

BOOK REVIEWS

R.R. WILCOX (2001): *Fundamentals of Modern Statistical Methods*. Springer. ISBN 0-387-95157-1

This enjoyable book highlights some of the deficiencies of classical statistics and introduces some of the repairs offered by modern statistics in an easy-to-understand, intuitive style, aimed at the applied user of statistics. The title essentially refers to the methods of robust statistics, which have been designed to overcome the shortcomings of traditional methodology in situations where key assumptions, such as the normality of populations, break down and lead to unreliable inference.

The intended audience of the book is experimental scientists who are interested in the properties and problems of the statistical methods they use, but who have not actively followed the development of robust methods in the mathematical statistical literature. The book could equally be recommended to actuaries or financial risk managers who find themselves analysing data using standard textbook procedures.

With its low technical level the book makes suitable spare-time reading and the essential messages are quickly grasped with the aid of simple examples. For those who have been put off robustness by the academic nature of the subject and the mathematical focus of much of the existing literature, this is an opportunity to gain an insight into the area and to realise the great importance of robust methodology. Indeed, some of the messages will be disturbing revelations for those who have not encountered them before.

The book begins with a short discussion of the history of the normal distribution and its central role in statistics. Some flavour for this section can be given by reproducing the quotation of Poincare that appears in the preface. "Everyone believes in the (normal) law of errors, the experimenters because they think it is a mathematical theorem, the mathematicians because they think it is an experimental fact".

Thereafter the book divides into two complementary parts: the first describes standard statistical methods, and their potential problems; the second part describes modern robust methodology.

Among the topics addressed in part 1 are: simple sample statistics and their breakdown properties, that is their sensitivity to outliers; the central limit theorem and the problem of speed of convergence; confidence intervals and hypothesis testing, with an emphasis on how non-normality may affect the accuracy and power of such standard procedures; bootstrap methods and their advantages; the problem of contamination in normal populations.

Part 2 addresses many of the most important ideas in modern statistics: robust estimates of locations, such as trimmed means and M -estimators; calculating errors for robust estimators and constructing inferential procedures

that are robust analogues of standard methods; robust tests of association, such as Spearman's ρ and Kendall's τ ; robust regression methods; a comparison of robust methods and non-parametric methods; permutation tests.

Every user of statistics should know something of these ideas. For a reader who has little prior knowledge and wishes to satisfy his or her curiosity without resorting to the vast academic literature on the subject, this book may fill a useful niche.

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