The "Six Fusion" of Curriculum Ideological and Political Elements in Probability Theory and Mathematical Statistics;

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Abstract: In the teaching of probability theory and mathematical statistics, we should explore the ideological and political elements of the curriculum in multiple dimensions, and integrate them into daily teaching silently. This paper excavates and integrates the ideological and political elements of probability theory and mathematical statistics from six angles, namely: philosophical principle, dialectical unity; Patriotic films, feelings of home and country; Historical achievements, cultural achievements; Enlighten wisdom and enhance cognition; Current political hot spots, news policies; Stepping into the forefront, scientific and technological innovation. Multi-dimensional integration of ideological and political elements, so that the course content is no longer too abstract, theoretical, mathematical, but rooted in life, culture, society, so as to solve practical problems, cultivate students' mathematical thinking, enhance cognition, highlight the value of education, to achieve the goal of moral education.

Key words: probability theory and mathematical statistics; Curriculum thinking and politics; merge

As mathematics teachers in colleges and universities, we are adhering to the task of teaching and educating people, and need to think about "who to train and how to train people". In the face of this problem, we should actively carry out curriculum ideology and politics, value shaping in daily teaching, and devote ourselves to cultivating talents with both scientific literacy and feelings of family and country, so as to achieve the fundamental goal of cultivating morality and educating people.

1. The connotation of thought and politics of probability theory and mathematical statistics course

In the teaching of probability theory and mathematical statistics, we should implement the requirements of the Guiding Outline for the Construction of Curriculum Ideological and Political Construction in Colleges and Universities, actively carry out curriculum ideological and political construction, and skillfully integrate the classroom teaching of curriculum ideological and political theory, probability theory and mathematical statistics by combining theory and practice, combining in class and extracurricular, and combining online and offline. Throughout the whole teaching process of probability theory and mathematical statistics.

2. The mining and integration of the ideological and political elements in the curriculum of probability theory and mathematical statistics

In order to carry out curriculum thinking and politics more effectively, it is necessary to fully explore the ideological and political elements in the teaching process of probability theory and mathematical statistics. Compared with other subjects in college courses, mathematical subjects such as probability theory and mathematical statistics are often considered difficult to dig out ideological and political points because of their excessive abstraction and mathematics. But in fact, from the perspective of general education and practical application, combined with philosophy, history, literature, film and television, current politics, motivation, science and technology and other different perspectives, probability theory and mathematical statistics courses can fully explore and integrate a large number of ideological and political elements.

I dig and integrate the ideological and political elements of the course of probability Theory and mathematical statistics from six different angles to create "six flavors" of thought and politics. They are: philosophical principle, dialectical unity, rich in philosophical flavor; Patriotic films, family feelings, rich in film and television flavor; Historical achievements and cultural achievements are rich in historical flavor; Enlightening wisdom and enhancing cognition are full of inspiration; Current political hot spots, news policies, rich in political flavor; Enter the frontier, scientific and technological innovation, rich in scientific and technological flavor. In the way of integration, a good curriculum ideological and political, need to moisten things quietly. In the teaching process, I have gradually accumulated and created many cases that are different from the traditional textbooks, and integrated the ideological and political elements of the course from multiple perspectives to form the ideological and political map of the course, so that the content of the course is no longer too abstract, theoretical and mathematical, but rooted in life, culture and society, so as to solve practical problems, cultivate students' mathematical thinking, enhance cognition and highlight the value of education. To achieve the goal of cultivating moral and human beings.

3. The "Six Fusion" of ideological and political elements of curriculum in Probability Theory and Mathematical Statistics

The exploration and integration of the ideological and political elements of the course of probability theory and mathematical statistics from six different angles is called "six fusion". The following are the specific development and examples of the "six fusion" curriculum thinking and politics with knowledge, dimension and flavor:

1, philosophical principles, dialectical unity

In the content of the section on statistics, Grivenko's theorem is involved:

Let it be taken from a sample whose population distribution function is, is its empirical distribution function, when n, has. x_1,x_2,…x_n

$F(x)$ $F_n(x)\to\infty P(sup_{-\infty<x<\infty}|F_n(x)-F(x)|\to 0)=1$

Grivenko's theorem, in layman's terms, is that as the size of the sample gets larger, its empirical distribution function tends to the true distribution. That is, the distribution of the sample tends to the population distribution. When we explore the philosophical idea behind this theorem, samples correspond to practice, experience distribution function corresponds to experience, and real distribution corresponds to truth. It reveals that when there is enough practice, people's experience is infinitely close to the truth.

