the quality of training, enhancing students' physical The study of the current situation of after-school athletic training in junior high schools is of great significance to improve the quality of training, enhance students' physical fitness, improve students' health, guide students to physical exercise, cultivate interest in sports and implement the idea of lifelong sports. It is significant. It is an irreplaceable role to jump out of the quagmire of the continuous decline of students' physical health and to break the stumbling blocks that hinder the training of sports talents. It has an irreplaceable role.

After-school training is an important part of school sports. The scientific development of after-school athletic training is essential to the implementation of our the scientific development of after-school athletic training is of great importance to the implementation of our educational policy, the realization of the objectives of school physical education, the promotion of the popularity of athletics and the improvement of athletic standards. It is of great significance. After-school sports training has an important position in the development of competitive sports, and it is an important part of sports training work. It is an important part of athletic training and is the primary form of competitive sports. It is hoped that through the study of the implementation process of athletic training We hope that by studying the implementation process of athletic training, we can grasp after-school athletic training as a whole, and play an important role in better tapping and cultivating athletic reserves and transferring athletic talents. It is hoped that the study of the implementation process of after-school athletic training will provide an overall grasp of after-school athletic training, and play an important role in better tapping and cultivating athletic reserves and sending sports talents.

It is necessary to properly introduce moderate intensity physical training in youth amateur athletic training, which can improve the athletes' physical fitness and strengthen the special exercise of athletics, thus improving the athletes' special athletic ability, especially improving the strength of the athletes' small muscle groups to achieve their body stability, flexibility and coordination are improved (Guo, 2020; Nolan, 2022). According to relevant surveys, it was found that if the training intensity of sprinters was reduced by 40%, the training volume of sprinters could be increased by 14-5 times (Liu et al., 2020). Once the training intensity is reduced, athletes can run considerable distances, but for some breakthrough sports, the training effect is small (Setiawan et al., 2020). For long-distance runners, excessive increases in training volume and decreases in training intensity may prevent training from breaking through to the current state, thus failing to achieve the desired training effect (Wei et al., 2020). In track and field training, if the training intensity is increased and the training volume is reduced accordingly, it will cause strong tension to the central nervous system and psychological state of the athletes and affect their physical health (Cheng et al., 2020). Therefore, the best training effect can only be achieved by mastering the training intensity and training volume in a scientific and reasonable manner according to the sports.

## 2. Related Work

### 2.1 Foreign Countries About After-School Athletic Training

After-school athletic training in the United States is mainly for middle school students in the 12-14 age group, i.e.,

grades 6-8, and focuses on basic training, while for high school students in the 15-19 age group, it focuses on special training and theoretical knowledge (Sogokon et al., 2020; Zebzeev et al., 2019). The United States, as a sports powerhouse, has established a special governing body to manage after-school training, commonly referred to as the "athletic department". In public schools in the United States, there are two main components of after-school training: one is the athletic department, which is dedicated to sports competitions; the other is the athletic department, which is mainly for students' recreation during the week; in private universities in the United States, there are several important subdivisions that manage school sports. In terms of the way after-school training is run: most American universities are more in the form of various clubs. A combination of group and individual training is the main focus, including indoor and outdoor sports activities. In the U.S., extracurricular sports activities are guided by specialized sports organizations who have sound rules and regulations and can provide scientific guidance to individuals.

For Japan and many European countries, the percentage of students participating in after-school athletics is extremely high. In Japan, the number of students participating in after-school athletics is 10% of the total number of students in secondary schools; in Europe, the number of students participating in various athletic sports exceeds 5.2 million each year, accounting for almost 1/3 of the total number of students in secondary schools (Botero et al., 2020; Teixeira et al., 2020).

In Australia, after-school athletics is very popular, especially for students at the secondary school level, and the support for after-school athletics, both at school and at home, is very high, and the athletic coaches are very rigorous and scientific in organizing after-school athletic training (Marsico et al., 2021; Schlegel, 2021).

