and large data sets and correlation within clusters are considered briefly in this chapter also.

This book has much strength especially through its comprehensiveness and use of apposite informative examples. However, some constructive criticism may still be offered. For example, it would have been useful if the authors had reiterated null and alternative hypotheses for each procedure (outside specific examples) so that readers are reminded of the general case. Definitions of the different types of error rates encountered in multiple comparison procedures could be dealt with in more detail in Section 8.6. Readers should be made aware earlier in Section 9.1 that the censoring dealt with is known as right censoring and referral to survival analysis texts for more information on other forms of censoring and the associated assumptions would also be useful. Similarly, the pitfalls of Cohen's kappa (Section 10.3) could have been mentioned with reference to techniques that are not simply a single summary index. More focus on density estimation and scatterplot smoothers and a lesser focus on the other topics in Chapter 15 would make for a more cohesive final chapter. Finally, while the book provides a thorough introduction to nonparametric statistics, students from quantitative backgrounds and statistical practitioners may prefer a more mathematical text to aid in their understanding of the methods.

Overall the book is well-written and interesting and is to be recommended for undergraduate students in applied statistics or from non statistical backgrounds.

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2. META-ANALYSIS OF BINARY DATA USING PROFILE LIKELIHOOD. Dankmar Böhning, Ronny Kuhnert and Sasivimol Rattanasiri, Chapman & Hall/CRC, Boca Raton, 2008. No. of pages: 208. Price: $79.95. ISBN: 978-1-58488-630-3

The book provides the reader with a comprehensive and unified approach to the application of profile likelihood (PL) method in meta-analysis. It concentrates on meta-analysis data when a 2×2 table is available from published literature, called meta-analysis with individually pooled data (MAIPD). It is the first book entirely devoted to the analysis and modeling of MAIPD using the PL technique. The presence and impact of heterogeneity in meta-analysis are inevitable; however, uncertainty remains about the most appropriate method to incorporate heterogeneity into summary estimates. Random effects and Bayesian hierarchical meta-analysis methods become appealing approaches to account for both observed and unobserved heterogeneity. With no doubt, the PL method is an alternative to handle meta-analysis data properly and it is particularly beneficial when the data are sparse. The book covers estimation, inference, model evaluation, computational issues, hypothesis testing and others.

The book is organized into 10 chapters and an appendix that details mathematical derivatives. MAIPD gives the flexibility to compute different effect measures such as relative risk (RR), risk difference (RD) and odds ratio (OR), along with their standard error; however, there is no ultimate data-driven solution for the choice of effect measures. Wrong effect measure choice may introduce an artificial heterogeneity effect (Chapter 1). The entire book, except one chapter that discusses OR, is devoted to RR.

The first chapter presents several real data examples that cover a range of practical complexities in meta-analysis. Minor typographical errors: page 2, replace (348/1 621)/(204/1 814) by (348/1 621)/(204/814) and page 18, replace

$$\frac{(x_i^T n_i^C - x_i^C n_i^C)/n_i}{n_i^T n_i^C/n_i} \quad \text{by} \quad \frac{(x_i^T n_i^C - x_i^C n_i^T)/n_i}{n_i^T n_i^C/n_i}$$

Page 21, line 2, '...RR and RD.' and for Table 1.15 the second column (OR) creates confusion.

Chapters 2–4 introduce the basic framework for PL under the assumption of effect homogeneity (Chapter 2) and extend it to incorporate the unobserved heterogeneity (Chapter 3) and observed heterogeneity (Chapter 4). The chapters discuss PL maximization techniques and parameter estimation, classification of centers or studies into groups, model evaluation using information criteria and a simple homogeneity test through gradient function. The comparison of the PL method with the classical Mantel–Haenszel method, which is robust for sparse data under effect homogeneity, is notable. Further minor typographical errors: the y-axis labels of Figures 2.2 and 2.3 are incorrect, and in Section 2.6.2, line 2, replace

$$\frac{\sum_i x_i^T n_i^C/n_i}{\sum_i x_i^C n_i^C/n_i} \quad \text{by} \quad \frac{\sum_i x_i^T n_i^C/n_i}{\sum_i x_i^C n_i^T/n_i}$$

Chapter 5 provides alternative, approximate and multilevel likelihood methods, which are appearing increasingly in the medical literature for the meta-analysis of MAIPD, and compares them with the PL method. One important difference between the three models lies in the way the nuisance (or baseline parameter) is treated. The binomial PL, as an alternative for Poisson PL, is introduced.

Modeling observed and unobserved heterogeneity separately, such as in Chapters 2–4, may fall short of accounting for the realities in the medical research. Chapter 6 focuses on joint modeling of observed and unobserved heterogeneity, which is one of the strongest features of the book. Computational limitations have prevented the PL method from being routinely implemented in meta-analysis. I congratulate the authors for undertaking the development of computer-assisted analysis of meta-analysis using the PL method (CAMAP) software. Chapter 7 demonstrates the usage of CAMAP step by step, which is easy to follow with no need of prior programming knowledge. The software provides the flexibility to choose convergence accuracy, stopping criteria, maximum number of mixture components and choice of covariate effect across mixture components. A minor point: I wonder why the software did not include one of the most frequently used effect measures, OR, discussed in Chapter 8.

Chapter 8 briefly covers the estimation of OR using the PL technique under effect homogeneity and by incorporating covariate information. The issue of unobserved heterogeneity is left out and as a result a sense of incompleteness is felt in the chapter. In this and previous chapters, the authors routinely used Wald-type confidence interval that gives a coverage probability far from the nominal level when applied to sparse data. Instead, a PL-based confidence interval should be included [1].

Chapter 9 introduces a 'new estimate' (I prefer to give a name) of between-studies variance for MAIPD. It also briefly covers classical techniques such as Q-statistics and its derivatives, H^2 and I^2, and moment estimator of τ^2 suggested by DerSimonian and Laird to estimate the amount of between-studies variability. Beyond quantifying heterogeneity, the chapter covers hypothesis testing using Q-statistics and Nass-modified Q-test. Application of PL (related) method on studies other than clinical trials is straightforward. Chapter 10 shows the application of PL to multi-country surveillance study.

In summary, most of the methods described can be understood and applied by anyone with a solid statistical background. However, a researcher with little statistical expertise could still benefit from the wealth of data examples analyzed in each chapter, using the freely available software by the authors. One limitation of the book is that it gives limited coverage of the OR. Overall, I recommend the book as a supplement for graduate level course in meta-analysis and for readers seeking an alternative approach to analyze MAIPD or multicenter clinical trial studies; specifically when the outcome variable is the occurrence of rare events.

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