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DELIVERING QUALITY SCIENCE TO THE WORLD

Design and research of intelligent Course Scheduling System Based on priority

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Abstract: With the rapid development of Internet technology, building smart campus has become an important part of many college education reforms. Course scheduling has always been an extremely heavy work in the educational administration management of colleges and universities. At the same time, with the implementation of the reform of the educational system, the number of courses is increasing, and the category and nature of courses are changing. These put forward more and more requirements for the task of course scheduling, which makes the task of course scheduling more complex. At present, many domestic colleges and universities still use the traditional manual course scheduling method, which is not only heavy workload, low efficiency, but also very easy to make mistakes. Therefore, with the help of computer Internet technology, building an intelligent, efficient and humanized course scheduling system is an important part of building a smart campus.
Keywords: Priority algorithm, Intelligent course scheduling system, Backtracking algorithm, Spring framework.

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1. INTRODUCTION

The use of course scheduling algorithm in course scheduling system is a way to realize course scheduling, which can help us realize a reasonable combination of courses, teachers, classes, classrooms and time, which is the most basic requirement of course scheduling system. However, with the deepening of the reform of the education system, there are more requirements and restrictions on our course scheduling task. For example, we should reasonably allocate the class order of courses according to the relationship between different courses; Reasonably allocate the class time of the same course, etc. These rationalized needs can help us improve the teaching level of colleges and universities. At the same time, in response to the "Internet + education" mode of the education department, the network can be combined with the course scheduling system. So that teachers can directly use the browser to log in to the system to view their teaching arrangements, and can modify the teaching arrangements directly according to their own needs. Students can directly log in to the system through the browser to view and download the timetable. So as to reduce the work of academic administrators. At present, some colleges and universities have their own course scheduling systems. At the same time, there are many online course scheduling systems on the network, but the educational administration arrangements of many schools are different, so it is impossible to design a general course scheduling system. Based on the actual situation of course scheduling in Central China

Normal University, in order to solve the low efficiency of manual Course Scheduling in Central China Normal University and meet the needs of the revision of talent training scheme and the construction of smart campus in Central China Normal University, this paper designs a course scheduling system based on priority algorithm, simulates the way of manual course scheduling, and designs a more reasonable course schedule. The system adopts B / s system framework, fully considers the actual use needs of users, and provides users with better use experience.

2. COURSE SCHEDULING ALGORITHM

Course scheduling algorithm includes heuristic algorithm, greedy algorithm, backtracking algorithm and priority algorithm. This paper will introduce the theoretical knowledge of the course scheduling algorithm in detail, show the algorithm process with the help of the flow chart, and analyze the advantages and disadvantages of the course scheduling algorithm in combination with the actual situation of the application of each course scheduling algorithm to solve the course scheduling problem in recent years. The details are as follows.

2.1 Heuristic algorithm

Heuristic algorithm is proposed relative to the optimal algorithm. The optimal solution of a problem is to obtain the optimal solution of each instance of the problem. Heuristic algorithm is to obtain the feasible solutions of all instances of the combinatorial optimization problem to be solved in a certain time according to experience or intuition, but the similarity between the feasible solution and the optimal solution cannot be calculated. Generally speaking, heuristic algorithms can often find good solutions, but we can't guarantee that they won't get bad solutions. At present, heuristic algorithms are often used to solve NP complete problems. Heuristic algorithms include ant colony algorithm and genetic algorithm. Ant colony algorithm was proposed in Marco Dorigo's doctoral thesis in 1992.

The algorithm is mainly inspired by the fact that ants can always find the shortest path behavior in the process of looking for food. When he observed the ants going out to look for food, he noticed that each ant, as an individual, had no special behavior, but a group of ants showed strong intelligence in the process of foraging. For example, in the process of foraging, ants can find the nearest route to the food location under various circumstances. Research shows that ants can transmit information to each other through some information mechanism. In-depth study found that ants release a chemical called pheromone during walking%1. Ants can detect the "pheromone" concentration of each line. When ants go out looking for food, they always choose the line with high "pheromone" concentration. Ants will continue to release "pheromones" during walking, which forms a positive feedback. The shorter the route, the more ants will walk, and the more "pheromones" will lead to more ants walking along the route. Ant colony algorithm is to simulate the process of ant foraging and solve the problem to be optimized. Firstly, we should complete a mapping from the ant foraging process to the optimization problem, and regard the route from the ant nest to the food location as the feasible solution of the optimization problem.