Studies (Lai et al., 2021; Tan et al., 2021). conducted a comparative analysis of secondary school physical education and health curriculum content in the United Kingdom, the United States, Canada, Japan, and New Zealand, which showed that the development of physical education and health curriculum in junior high schools in these countries have certain commonalities, namely, the division of curriculum content based on learning areas, more attention to the development of students' physical fitness and motor skills, more flexible and selective curriculum content, and the ability to effectively meet the inter-individual The content of the curriculum is more flexible and selective, which can effectively meet the differences between individuals, and the teaching contents of the physical education and health courses are integrated with each other, focusing on the cultivation of students' awareness of "lifelong physical education" and enhancing the connection between physical education and daily life.

To summarize, extracurricular sports activities in foreign countries are guided by specialized sports institutions with sound rules and regulations that provide scientific guidance to individuals. They are able to appreciate the fun of sports and do not let their sports performance affect their motivation to participate in training. In countries with relatively developed economies, they have placed equal importance on education and sports, and the concept of lifelong sports is deeply rooted in their hearts. At the same time, they have first-class teaching facilities, advanced sports equipment, sufficient training funds, and highly qualified coaching team, in which China lags behind developed countries. The development of after-school athletic training is constrained, so it is necessary to learn from foreign experience. Government departments at all levels should pay attention to the development of sports, so that the concept of lifelong sports is deeply rooted in people's hearts and set off a fever of sports for all. It is necessary to continuously increase financial investment to improve the status of venues and equipment, strengthen medical supervision, and pay attention to the training of professionals to provide support for scientific training.

### 2.2 Domestic Situation About the Development of After-School Athletic Training

Studies (Nemani & Lowe, 2021; Zhang et al., 2021). analyze the constraints of after-school athletics in secondary schools are the high academic structure of athletics participating teachers, experienced in training, but few training and learning opportunities, participating teachers work seriously, but the workload is large, the workload calculation is unreasonable and the treatment is low, which to a certain extent affects the motivation of teachers' work. Participating students are enthusiastic about training, and parents of participating students support their children to participate in athletics after-school training. Secondary school leaders attach more importance to track and field training, but the single and seriously insufficient source of training funds and the poor quality of training equipment seriously affect the quality of track and field after-school training.

Studies (Barman et al., 2021; Wickramaratne & Mahmud, 2021). pointed out that the problems in after-school track and field training are imperfect training guidance, lack of scientific awareness of material selection, the phenomenon of "pot luck" in training plans, blind pursuit of "big sports weight", the phenomenon of seclusion in training, and the lack of scientific training groups. The lack of scientific grouping restricts the goal of after-school athletic training in secondary schools.

Studies (de Blaine & Morvillers, 2021; Krawczyk, 2020). suggest that "training and learning" are a pair of themes that are difficult to grasp in after-school track and field training, and "training and learning" hinder the improvement of youth track and field in China.

The study (Delevatti et al., 2020; Sheremet et al., 2020). pointed out that the development of a unified after-school training program, a clear goal of forming a one-stop training system for elementary school, junior high school and high school, overcoming short-term behavior and the idea of quick success, focusing on scientific selection, scientific training and scientific management and other effective measures.

To sum up: the reasons for the low level of development of after-school athletic training in China are multi-level and multi-faceted. In terms of teachers: experienced teachers with high level of expertise lack training opportunities; young teachers lack experience and have high workload, heavy training tasks, unreasonable workload calculation and low treatment, which affect work motivation. Field equipment: the lack of training equipment and standard fields seriously restrict the development of after-school athletic training. The scientific aspect of training: training plan development is arbitrary, not in accordance with the new curriculum standard requirements to develop training plans, quick success, blindly take a large intensity, do not pay attention to scientific selection and scientific training.

In short, in addition to strengthening the funding for after-school track and field training, we must also increase the construction of after-school track and field training sites and training equipment to provide better conditions for students to train in after-school track and field to ensure that track and field training is carried out normally. In terms of training plan: the training plan of after-school track and field training is based on short time training plan and unit training plan, lacking long time training plan; the organization form of after-school track and field training is mainly temporary pre-tournament training; the training only pays attention to technical and special physical exercises, mainly to cope with the competition. Scientific and systematic training is required a lot of time, and longtime training will, to a certain extent, affect the athletes' academic performance, leading to the phenomenon of strong sports and weak culture. From the side of coaches: the recovery means after training is single, and cannot take scientific training methods according to the age characteristics of junior high school students. Can not follow the principles of after-school athletics training, premature special technical training, pulling the seedlings to help. At the same time, the development of after-school track and field training is not sufficient, the popularity rate is low, and the training lacks scientific and systematic, which seriously hinders the development of after-school track and field training.

