REFLECTION ON CLASSROOM TEACHING OF PROBABILITY AND MATHEMATICAL STATISTICS

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ABSTRACT

This paper focuses on the class teaching of probability theory and mathematical statistics course. It points out the problems exists in current teaching classes and puts forward some teaching suggestion to stimulate students' interest in probability theory and mathematical statistics. The use of knowledge of Probability Theory and Mathematical Statistics can help students solve practical problems.

KEYWORDS

Probability theory, Mathematical statistics, Teaching example, Teaching method, data mining technology

1 INTRODUCTION

Probability theory and mathematical statistics are important basic mathematics theory courses offered by many colleges and universities in China. With the development of the time, the knowledge of probability theory and mathematical statistics has received more and more attention. For engineering students in our school, the introduction of probability theory and mathematical statistics course will help them to use the probability theory knowledge to analyse random events in their lives and help them to monitor product quality in their future work. On the other hand, probability theory and mathematical statistics are follow-up courses of higher mathematics, so that the study of probability theory and mathematical statistics can help students review some advanced mathematics knowledge and let students see the applicability of higher mathematics. In particular, in the context of current big data, the establishment of probability theory and mathematical statistics will directly affect the data view of students in the new era. Initially understand of the methods of data processing can facilitate the improvement of the students' overall quality. And it can strengthen the impact of mathematics knowledge on the students' social life, too.

However, the current teaching theory of probability theory and statistics emphasizes the teaching status of theoretical knowledge and neglects the practical application. Part of the reason for this situation is that the teaching philosophy namely the importance of theoretical teaching is deeply rooted, so that the content of teaching is aging. The school case cannot be updated in time, and it is not close to the student's academic situation. In order to effectively improve students' enthusiasm for learning, teachers are urgently required to make this course concrete, life-oriented and time-oriented. Teachers should make students have a strong interest in learning probability theory and mathematical statistics, master their basic concepts,

theories and methods, and use probabilistic methods to analyse and solve practical problems encountered in life.

2 REFORMING THE TEACHING MODEL

2.1 BRINGING THE HISTORY OF PROBABILITY THEORY AND MATHEMATICAL STATISTICS DEVELOPMENT INTO CLASSROOM TEACHING

Probability theory and mathematical statistics are a science derived from life. Infiltrating the history of the subject in classroom teaching enables students to grow their historical knowledge of this discipline and enhance their subjective cognition. For example, the origin of probability theory comes from the question that Merle Knight asked Pascal in 1654: how to allocate gambling money in a gamble that had to be broken off early, which produced the first concept of probability - expectation. When teaching a normal distribution, the earlier application that can be taught as a normal distribution is the military uniforms of the soldiers participating in the First World War. When teaching the axiomatic definition of probability, we can tell students that in the history of probability theory, there have been classical definitions of probability, geometric definitions, frequency definitions, and subjective definitions. In 1900, mathematician Hilbert proposed establishing the axiomatic definition of probability. In 1933, the Soviet scientist Kolmogorov first proposed the axiomatic definition of probability. This definition summarizes the common characteristics of the above specific probability definitions and extracts the basic properties of probability. And it is a milestone in the history of the development of probability theory. When you talk about the t-distribution, you can give students the story of the name of t-distribution comes from. These historical narratives can activate the classroom atmosphere and on the other hand it is a natural context for students to clarify the development of the discipline.

2.2 INTRODUCING LIFE INTO CLASSROOM TEACHING

Learning probability theory and mathematical statistics should make the classroom closer to valid life. Selecting real cases in life can let students truly feel the probability and statistics and our life are inseparable. To solve these practical problems, you can cultivate their theoretical application awareness, enhance their ability to analyse and deal with problems, and also strengthen their initiative and consciousness. For example, birthday problems are common in the current textbooks. What is the probability of people having the same birthday in a group of 50 people? Most students will think that this probability is very small before learning probability theory and mathematical statistics. However, they will find that the probability is surprisingly high close to 95%. This problem can be extended. What is the probability of having a birthday today among the classmates present? The problem of small probability events is another problem discussed frequently. We can tell the story that an immortal monkey inexhaustibly knocks out a section of Shakespeare's famous sentence. We can also talk about why we should continue to deepen the campus electricity safety education. These cases can deepen the understanding of accumulation of small probability events. In the case of geometric distribution, for example, we emphasize the non-memory of geometric distribution. Students have doubts in understanding non-memory. We can tell students the following story. A gambler who had lost a lot of games wants to win in the next.