When teaching Bayes' formula, we can also dig into the philosophical principles behind the formula. $P(B_i \mid A)=\frac{P(A \mid B_i)}{P(A)}P(B_i)$ $P(B_i)$ It's called prior probability, and it corresponds to past perceptions. $\frac{P(A \mid B_i)}{P(A)}$ It's called probabilistic probability, and it corresponds to new information. $P(B_i|A)$It's called a posterior probability, and it corresponds to new knowledge. In real life, we are always looking for new information, adjusting and updating our judgments, updating the past cognition to the new cognition, so as to constantly adjust our decisions and improve the accuracy of our judgments. The essence of this is precisely "keep pace with The Times and seek truth from facts". This phrase is also a variation of the same and contains this philosophical principle. One of the most important things that China's reform and opening up have taught us over the past four decades is "seeking truth from facts". On the road to economic development, our Party did not simply copy western economic theories, but followed a path of economic development with Chinese characteristics, and created a miracle of economic development that has attracted worldwide attention, becoming the second largest economy in the world. The core of its thinking is to keep pace with The Times and seek truth from facts. "Advancing with The Times and seeking truth from facts" is the biggest Bayes!

The above Grivenko theorem and Bayes formula fully demonstrate the Marxist-Leninist philosophy principles behind mathematical theorems.

2. Patriotic films, feelings of family and country

In the introduction of the n double Bernoulli experiment, the scene in the patriotic movie as an example:

Example 1: In the movie "The Liaoshen Campaign of the Final Battle", our army uses cannons to shoot at enemy targets. The hit rate of each cannon shot is set to be 0.02. 400 cannons are fired at the same time, and the enemy target will be destroyed only when at least 2 bullets are fired. What is the probability of our army destroying the enemy's target?

Solution: This model conforms to the n double Bernoulli test scheme, let X represent the number of anti-aircraft guns hit the aircraft, from the binomial theorem can be obtained:

$P\{X\geq 2\}=1-C^0_{400}(0.02)^0(0.98)400-C^1_{400}(0.02)^1(0.98)^{399}=0.9972$

It is known that the probability of the cannon hitting the enemy target at least twice is about 0.9972, and the probability of destroying the enemy target is close to 100%. Therefore, through the flexible design of examples and the carrier of patriotic movies, students are not only familiar with mathematical formulas, but also cultivate their ability to solve practical problems, and cultivate their feelings of home and country.

3. Historical achievements and cultural achievements

When introducing the binomial distribution, the binomial distribution gets its name because of the binomial coefficient in the formula. The binomial coefficient, as early as the Southern Song Dynasty, appeared in the book "Detailed Explanation of Nine Chapters Algorithm" written by mathematician Yang Hui. In Europe, the mathematician PASCAL only discovered this rule in 1654, 393 years later than Yang Hui. This paper introduces Yang Hui Triangle, a historical achievement and cultural achievement in the history of ancient Chinese mathematics. In addition, the ancient proverbs, such as "three people must have a teacher", "often walk by the river where there is no wet shoes", "man proposes and God disposes", all contain rich probabilistic thinking.

4. Enlighten wisdom and enhance cognition

Starting from independence can enlighten students' team spirit. For example, the case of "Three stooges top one Ge Liang" :

Example 2: Given that Zhuge Liang has a probability of solving the problem of 0.8, that the chief stooge has a probability of solving the problem of 0.5, that the second stooge has a probability of 0.45, and that the third stooge has a probability of 0.4, and that each person has to solve the problem independently, what is the probability that at least one of the three stooges will solve the problem? Comparing this probability with Zhuge Liang's probability of solving the problem, which one is greater?

Solution: Suppose A={at least one person solves the problem}, B={elder brother solves the problem}, C={second brother solves the problem}, D={elder third solves the problem}, B,C,D are independent of each other.

According to the condition, find $P(B)=0.5,P(C)=0.45,P(D)=0.4$ $P(A)$

the $P(A)=1-P(\overline{A})=1-P(\overline{BCD})=1-P(\overline{B})P(\overline{C})P(\overline{D})$

$=1-(1-0.5)(1-0.45)(1-0.4)=0.835>0.8$

Through the derivation of the above formula, let students understand that "three stooges are better than one" is not an empty talk, but based on mathematical theory, so that students can more deeply appreciate the importance of unity and cooperation.

5. Current affairs hot, news policy

When talking about variance, the current political hotspot and news policy of common prosperity are introduced as the practical application background of variance. Based on the vertical and horizontal comparison of China's per capita GDP income in the past 70 years, this paper analyzes the change of the average value and leads to the topic of the gap between the rich and the poor and the realization of common prosperity. Let the students understand that the core policy of the country's common prosperity, explained in mathematical

language, is to improve the mathematics expectation and reduce the variance, so as to enhance the students' road confidence and national pride.

6. Step into the frontier and make scientific and technological innovation

When introducing statistics and Bayesian formulas, we can mention chatGPT artificial intelligence, which is hailed as the fourth Industrial Revolution. The basic framework of AI machine learning is precisely Bayes' theorem; The data used in machine learning is based on statistics and big data. Artificial intelligence machine learning is the combination of Bayesian reasoning and computer technology, coupled with big data training, teaching machines to process data and deep learning, so that artificial intelligence has been rapid development. "Scientific and technological innovation, strong national self". Scientific and technological innovation is the new engine of China's development, and the new generation of scientific and technological innovation wave represented by artificial intelligence needs the active participation of students to make contributions to the realization of China's high-level scientific and technological self-reliance.

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