MARIUS IOSIFESCU, GHEORGHE MIHOC, RADU TEODORESCU: Theory of probabilities and mathematical statistic (Teoria probabilităţilor şi statistica matematică)

The necessity for an ever deeper knowledge of practice leads to the continuous broadening of the sphere of mathematical research of a basic and applied character, particularly in those domains which have numerous applications in economy, natural science, linguistics, etc., thus leading to a marked differentiation of its branches. In the last few decades, mathematical statistics, mathematical programming, mathematical linguistics and so on, have made their appearance and have been established as independent branches of mathematics.

Nowadays mathematics has become an indispensible auxiliary for all the other sciences, and an invaluable help in the practical application of the latest scientific findings.

The work "Theory of Probabilities and Mathematical Statistics", elaborated by Dr. M. Iosifescu, Academician Gh. Mihoc and Dr. M. Teodorescu, recently published, is the outcome of studies aiming to thoroughly investigate the researches made in the domain of mathematical statistics.

In a modern, strictly scientific form, the authors systematically expound the fundamental concepts and the methods of the Theory of Probabilities and of Mathematical Statistics. Classical and modern concepts such as probability, aleatory variables, law of large numbers, two-dimensional aleatory vectors, are critically examined, the authors succeeding in successfully elucidating their contents. Mathematical developments and the boundaries within which these notions and theses may be applied are presented with particular care, the understanding of the problems examined in the work being thus made easier.

The care devoted to the strictly scientific definition of the concept of probability, a basic problem of modern mathematics, in connection with which numerous discussions of a logical and methodological order are still carried on, should be particularly stressed.

In the first part of the work reviewed, much competence and scientific accuracy are displayed regarding Boolean rings and algebra, the field of probability, aleatory variables, distribution functions, typical values, sets and series of aleatory variables, the law of large numbers, characteristic functions, the central asymptote problem, Markov chains and aleatory functions.

A synthesis regarding Boolean rings and algebra is presented for the first time in the specialty literature of Romania, the authors bringing an original contribution to the elucidation of the existent links between the assembly and Boolean models used in the organisation of sets. The law of large numbers is treated in a deeply scientific interpretation, stress being laid on the fact that it reflects the dialectic unity between chance and necessity, in other words that the chance element generally vanishes, the greater the number of cases analysed. Moreover, the merit rests on Academician O. Onicescu and Academician Gh. Mihoc, for presenting the first example of stability in probabilistic phenomena. Likewise, the modern form in which the theory of chains with complete links is treated also stands out, this theory having already been initiated since 1935 by the two above-mentioned Romanian scientists.

In their orientation towards the most important chapters of mathematical statistics, the authors have succeeded in depicting in an original form the problems of statistical distribution, classical probabilistic distribution, the theory of selection, the theory of evaluation, the checking of statistical hypotheses, regression and correlation, and the statistics of order.

The authors, rightly, have laid greater stress on the method of selection, one of the fundamental problems of mathematical statistics. The method of selection allows to obtain,

on basis of the selected data, substantiated, strictly scientific conclusions, regarding the development of the phenomenon investigated in its whole. Single-phase, two-phase or several-phase sampling, as well as small-volume sampling, are shown with great clearness. A particular important part is played in social-economical statistics, as is, moreover, stressed by the three authors, by the principle of preponderance of qualitative analysis over quantitative analysis.

It is also worth noticing that, without reflecting on the scientific contents of the work, the authors have given an accessible explanation of dispersion analysis and of sequential analysis, as well as of some of the non-parametric tests (sign test, Wilcoxon test, von der Worden's X test), which have a large application.

Lately, ever increasing importance is granted, in analysis, to regression and to correlations. This relatively new chapter in mathematical statistics has, as a rule, been neglected by the various authors, not only from Romania, but also from abroad. The authors deserve credit for having expounded, in a clear form, and for having thoroughly substantiated from the scientific point of view, the theory of regression and of correlation, the methods used and domains of application, particularly in the investigation of social-economical phenomena where, until not long ago, it was considered that they were unappliable.

The illustration of the theoretical theses with well chosen examples contributes to make easier the understanding of the manner of computation and to a correct practical application of the computation concepts and techniques shown.

By its contents this work is of undisputable scientific value. It has a vast domain of usefulness and can be advantageously studied both by mathematicians and by economists or engineers.

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