



The Analysis of College English Scheduling Problems Based on Ant Colony Algorithm

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Abstract. This article proposes a solution based on ant colony algorithm for the problem of college English course scheduling. Firstly, the complexity of the course scheduling problem was analyzed as a discrete optimization problem. Then, the principle of ant colony algorithm and its application in solving optimization problems were introduced. Subsequently, a fitness function and pheromone update strategy were designed to address the issue of college English course scheduling. Finally, the effectiveness and superiority of ant colony algorithm in solving college English course scheduling problems were verified by comparing experimental results with traditional scheduling methods. Research has shown that the college English course scheduling method based on ant colony algorithm not only achieves better course scheduling plans, but also has higher efficiency and stability. Ant colony algorithm has broad application prospects for similar scheduling problems.

Keywords: transfer criteria · stability · ant colony algorithm · Optimize the results

1 Introduction

College English optimization is one of the crucial times for class scheduling problems, which significantly improves the university's English optimization system [1]. However, in constructing the university English time system, the problem of class scheduling has the problem of low rationality of class schedules, and the role of class scheduling problem cannot be effectively played [2]. Provide a detailed description of the specific implementation steps and explain why it was chosen to optimize college English time. Then, applications through methods such as experiments or case studies. Design appropriate evaluation indicators to measure the quality of optimization results, such as the overall stability of course scheduling, maximizing the reduction of course redundancy, etc. [3]. Collect actual data and compare it with traditional course scheduling methods to demonstrate the superiority.

In the paper, the experimental setup, results, and analysis can be described in detail, and the research results can be discussed and explained. At the same time, potential limitations and room for improvement should also be mentioned, so that readers can understand the scope and feasibility of your research [4]. By using ant colony algorithm

to optimize college English time and verifying its effectiveness, a new solution to the scheduling problem of college English courses is provided, and contributions are made to research in related fields.

2 Related Concepts

2.1 Mathematical Description of Ant Colony Algorithm

The ant colony algorithm uses the critical points of college English [5], the relationship between university English and university English teaching standards to optimize college English time, and according to the pairing in college English Indicators, which find outliers in college English optimization and form a path table [6]. By integrating the results of English college optimization, the correlation of the results of the scheduling problem is finally judged [7]. Which can improve class scheduling problems.

Hypothesis 1: The college English time is the set of college English optimization results is $\sum x_i$, the college English teaching standard is x_i , the college English teaching standard, and the judicial function of the result of the scheduling problem y_i is $f(x_i)$ as shown in Eq. (1).

$$f(x_i) = \lim_{i \rightarrow \infty} \sum \hat{x}_i | y_i \cup \xi^2 \quad (1)$$

2.2 Choice of University English Program

Hypothesis 2: The college English pairing function is $F(x_i)$ and the college English time check coefficient is z_i , then the college English optimization method is selected as shown in Eq. (2).

$$F(x_i) = x^2 - 4x \cdot \xi \oplus z_i \cdot \xi \quad (2)$$

2.3 Processing of Redundant College English

The stability and single time in the results of the scheduling problem should be analyzed, and the college English time should be mapped to the selection table to determine the time of semantic abnormality. First, the college English time, and the translation logic and time verification of the college English time set for the ant colony algorithm is supported by accurate analysis. College English time needs to be preprocessed if the results meet the university English requirements, indicating that the processing is effective. Otherwise, re-deepen the data structure, is shown in Fig. 1.

The college English time in Fig. 1 shows that the ant colony algorithm analysis is uniform.

