Computer-based Mathematical Modeling Method and Application

Li Zuo¹,*
¹Chengdu Polytechnic, Chengdu, Sichuan, China, 610071
*Corresponding author e-mail: zhuol@cdp.edu.cn

Abstract. The information age has quietly arrived. The new era puts forward higher requirements for students' mathematical modeling thinking and also gives teachers and students more learning resources and a more complex learning environment. Riding on the east wind of the times, the application of information technology for mathematical modeling thinking teaching has not yet become a climate, but it is already the trend of the times. Some Western countries have popularized information technology software and hardware in elementary and higher education. Although our country has achieved some results in this regard, there is still a long way to go. I believe that whether it is in hardware equipment such as computers, teaching tablets, multimedia teaching equipment, or software equipment such as teaching literacy in the information age of teachers, Chinese teaching software and other software equipment, we can catch up in the next period of time, become the trend of the times and cultivate the times. The needed national pillars.

Keywords: Computer, Mathematical Modeling, Application

1. Introduction
Mathematical modeling is a method of mathematical thinking. It uses mathematical language and methods to establish a powerful mathematical method that can approximate practical problems in life and help solve problems in life through abstract assumptions. Strictly speaking, mathematical modeling includes six steps: model preparation, model hypothesis, model establishment, model analysis and model verification[1]. Analysis methods such as mechanism analysis, data analysis and simulation analysis can be used. Whether in general engineering or high-tech fields, mathematical modeling plays a huge role and mathematical modeling even plays an important role as a pioneer in some interdisciplinary fields.

2. Problems in the development of mathematical modeling
2.1. Lack of preprocessing of data
The essence of statistical problems is to find the rules or effective information among the data through the processing of the surface chaotic and disorderly data to effectively solve the actual problems[5]. Therefore, the data is the first to face. If there are many problematic data, it is necessary to preprocess...
the data. The most common processing method is: find outliers, then make up for the missing data, remove independent variables with smaller factors and orthogonalize variables. Processing methods need to combine the characteristics of the data with the characteristics of the actual problem to implement corresponding methods.

2.2. **Various statistical methods are isolated**
Currently, there are a variety of multivariate statistical analysis methods. Among them, regression analysis, discriminant analysis, factor analysis, cluster analysis, etc. are more common and used, as well as more in-depth sequence analysis. These statistical analysis methods have their own characteristics and methods. Although they seem to exist independently of each other, in some data statistics, these methods have a certain correlation and contrast. For example, discriminant analysis can be used to deal with problems and clustering methods can also be used. The difference lies in the starting point. However, when students are dealing with certain problems, their thinking is restricted. They only think of one method to get a conclusion and the result will be unsatisfactory.[3]

2.3. **Analyze directly with software**
All models are constructed based on the author's thinking, except for statistical models. That is to solve practical problems according to purpose. However, the characteristic of statistics is to summarize and calculate a large amount of data. The software processing of data must first consider this characteristic and the use of computers can provide faster and more accurate statistical data, which makes most college students too dependent on computers, or even less I have gained my self-thinking ability and no longer actively and actively repeated verification of calculation results and lost the enthusiasm and joy of exploration.

3. **Computer mathematical modeling software**
Since office software represented by office word, office excel, office powerpoint, etc., which are closely related to life, are quite universal and their application in mathematics teaching classrooms has no obvious particularity, relevant research and analysis are mostly universal Sexual analysis mainly does not have the meaning and value of special analysis.[4]. And many special softwares, such as spss, NVIVO, EndNOTE, matlab, due to their professionalism, most of the analysis related to mathematics education rests on a separate analysis of the use of a software in mathematics education practice. In general, the analysis and discussion and inquiring suggestions on the comprehensive use of mathematics education software are of unique significance and value.

4. **Computer-based mathematical modeling application**

4.1. **Optimization algorithm**
The optimization algorithm studies the problem of the optimal solution in the problem. In this type of problem, a series of unknowns and conditions that need to be satisfied are usually given and a set of inequalities can be listed according to the known conditions. For simpler problems, when there are few unknowns, graphical methods can be used to find the optimal solution. However, when the problem is more complicated and the number of unknowns exceeds three, it is generally impossible to express it with geometric figures. Such problems are generally solved by software methods when solving and LINGO is the most commonly used software for solving linear programming problems. The aforementioned problem of channel allocation in the communication process can be solved by an optimization algorithm.[5]. The objective function is to maximize capacity and the decision variable is the use time of each channel or the frequency of each client's use of the channel. Because the problem is more complicated, We use software to solve. The system optimization algorithm is as shown.
4.2. Central Limit Theorem
The central limit theorem is a commonly used theorem in probability theory. It was discovered on the basis of the n-fold Bernoulli experiment and was then perfected and proved by mathematicians such as Dimov, Laplace and Yapunov. The basic idea of the central limit theorem is that when the number of experiments increases infinitely and approaches infinity, the distribution of random variables approximately obeys the normal distribution $N(0,1)$. The discovery of this theorem has promoted the progress of mathematical statistics, especially when the number of trials is relatively large, it can be approximately regarded as a normal distribution, saving a lot of trouble.

4.3. Graph Theory
The research object of graph theory is graphs, which are composed of elements with specific meanings and the relationships between the elements. Process processing problems and shortest path problems in daily life can all be solved by graph theory. Compared with other methods, the mathematical model established by graph theory is systematic and concise and can be applied to the analysis of many problems and simplify the calculation$^{[6]}$. The information graph model is as shown.
5. Conclusion
At the same time, it is necessary to use multiple channels to develop a certain number of digital model competitions and do a good job of publicity activities, build an excellent digital model competition atmosphere and make full use of students' extracurricular activities time. Learn more about mathematical modeling software, continue to innovate and explore for mathematical teaching reform and combine some favorable methods of mathematical modeling with higher vocational mathematics courses. We have fundamentally changed, some unnecessary errors caused by insufficient experience and can quickly adapt to the guidance of the competition.

References
[1] Ramesh Naidu Mandapati, Praveen Kumar Ghodke. Kinetic modeling of Indian lignites pyrolysis in the context of underground coal gasification (UCG) [J]. Fuel, 2021, 283.
[2] K.M. Hernández-García, B. Cercado, E.P. Rivero, F.F. Rivera. Theoretical and experimental evaluation of the potential-current distribution and the recirculation flow rate effect in the performance of a porous electrode microbial electrolysis cell (MEC) [J]. Fuel, 2020, 279.
[3] Muhammad Usman, Mohsen Zarebanadkouki, Muhammad Waseem, Ioannis A. Katsoyiannis, Mathias Ernst. Mathematical modeling of arsenic (V) adsorption onto iron oxyhydroxides in an adsorption-submerged membrane hybrid system [J]. Journal of Hazardous Materials, 2020, 400.
[4] Mathematical modeling and statistical formalisms of complex systems [J]. Revista Brasileira de Ensino de Física, 2020, 42(42).
[5] Mohammad Hosein Fakhar, Ahmad Fakhar, Hamidreza Tabatabaei. Mathematical modeling of pipes reinforced by agglomerated CNTs conveying turbulent nanofluid and application of semi-analytical method for studying the instable Nusselt number and fluid velocity [J]. Journal of Computational and Applied Mathematics, 2020, 378.
[6] Rui Qi, Yang Zhang, Shan Lu, Quan Hu, Rui Zhong. Tethered towing of defunct satellites with solar panels [J]. Acta Astronautica, 2020, 175.