Advisory Opinion

On the education of statistical science in the area of mathematical science, data science and artificial intelligence in universities

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Science Council of Japan

Committee on Mathematical Science

Subcommittee on Mathematical Statistics

This advisory opinion is the result of the deliberations of the Subcommittee on Mathematical Statistics of the Committee on Mathematical Science of the Science Council of Japan.

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Executive Summary

1 Background

The situation surrounding statistical sciences has changed rapidly over the past decade or so. The era of big data has progressed significantly, and the importance of the fields of mathematics, data science, and AI (Artificial Intelligence) has been strongly recognized, especially with the rapid development of AI technology as represented by deep learning. It is important to position statistical sciences in the midst of such changes for the future development of statistical sciences. In August 2014, this subcommittee published a recommendation "On the Promotion of Statistical Sciences Education and Research in the Age of Big Data." In light of the rapid changes during this period, this advisory opinion follows up on the 2014 recommendation, reconsiders the role of statistical sciences, and presents suggestions for future education and research in statistical sciences.

2 Current Status and Issues

In the United States and other countries, the progress of education and research in statistical sciences has accelerated since around 2010 compared to earlier years. This is thought to be due to the recognition of the fundamental importance of statistical sciences even as AI technology attracts attention. Meanwhile, in Japan, broad education in the fields of mathematics, data science, and AI has only recently been taken up as a government policy. A number of new data science faculties have also been established one after another. In addition to the education of university students, the re-education of those who have already entered the workforce has become an important issue for Japan. Furthermore, further enhancement is needed in primary and secondary education. Thus, while there is a need to strengthen education in statistical sciences, the shortage of teachers who can properly teach statistical sciences is a serious issue that needs to be resolved immediately.

3 Contents of the advisory opinion

(1) Positioning of statistical sciences as a theoretical foundation in the fields of mathematics, data science, and AI

In the processing of big data, the methodology of statistical sciences provides the theoretical basis for various methods. In education in the fields of mathematics, data science, and AI, it is important to educate not only about various methods as tools but also about the theoretical basis of the methods in order to interpret data correctly.

(2) Promotion of re-education (reskilling) in the fields of mathematics, data science, and AI

The promotion of reskilling in the fields of mathematics, data science, and AI for working people is an urgent need in Japan, and universities have a significant role to play.

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(3) Fostering statistical faculty members required by undergraduate and graduate education

There is an extreme shortage of statistical instructors required for undergraduate and graduate education. The training of instructors is an urgent issue, and the Project for Training Experts in Statistical Sciences should be greatly expanded.

(4) Improvement of teaching materials, software, and digital environment in primary and secondary education and further enhancement of statistics education

As a prerequisite for university education in the fields of mathematics, data science, and AI, teaching materials, software, and digital environments in primary and secondary education should be developed, and statistical education should be further enhanced.