### 2.3 Genetic Algorithms

Genetic Algorithm (GA) was first proposed by John holland in the 1970s, which was designed and proposed according to the law of evolution of organisms in nature. It is a computational model of biological evolutionary process that simulates the mechanism of natural selection and genetics of Darwinian biological evolution, and is a method to search for the optimal solution by simulating the natural evolutionary process. The algorithm converts the problem solving process into a process similar to the crossover and mutation of chromosomal genes in biological evolution by using computer simulation in a mathematical way. In solving more complex combinatorial optimization problems, it is usually faster than some conventional optimization algorithms to obtain better optimization results. Genetic algorithms have been widely used in combinatorial optimization, machine learning, signal processing, adaptive control, and artificial life. In many motion management systems, tasks are scheduled one by one during the run. The dynamic methods used in these motion flow management systems tend to optimize the execution time of only a single task without considering the whole motion flow system as a whole, which is optimized for the execution time of all tasks. The study proposed a motion flow scheduling algorithm based on a genetic algorithm, but it did not take into account the possible concurrent relationships between tasks and had a limited application. Based on this, this paper proposes an improved genetic algorithm (IGA) that plans the sequence of tasks and resource combinations with the shortest execution time before the execution of the motion stream, so as to achieve global optimization, taking into account the order between tasks in the chromosome encoding. and concurrency relationships.

## 3. Methods

### 3.1 Modeling Adaptation

According to the appropriate resource allocation principle proposed, it is necessary to make decisions on the task execution sequence and how to allocate resources. In this paper, these two decisions can be abstracted into two problems: task sequence and resource allocation.

Task Sequence and Resource Allocation$t(i = 1,2,\ldots,m)$ It represents $m$ tasks that need to be executed in the motion flow, and there may be constraints and concurrency between each task. The task sequence

represents the task set composed of all tasks in the motion flow, but the sequence of tasks is not necessarily the same. Assuming that $I$ can only be executed after $I$ is executed, it means that $t$ is a pre-order task of 0. When the pre-order tasks of multiple tasks are executed, and these tasks have no resource occupation conflicts, these tasks can be executed concurrently. It should be noted that the order of the task sequence does not represent the task execution order, it indicates that when resources conflict, $A$ task $t$ can be executed if and only if all tasks between$L$ and $t$ in the task sequence that are allocated the same resource as the task have been executed. In the task sequence, the pre-order task of $Z$ cannot appear after one, otherwise it may cause a deadlock problem, which is an infeasible task sequence and cannot guarantee that the execution of the motion flow is completed. $RM = 1,2,\ldots,n$ Represents $n$ resources provided to the task execution needs. $R_t$ represents the set of candidate resources that can complete task $t$, $RT_i$is a subset of $R$. When the task is running, it only needs to select any resource from $R_t$ to complete the task. In this paper, it is assumed that each task uses different resources to complete the processing time can be different, a resource can be used by multiple tasks, but at the same time Only one task can be occupied. When two tasks compete for the same resource at the same time, the task ahead in the task sequence has the priority to occupy the resource. Considering the above factors, different task sequences and different resource allocation will lead to different execution time of motion flow.

The objective of the IGA optimization proposed in this paper is to compute the optimal combination of task order and resource allocation to achieve the goal of the minimum time for the motion stream to complete all tasks when the resources of the motion stream system are limited and the tasks can run concurrently.