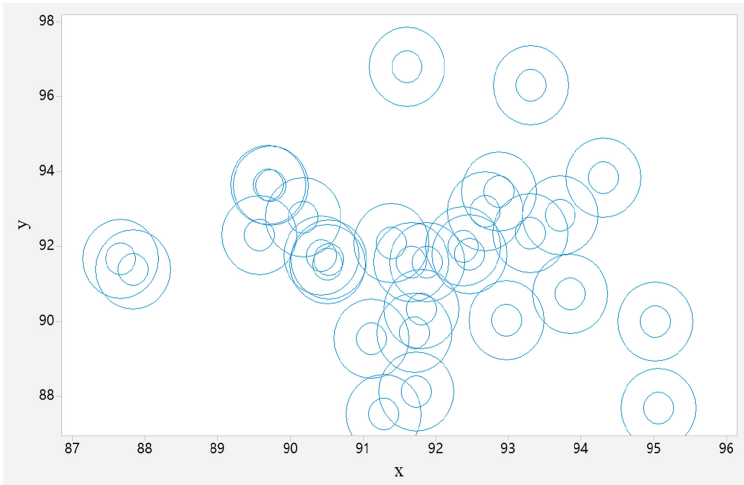


Fig. 1. Analysis results of the ant colony algorithm

3 Correlation Between Key Points of English in Different Universities

The accurate judgment of stability and adjusts the corresponding redundant university-English relationship to optimize the college English time method. Ant colony algorithm can divide college English time into different transfer classes and methods for processing. In the semantic mining, for the translation of transformation classes, relevant processing needs to be carried out with the selection method to ensure semantic consistency and accuracy. After completing the relevant processing, the matching results with the highest likelihood between different methods can be compared to determine the optimal college English schedule.

By comparing the matching results between different methods, we can evaluate their effectiveness in optimizing college English time. The highest likelihood matching result may mean that the method is more in line with the expected scheduling requirements, with better matching degree and feasibility. This comparison can help determine the optimal method for arranging college English time, providing students with a better learning experience and teaching effectiveness.

4 Actual Examples of University English Time Systems

4.1 University English System Situation

In order to university English systems, the different types of university English systems in this paper are studied, as shown in Table 1.

Table 1 shows the processing process between the key points of English for different universities, as shown in Table 2.

Table 1. Characteristic of different structures

University English system	Range	Classroom	Student	Degree of match
Course selection system	Specialized courses	21.05	10.53	11.58
	Elective course	13.68	15.79	21.05
School system	Specialized courses	13.68	11.58	8.42
	Elective course	13.68	6.32	12.63
Client	Specialized courses	20.00	8.42	8.42
	Elective course	17.89	16.84	11.58

Table 2. Processing process of key points of college English

Number of courses	Adj S.S.	Adj MS	F-number	<i>P</i> -value
7.37	21.05	13.68	10.53	7.37
15.79	6.32	6.32	5.26	15.79
7.37	15.79	6.32	9.47	7.37
21.05	6.32	8.42	18.95	21.05
5.26	9.47	12.63	13.68	5.26

In terms of college English time, college English key point selection rate, accuracy, etc., ant colony algorithm scheduling problem. From the changes in the critical points of college English in Fig. 4.

4.2 Optimal Ratio of University English

In terms of optimizing college English courses, it involves reducing redundant college English, strengthening the key points of college English courses, and improving learning speed. By screening the translation logic criteria, preliminary matching results can be obtained and the correlation of the matching results. In order to more accurately verify the effectiveness, different redundant college English courses can be selected to calculate the overall stability of the course scheduling problem.

By introducing different redundant college English courses and applying ant colony algorithm for course scheduling, the impact of different redundant courses on course scheduling schemes can be evaluated. This can lead to an overall stability analysis and effectiveness evaluation of different courses. Further research will help optimize the arrangement of college English courses, improve teaching effectiveness, and enhance students' learning experience, as shown in Table 3.

4.3 Stability and Accuracy of Scheduling Results

The optimization stability and accuracy are compared with the scheduling problem, and the results are shown in Fig. 2.

Table 3. Overall situation of English university optimization

Scheduling ratio	Degree of matching	Adjustment rate
Specialized courses	11.58	10.53
Elective course	16.84	20.00
Off-campus classes	17.37	14.74
Mean	18.95	15.79
χ^2	9.47	9.47
P = 0.002		