All the routes of ants from the nest to the food location are regarded as a collection of solutions to the problem to be solved. At the same time, the mother ant transports food back and forth more often on the short distance line, and the more "pheromones" it leaves on the broken line. Other ants will feel the high concentration line, and the more ants will take this line. Finally, ants will take the shortest

path under the influence of this positive feedback mechanism. The shortest path is the optimal solution of the problem to be optimized. The flow chart of ant colony algorithm is shown in Figure 2.1.

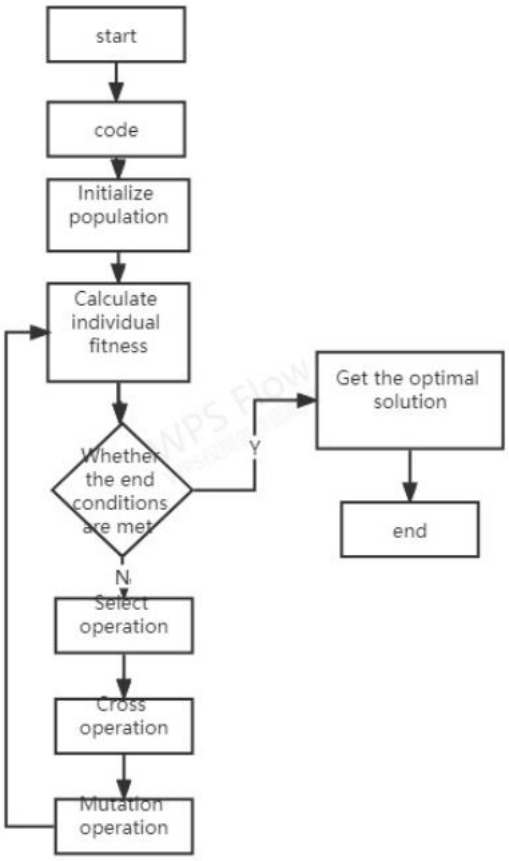

Figure 2.1 flow chart of genetic algorithm

2.2 Backtracking algorithm

Backtracking algorithm, also known as heuristic method, is actually an attempt search process similar to enumeration. Its difference from enumeration method is that enumeration method lists all possible situations of the problem to be solved and then filters them. Backtracking algorithm stops the search immediately if it is found to be inappropriate in the process of searching all situations. The backtracking algorithm looks for the answer through exploratory search. When reaching a certain point does not meet the constraints, "backtracking" to the previous problem point to explore other lines. At the same time, backtracking algorithm is also a heuristic search algorithm, which searches according to the current optimal conditions until the goal is reached.

At the same time, backtracking algorithm is a systematic and jumping algorithm. The backtracking algorithm searches in a state tree containing all the solutions of the problem. The leaf node of the tree represents the solution of the problem. First, start from the root node of the state tree and traverse the state tree according to the depth first traversal principle. If a node exists a solution that meets the constraints, continue to traverse the child nodes of the node, If the node does not contain the solution of the problem, return the parent node of the node, traverse other child nodes of the parent point, and proceed in turn until reaching the leaf node, that is, find a solution of the problem. At present, many

complex problems can be solved by backtracking algorithm. The flow chart of backtracking algorithm is shown in the figure 2.2.

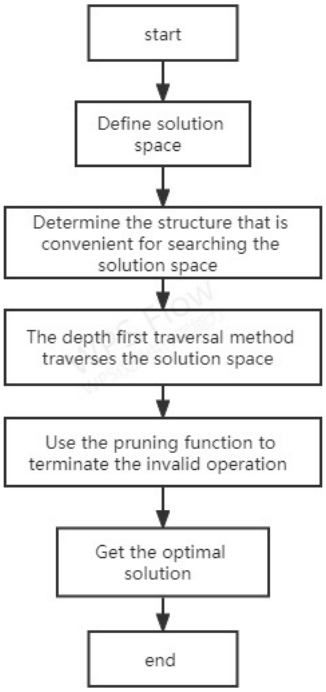

Figure 2.2 Greedy algorithm flow chart

2.3 Spring framework

Spring Ioc refers to control inversion, which is not a technology, but a design idea. Change the object originally managed by Java developers into a spring Ioc container to instantiate and configure the objects in the system, and establish the interdependence between objects. The unified management of springloc container reduces the coupling between system module codes. In the process of project development, the engineer builds the beans in the configuration file in advance. The springloc container obtains the corresponding beans according to the configuration file and instantiates the class objects in the way of dependency injection.