### 3.3 Using the Improved Genetic Algorithm to Make a Scheduling Scheme

The problem discussed in the nested genetic paper involves two sets of variables, task sequence and resource allocation. These two sets of variables affect each other. If each set of variables is optimized independently, the global optimal solution cannot be obtained, but the nested genetic algorithm can be used efficiently. It can overcome the shortage of standard Genetic Algorithm (Canonical Genetic Algorithm, CGA) by searching the entire solution space, so nested Genetic Algorithm is used in this paper. The algorithm is divided into two layers, the first layer determines the task sequence, and the second layer searches for the optimal resource allocation based on the known task sequence. In order to ensure the correctness and validity of sequence planning results, the concept of priority constraint matrix is introduced. $PCM$ is an $M \times M$ matrix. The elements in the matrix represent the relationship between tasks. In the text, $C$ is used to represent the priority restriction matrix, and i and i represent the row number and column number of the $PCM$ matrix $C$. The value of represents the relationship between task $i$ and task $J$.

$$C_{ij} = \begin{cases} 0 \text{There is no sequential restriction between tasks I and j, which can be executed concurrently} \\ 1 \text{Task J can only be executed after task I is completed} \\ -1 \text{Task I can only be executed after task J is completed} \end{cases} \quad (1)$$

### 3.2 Fitness function

$$F_{indi} = M_t - T_{indi} \quad (2)$$

$$M_t = \sum_{i=1}^{m\sum(T_{ij})(j=1,2,\ldots,n)} max \quad (3)$$

Fitness function $F$; the time required to execute task $i$, the sum of the longest time required to execute each task in a task sequence, $M$ when the tasks and resources are known. The value is fixed and represents the time required for the individual to perform all tasks.

Improved genetic algorithm flowchart. The variable $x$ in Figure 1 represents the task sequence layer, and the variable $y$ represents the resource allocation layer. The algorithm is mainly divided into two layers: the task sequence layer and the resource allocation layer. The specific improved genetic operation details will be explained in detail below.

Task sequence layer. Chromosomes in the task sequence layer of chromosome coding are represented by feasible task sequences. A feasible task sequence does not require tasks to be executed sequentially. Multiple tasks can be executed concurrently when all pre-order tasks are completed, but when concurrent execution occurs resource contention, will determine how resources are allocated in the order of the task sequence, but the resources in use cannot be preempted.

The initial population generation method randomly selects feasible task sequences to form the initial population. The feasible task sequence can be selected with the help of $PCM$. Each time, the tasks that have no pre-order tasks or the pre-order tasks have been executed are selected, namely $C$. If it is not equal to 1, then all rows and columns related to the selected task in the $PCM$ are set to 0, that is, after task $I$ is selected, $C$ is set. Continue to select the next task according to this method until a set of feasible task sequences is formed, and the initial population is generated by looping pop Size times, where pop Size is the size of the population, and the randomly generated task sequence may be repeated.