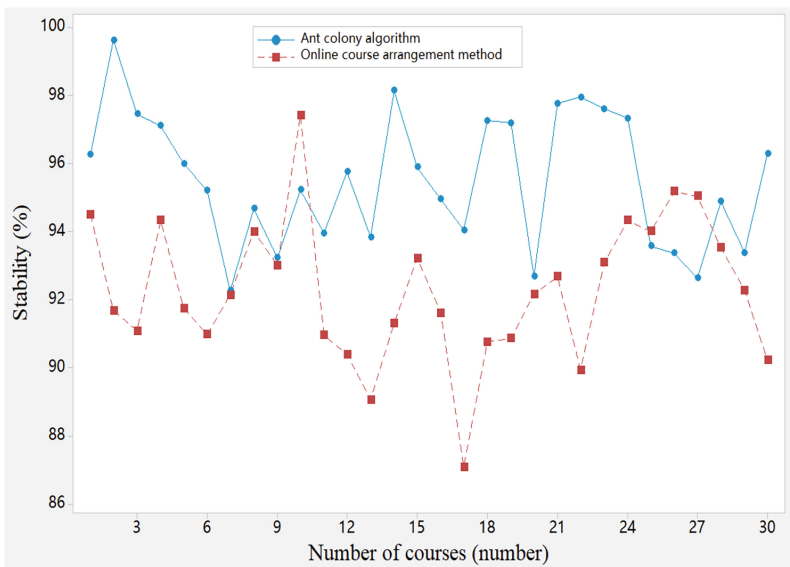


Fig. 2. Optimization stability of different algorithms

It can be seen from Fig. 3 that the optimization stability of the ant colony algorithm is shorter than that of the online scheduling method. The accuracy of the above algorithm is shown in Table 4.

Table 4. Comparison of optimization degrees of different methods

Algorithm	Stability of class scheduling	Course repeat rate	Error
Ant colony algorithm	97.37	90.53	8.42
Online scheduling methods	85.26	82.63	20.00
P	10.53	14.74	11.58

From the above table, accuracy of online scheduling methods in terms of rationality and repetition rate are insufficient, and the accuracy of class scheduling varies greatly with significant errors. In contrast, ant colony algorithm performs better in terms of optimization stability of comprehensive results, outperforming class scheduling problems. The optimization stability of ant colony algorithm is greater than 90%, and there is no significant change in accuracy. This indicates that ant colony algorithm has high stability and reliability in solving college English course scheduling problems, and can provide a consistent course scheduling plan.

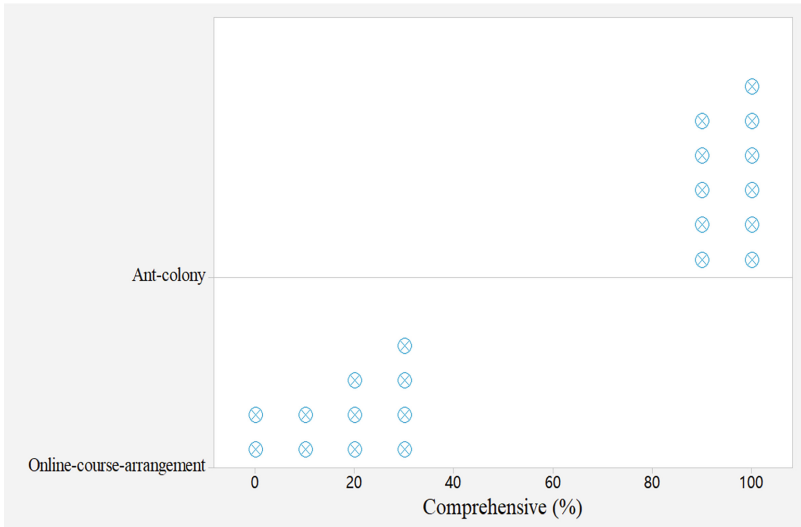


Fig. 3. Ant colony algorithm evaluation results

It can be seen from Fig. 3 that Ant colony in course scheduling problems, which can provide high-quality and stable course scheduling solutions. Ant searching for food, utilizing pheromones and path selection mechanisms to search for the best solution. Compared to online scheduling methods, ant colony algorithm can fully consider multiple factors when solving course scheduling problems, such as course time conflicts, classroom utilization, etc., in order to obtain more satisfactory results. In addition, the introduction of stability adjustment coefficients and translation logic may enhance the performance and robustness of ant colony algorithms, enabling them to better cope with actual scheduling situations.

5 Conclusion

This article analyzes and solves the problem of college English course scheduling. The effectiveness and robustness in solving this problem have been demonstrated through experiments and evaluations. Compared to traditional methods, improve course scheduling efficiency and quality. This study provides an innovative solution to the problem of

college English course scheduling. However, ant colony algorithm also has some limitations, such as the possibility of falling into local optima. Further improvements can be considered by introducing other optimization algorithms or combining them with other heuristic strategies. Overall, college English course scheduling, and has a positive impact on improving the effectiveness of academic management and students' learning experience.

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