AOP is spring's aspect oriented programming idea. Aspect oriented programming is the improvement of traditional object-oriented programming. A0p divides the functions into core business functions and peripheral business functions. The core business functions include login, adding data and deleting data. The peripheral business includes log, performance statistics and transaction management. Peripheral business is defined as aspect in the AOP idea of spring aspect oriented programming. In the aspect oriented programming idea, the core function and aspect function are developed independently, and then the core function and aspect function are combined together. For example, in the process of developing an application system, many modules have transaction management operations. Generally, the codes of these modules are universal. In order to avoid a large number of duplicate codes in the system code, the system coupling is greatly increased. According to the AOP idea of spring object-oriented aspect programming, the transaction management operation is encapsulated into a aspect, and then the aspect is applied to the place containing food management operation according to the configuration file, so as to reduce the coupling of the system and facilitate the maintenance of the system

The spring framework is shown in Figure 2.3. The details are as follows:

(1) springcore: springcore provides the basic functions of the spring framework. Its basic component is beanfactory, which provides interfaces for the parent classes of all spring containers.

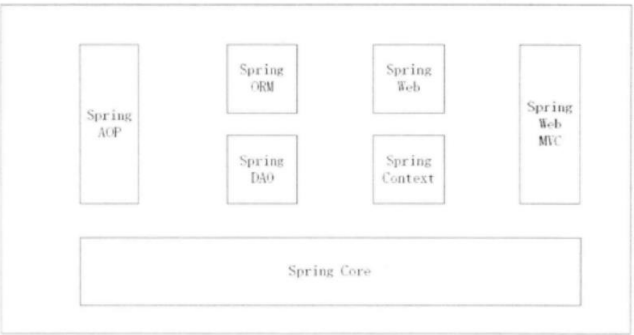

Figure 2.3 Spring framework diagram

(2) Springorm: engineers can integrate the ORM framework into the project ki according to the expertise of the developed system, so as to shorten the development cycle.

(3) Spring Dao: use this structure to manage exception handling and error messages thrown by different databases. Shanyu has a common exception hierarchy, so that different database persistence layer pivots can be well compatible under the spring framework. Engineers can choose the database persistence layer framework according to the needs of the project.

(4) Spring Web: built on the application context module, it provides context for web-based applications.

(5) Spring context: This module is -? A configuration file that provides context information for the spring framework.

(6) Spring AOP: the specific content of AOP has been introduced earlier and will not be repeated here.

2.4 Spring data JPA framework

Spring datajpa belongs to the spring data family. Spring datajpa is a set of Java persistence API framework developed by spring based on ORM framework and JPA specification. An additional abstraction layer is added at the top of our JPA provider (such as hibernate), which is just an abstraction, It helps us greatly reduce the amount of code required to implement the data access layer for various persistent storage, and can help developers realize the operation of the database with minimal code. It not only provides the operation of adding, deleting, modifying and querying the database, but also is easy to expand.

The main interfaces of spin datajpa are as follows:

(1) Repository: it's just an identification, indicating that the interface inherited by the user is the interface class of the warehouse, which is convenient for Springt to scan and identify automatically.

(2) Crudrepository: it inherits from the repository and implements a series of methods of addition, deletion, modification and query.

(3) Pagingandsorting Repository: it inherits from crudrepository and implements a series of paging sorting related algorithms.

(4) Jparepository: inherits (1) agingandsortingreposition and implements a series of JPA specification related methods.

(5) Jpaspecificationexecutor: implements a series of jpacriteria query related methods.

3. CONCLUSION

The course scheduling system studied and implemented in this paper is based on the priority algorithm, combined with the greedy idea and divide and conquer method, and uses the improved backtracking algorithm to solve the deadlock problem. The course scheduling system is developed using spring, spring MVC, react and other development frameworks or technologies, combined with MySQL database to realize the course scheduling system based on B / S architecture. On the basis of completing the course scheduling task, combined with the students' class habits, the system obtains a high-quality schedule, fully analyzes the use needs of the users of the course scheduling system, and reasonably designs the functional modules of the course scheduling system, so as to make the course scheduling system more humanized and loved by the users.

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