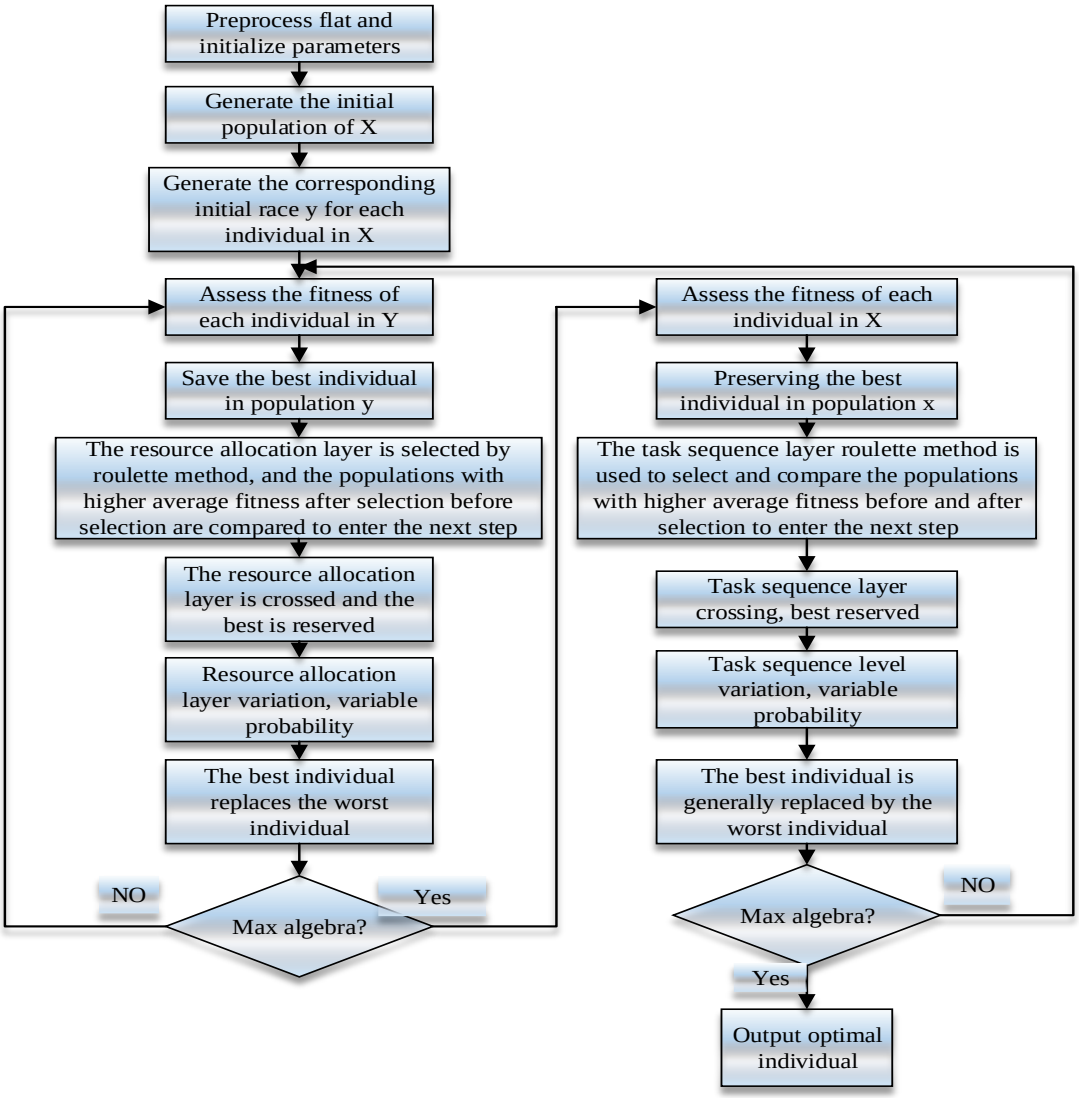


***Figure 2*** flow chart of improved genetic algorithm

The elite retention operation and the improved selection operation first adopt the elite retention strategy Hu to retain the optimal individual, and then perform the selection operation. The selection operation adopts the roulette method, and the average fitness of the population before and after the selection is compared, and the best one enters the crossover operation. The improved selection operation can prevent the roulette method from selecting a population whose average fitness is not as good as before the selection to enter the crossover operation in the case of a small probability.

What is the improved crossover operation? In a crossover operation suitable for the task sequence layer is proposed, which can guarantee that a legal chromosome is obtained after the crossover. The crossover method proposed in this paper is to randomly select an intersection point in front of two feasible task sequences, and the task sequence between the first task in the task sequence and the task pointed by the intersection point is called the matching region. Assuming that the two task sequences are parent 1 and parent 2 respectively, first add the matching area of parent 1 to the front of parent 2, and add the matching area of parent 2 to the front of parent 1 to form two intermediate task sequences. Then remove the same task as the matching area outside the matching area to obtain two child sequences, as shown in Figure 3, refer to the motion flow system in Figure 3. The child individual obtained through the above crossover process cannot be guaranteed to be feasible, so the feasibility of the child individual needs to be verified according to the PCM. If it is found to be infeasible, delete the first infeasible task and its subsequent tasks in the task sequence, and generate the remaining tasks according to the PCM to ensure the feasibility of the task sequence. In order to further promote the convergence of the algorithm, the fitness of the two parents and children is compared after the crossover. The two individuals with large fitness enter the mutation operation, and the individual with small fitness is eliminated.

The improved mutation operation cannot be mutated by the traditional mutation method of genetic algorithm because of the possible constraint relationship between tasks and the need to ensure the feasibility of the mutated task sequence. The study proposed a mutation method suitable for the task sequence layer in the paper. First, a chromosome is randomly selected for mutation, a task I in the task sequence is randomly selected, and all tasks after task t in the task sequence are deleted. Since the feasibility of the task sequence can be guaranteed by using PCM, the mutation is achieved by using PCM to randomly plan new tasks based on the remaining tasks to form a new feasible task sequence. In addition, since the elite-preserving and optimal strategies in the alternating method lead to fast convergence of the algorithm, the algorithm may converge to a locally optimal solution. In order to make the algorithm search the entire solution space as much as possible, the variational mutation probability u" is used in this paper to maintain the diversity of the population.

