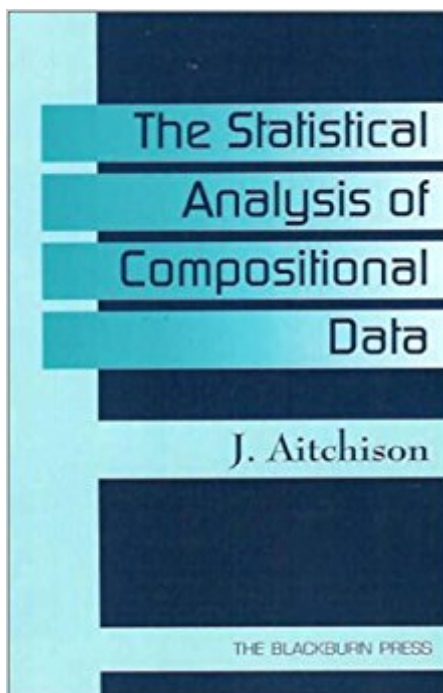


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The Statistical Analysis Of Compositional Data



Synopsis

This book was originally published in 1986. It is reprinted here with a new foreword, extensive postscript detailing developments in the field since publication and a selection of more recent literature references. A recent excursion on the web in search of "compositional data" produced over 3000 entries within a great variety of disciplines. In agriculture, land use compositions; in archaeology, chemical compositions of ceramics; in developmental biology, shape analysis relating (head, trunk, leg) compositions to height; in economics, household budget patterns; in environmetrics, pollutant compositions; in geology, major oxide compositions of rocks and sediment (sand, silt, clay) compositions; in literary studies, sentence compositions; in manufacturing, global car production compositions; in medicine, blood, urine and renal calculi compositions; in ornithology, plumage and artefact colour compositions of the greater bower bird and sea bird time budgets; in palaeontology, zonal pollen compositions; in psephology, US Presidential election voting proportions; in psychology and sociology, time budgets of various groups; in waste disposal studies, waste composition. There can be little doubt that appropriate statistical analysis of such compositions is a requirement of many problems in many disciplines. This book provides a clear and systematic account of statistical methods designed to meet the special needs of the compositional data analyst. From the motivation of a number of practical examples from different disciplines and from a re-examination of the difficulties inherent in the inappropriate standard methods, the author argues that any successful statistical methodology must be based on the simple perception that only the relative magnitudes of the components of a composition matter, not their absolute values. "All along Aitchison motivates his mathematics by showing how it can answer the real questions of scientists . . . An enthralling instance of statistics at the service of modern science." The Times Higher Education Supplement "This book is the definitive work in its area and is likely to be the standard reference for decades to come." Mathematical Reviews "This splendid monograph develops sensible models for distributions on simplexes." Journal of the Royal Statistical Society "It is very well written and provides the only unified approach in existence to the analysis of compositional data." International Statistical Institute

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"All along Aitchison motivates his mathematics by showing how it can answer the real questions of scientists. -- The Times Higher Education Supplement" "This splendid monograph develops sensible models for distributions on simplexes" -- Journal of the Royal Statistical Society. The definitive work in its area and is likely to be the standard reference for decades to come" -- Mathematical Reviews

My research involves compositional data in psychology in the scaling of preferences measured as continuous variables, e.g., proportions of time allocated to a task. I remember well the first time I encountered compositional data, dealing with some priority allocations on different policy preferences several years ago. I didn't realize the key issue at the time, namely the fact that a sum constraint on a multivariate data vector totally changes the sample space. For instance, it induces negative correlations in variables one would logically expect to be positively correlated. This can be very confusing until you realize what is going on. Doing something about it, however, is more complex. Aitchison's book gives you the necessary tools to handle the problem. (Unfortunately software solutions are rarer and you will likely have to do some programming of your own.) This book is, as the editorial reviews indicate, the standard reference in the field. I highly recommend this book to anyone who has a decent background in mathematical statistics. You certainly need to have a solid understanding of linear algebra and transformations of multivariate distributions to make your way through it, but it is very clearly written, the math is lucid, and it has the added benefit of Aitchison's dry British wit throughout (presuming you enjoy that sort of thing).

The data in vectors of proportions are very usuals in Agricultural Research like Plant pathology and plant physiology; such data may be: nutrient concentration in leaf, proportion of fruits with some infection process, amount of foliar area with any microbial disease, etc. Monography of Dr. Aitchison

gives an appropriate methodology for the statistical analysis of compositional data that are very usuals in plant research; Aitchison's book should be in personal libraries of all people that works in Agricultural research. Eduardo DÃvila Sanabria

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