He always thinks that I have lost so many games that I will not continue to lose. The non-memory of geometric distribution tells everyone that every game of gambling is a new beginning, regardless of the previous situation. So we often see gamblers completely defeated. In explaining the conditional probability, we can use the mobile phone as an example. If the mobile phone falls to the ground for the first time, the probability of the screen being broken is 50%. If the phone falls to the ground for the first time with the screen unbroken, then the probability of breaking for the second time on the ground is 70%. If the phone falls to the ground for the second time with the screen unbroken, then the probability of breaking for the third time on the ground is 90%. We can ask the students that the phone has fallen to the ground three times without breaking. This kind of example is close to life, and it can mobilize the enthusiasm of students to participate in thinking.

2.3 BRINGING DATA MINING TECHNOLOGY INTO CLASSROOM TEACHING

Today using data resources to make inferences about things as a whole, and mining the hidden rules behind the data is the main task at present. This coincides with the discipline nature of the course of probability theory and mathematical statistics. Therefore, when teaching probability and mathematical statistics, it is necessary to introduce some current data mining technology principles to everyone. For example, when teaching the concept of expectation, you can use the opportunity to teach the definition of information entropy to the students, so that students know that knowledge is growing, and the connection between some new concepts and old concepts. Thus it cannot only consolidate the concept of expectations but also expand the students' knowledge. We give another example now. When explaining the covariance matrix, the teacher can infiltrate part of the typical correlation analysis, so that students can understand the core position of the covariance matrix in data analysis and deeply understand the connotation of the covariance matrix. And when designing Bayesian formula teaching, you can infiltrate a little Bayesian estimation common sense to deepen students' understanding.

3 REFORMING TEACHING METHODS AND CONTENTS

3.1 ENRICHING TEACHING METHODS

In classes, we should use multimedia teaching to play video and courseware in the original teaching mode of a blackboard. Time should be invested into introducing the use of statistical software such as statistical software SPSS, SAS, R. We should add experimental courses of probability theory and mathematical statistics to deepen students' understanding. Computer and multimedia bring images and models to show. The process of dealing with practical problems will make it easier for students to understand and master the basic knowledge, and also improve students' ability to deal with practical problems.

3.2 PROMOTING LEARNING BY USING COMPETITION

In probability theory and mathematical statistics classes, we can integrate mathematical modeling ideas in teaching. These works can improve students' spirit of teamwork and hands-on ability based on practical problem modeling. We should establish a library of probability theory and mathematical statistics cases, introduce knowledge points into cases, and

incorporate the ideas of mathematical statistics and mathematical modeling into the teaching of probability theory and mathematical statistics.

3.3 COMBINING PROFESSIONAL KNOWLEDGE TO UNDERSTAND THE APPLICATION OF PROBABILITY THEORY AND MATHEMATICAL STATISTICS

Most engineering students will encounter practical problems such as product technology update and process improvement. Students can be advised to bring such data encountered in the profession to the probabilistic and mathematical statistics classroom. By using mathematical statistics tool to verify whether the new product is superior to the old product, and whether the new process has a significant improvement in technical indicators.

CONCLUSION

The era of big data requires us to update the concept of data processing in a timely manner. The teaching of probability theory and mathematical statistics must keep pace with the times and enhance students' data processing capabilities. This requires our teachers teach the students the basic knowledge, and find ways to improve students' interest in learning. Through the penetration of new technologies and the study of statistical language, students can master the preliminary data processing methods and effectively improve the overall quality of students. In the end, increase the actual competitiveness of the students in future study or employment.

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