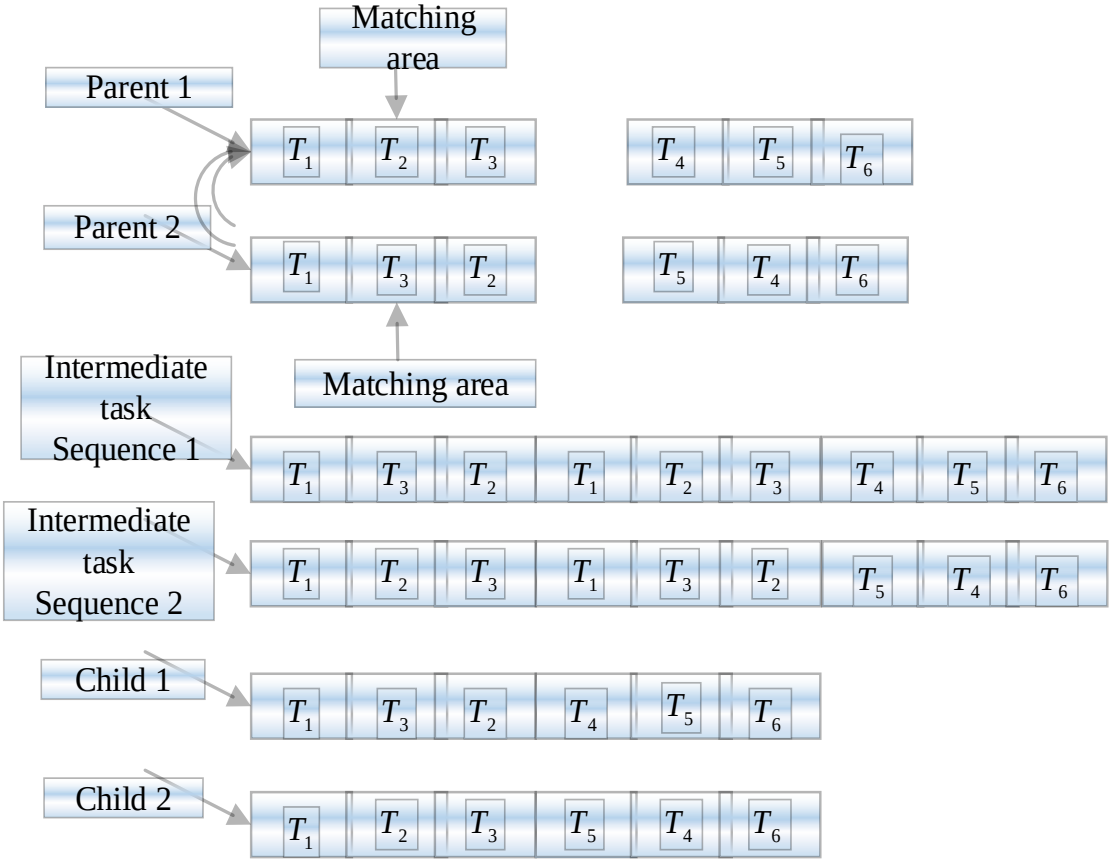


***Figure 3*** improved crossover method

Replace the worst individual operation, use the individual retained by the elite to replace the worst individual in the mutated population. In the resource allocation layer, the chromosome of the chromosome coding resource allocation layer can be represented by a resource sequence. The resource sequence and the task sequence have a corresponding relationship, and the task has been allocated resources. Each resource sequence represents a resource allocation layer individual, and the resources in each resource sequence represent genes in the chromosome. The initial population generation operation randomly selects an available resource for each task under the premise that the task sequence is known. The length of the resource sequence is the same as that of the task sequence. A total of popSize resource sequences are selected to form the initial population, and popSize is the size of the population. The elite retention operation and improved selection operation are the same as the elite retention and selection methods at the mission sequence layer. The crossover operation adopts the traditional single-point crossover operation, and randomly selects the crossover point for the crossover operation. The mutation operation randomly selects a mutation point, and randomly selects a resource to replace the current resource in the resource set that can perform the task corresponding to the mutation point. The mutation probability still changes as the task sequence layer mutation operation. The replace worst individual operation replaces the worst individual in the mutated population with the best individual retained by the elite.

