Applied Nonparametric Statistical Methods

by Peter Sprent

Book Review

by Charles E. McCulloch

BU-1053-M   October 1989

The author likens mindlessly following a set of rules in order to perform a statistical analysis to "driving a car with no inkling of how the internal combustion engine, the gears, the ignition system, the brakes actually work." He aims to provide a "do-it-yourself" guide to students of statistics encountering nonparametrics for the first time and to research workers. This is not a book intended for the professional biometrician. Chapters 1-8 cover the standard topics in introductory nonparametric statistics: one sample methods, two paired samples methods, two independent samples methods, multiple sample methods, regression and correlation, and categorical data analysis. Chapter 9 briefly discusses the jackknife and bootstrap and Chapter 10 briefly notes other, more advanced, nonparametric techniques and gives references to them.

One of the unique features of the book is its format. It is organized around a series of examples and presents information in the sequence

1) Problem
2) Formulation and Assumptions
3) Procedure
4) Conclusions
5) Comments.

To give the flavor of this approach, two of the problems covered in the book are: 1) Ten students are ranked by their marks in French and German examinations. Use a graphical method to calculate Kendall's tau and 2) Using the sample of numbers of pages of 12 books in Example 2.6, calculate 95% and 99% confidence intervals for mean number of

pages. This approach has the advantage of maintaining a conversational development of the ideas but the disadvantage of making it quite difficult to find the relevant procedure when faced with a real problem of one's own.

The book has a number of strengths. It's conversational approach makes reading relatively painless. It contains a number of simple examples that manage to convey basic ideas without getting too caught up in messy details. It clearly reflects the author's experience in data analysis. One understatement I particularly appreciated was "it is generally regarded as bad statistical practice to hive off sections of data in a way that happens to suit us." The terribly important issues of how to decide which population is randomly sampled and how general inferences will be are discussed in numerous examples.

Unfortunately, I also have a number of complaints about the book. As mentioned above, the conversational style makes it very difficult to use this book as a reference. It is hard to find a particular method and the assumptions necessary for its use. The sections on Formulations and Assumptions are inadequate in this regard. For example, if one looks up the Wilcoxon signed ranks test in the index and looks under Formulations and Assumptions for the first example one finds:

We arrange deviations from 220 in order of magnitude and associate with each rank the sign of the corresponding deviation. We then compare the lesser with the sum of positive and negative ranks with tabulated values to assess significance.

A similar exercise using Conover's book on the same topic (Practical Nonparametric Statistics, 2nd Ed., 1980) gives the following:

1. The distribution of the D_i is symmetric.

2. The D_is are mutually independent.
3. The D_is all have the same median.
4. The measurement scale of the D_i is at least interval.

The text contains the appropriate information, it is just that it is hard to find. Also making it inappropriate for reference is the paucity of tables for nonparametric procedures.

I also have some other, more minor, criticisms. To be a good text for an introductory course, the data sets need to be more interesting and scientifically relevant. I counted 31 pages which contained examples which were the numbers of pages found in books on the author's shelves. Also, I would have preferred to have seen the use of the rank transformation as in Conover. This is a natural bridge between an introductory parametric course (assumed for the audience of this book) and nonparametric rank methods. Finally, coverage of too much material in too little space has led to passages which are uninterpretable to the intended audience, e.g., the discussion of double-blind on p.72 or why F-tests arise with multiple sample problems on p.112 ("*because* t^2 with v degrees of freedom has an F-distribution with 1,v degrees of freedom" - italics mine).

In summary, this will make an adequate introductory text, but it is not appropriate for the practicing biometrician.

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