## 4. Experiments

### 4.1 Experimental Environment and Comparison Method

The experimental hardware platform is a personal notebook computer, the CPU is InterDuo2.10GHz, the memory is 2GB, the software platform is WindowsXP2002, and the development tool is Myeclipse7.5. This paper will compare the time required to complete all tasks by using the dynamic method H'51, CGA and IGA methods in the same motion flow system under the same software and hardware environment, and the method with the shortest time is the best.

### 4.2 Experimental Motion Flow System and Experimental Data

Here, a simple motion flow system is used to describe the experimental process. The motion flow system here is described by a petri net, as shown in Figure 4.

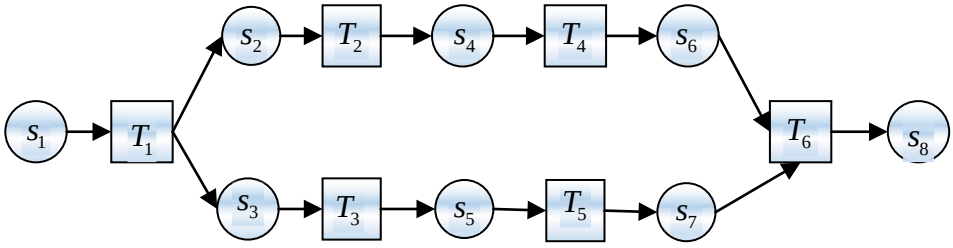


***Figure 4*** Example workflow system

Set the relationship between tasks and resources, $t$ represents task $i$ represents resources. Figure 5. IGA method, dynamic method, CGA method time vs. task $i$, the relationship between tasks and resources are shown in Table 1.

**Table 1**

*task resource relationship*

| $T_i T_{ij} Rj$ | $T_1$ | $T_2$ | $T_3$ | $T_4$ | $T_5$ | $T_6$ |
|---|---|---|---|---|---|---|
| $R_1$ | 31 | 15 | 14 | 0 | 24 | 11 |
| $R_2$ | 0 | 19 | 37 | 14 | 0 | 33 |
| $R_3$ | 48 | 15 | 0 | 19 | 0 | 44 |
| $R_4$ | 26 | 21 | 41 | 21 | 20 | 0 |

### 4.3 Experimental Results Using Dynamic Method

Motion Flow System Allocating Resources From the experimental results of this example, it can be concluded that using the IGA method can minimize the execution time of the entire motion flow. Subsequently, experiments were carried out with 9 other motion flow systems with different structures or motion flows with the same structure and different task-resource relationships, including motion flows with and without concurrent relationships. The experimental results are shown in Figure 5 and Figure 6.

From the average execution time of the motion stream instances in Figure 6, we can find that the average execution time of the motion stream system with the IGA method is the shortest. In the resource-constrained motion stream, when there are no concurrently executed tasks in the motion stream, the IGA method and the dynamic method have the same execution time and both are better than or equal to the CGA method, but if there are concurrently executed For tasks, the IGA method is always better than or equal to the other two methods in terms of execution time (Schreiber et al., 2022).

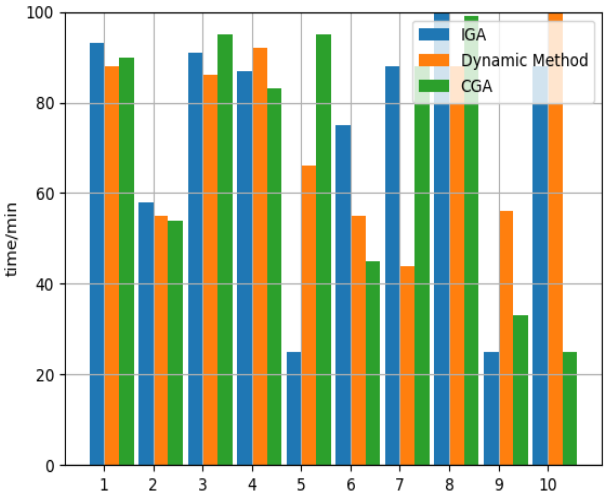


***Figure 5*** Time comparison of IgA method, dynamic method and CGA method

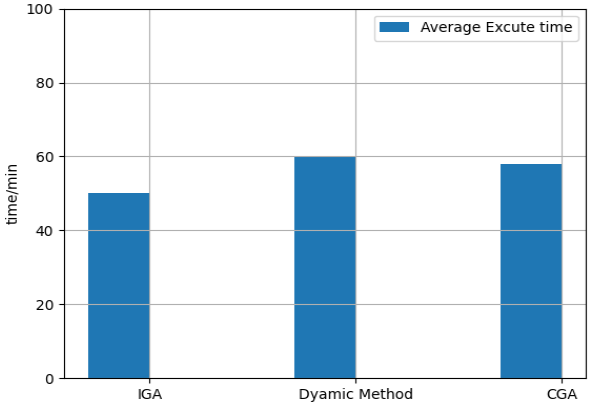


***Figure 6*** Comparison of average execution time of IgA method, dynamic method and CGA method

## 5. Conclusion

In this paper, an IGA algorithm for globally optimized motion flow systems is proposed and compared with motion flow systems based on dynamic scheduling methods and CGA methods. Experimental results show that using the IGA method in a resource-limited motion flow system, with or without concurrent execution tasks, results in a motion flow system that outperforms or equals the use of the dynamic scheduling method and the CGA method in terms of total time consumption, because the entire motion flow can be globally optimized using the IGA algorithm, and the search range and convergence are optimized on. The dynamic scheduling method optimizes only a single task and can easily fall into a local optimum. Although CGA can also perform global optimization of the motion stream, the convergence of the algorithm is not guaranteed and the obtained solution is not necessarily the optimal one. To sum up, if youth physical education and track and field teaching activities are to "keep pace" with other disciplines under the new curriculum reform, the teaching philosophy, teaching methods and teaching contents should be continuously strengthened and optimized in order to ensure students' healthy physical and mental development by means of effective physical training. At the same time, high school physical education teachers should pay attention to the improvement of their own teaching level, so that they can meet the modern teaching needs in the context of enhancing their confidence in teaching.

## 5.1 Suggestions

(1) Optimize the team of physical education teachers, attract more young and highly specialized physical education teachers to enter the team of after-school athletic training, improve the academic level of physical education teachers, and tilt the title evaluation to physical education teachers to improve the title level of physical education teachers. Teacher recruitment raises the requirements in terms of education, sports specialization and technical level, and further training is provided for in-service teachers to improve their professionalism.

(2) Reduce the teaching burden of physical education teachers, make physical education teachers dedicated to after-school athletic training, guarantee the time and number of training sessions each time, encourage teachers to participate in physical education research, improve the knowledge reserve of physical education teachers, and improve the level of scientific research of teachers.

(3) Enriching training programs, improving the fun of athletic training, cultivating athletic interest, improving athletic ability, cultivating students' quality of self-improvement, stabilizing the number of training, and improving the cumulative training time of students.

(4) Eliminate the contradiction between learning and practice, and give more help to after-school athletic training students' cultural classes before and after school to ease the contradiction between learning and practice.

(5) Take the track and field syllabus as a reference, improve the science of track and field training plan, pay attention to the development of medium and long-term training plan, train according to the training plan, pay attention to the routine training before the competition, apply the requirements and atmosphere of the competition in the usual routine training, improve the students' ability to participate in the competition, actively participate in events at all levels, and enhance the students' resilience.

(6) Strengthen propaganda, crack the prejudice of society about training, change traditional perceptions by positive propaganda, broaden funding sources, improve the current situation of funding shortage, improve the efficiency of the use of venues, and increase the construction of standard sports venues. Supplementary sports equipment to alleviate the current situation of equipment shortage. Emphasize the important role of medical supervision in improving the scientific nature of training, promote medical supervision on campuses and training teams, and improve the scientific level of training.

## Data Availability

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

## Conflicts of Interest

The authors declared that they have no conflicts of interest regarding this work.

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