P M Lee, Bayesian Statistics: AN Introduction, Arnold, London xv+351*pp; 2004; £19.99; ISBN 0 340 81405 5*

W M. Bolstad, Introduction to Bayesian Statistics, Wiley, New York, xviii+354 *pp; 2004, £50.5050 50, ISBN 0 471 27020 2*

As their titles suggest, both of these books aim to Provide an introduction to Bayesian statistics—Lee's book was derived from his notes used to teach a final year undergraduate class in the UK, whereas Bolstad's aim was to teach this subject at the earliest possible stage to undergraduates in New Zealand. So, although the books for the most part cover the same topics, this difference in origins has ted to a marked difference in presentation.

Lee is on his third edition, but the bulk of the first six chapters is unchanged from the original.

These cover the usual introductory topics: probability, random variables, inference for normal and other common distributions, hypothesis tests, two-sample problems and simple general linear models. Each topic is covered in a succinct manner, although this may not be best suited to the majority who wish to use it for self-study. However, exercises are provided at the end of each chapter with answers available via the web.

Bolstad's book begins with three chapters that cover more fundamental statistical and scientific data-gathering issues. He briefly discusses some of the philosophical issues concerning the way knowledge is obtained, going on to contrast the main approaches to statistics—although the likelihoodists may claim they deserve some mention here also. Different types of study and experimental designs are also discussed, providing a basic introduction to this very important subject. The last of these opening chapters covers the commonly used ways of summarising and displaying data. Bolstad emphasises that "Data should always be looked at in several ways as the first stage in any statistical analysis", which, although it may be obvious to most, is still too important a message not to be included in any introductory statistics book (even for Bayesians!).

Chapters 4–13 of Bolstad essentially cover the same ground as chapters 1–6 in Lee. Whereas Lee appears to be coming to the subject from a strong mathematical background, Bolstad is less mathematically demanding. So in Lee you will read about minimal sufficiency and data-translated likelihoods, whereas Bolstad builds up the concept of a probability density function as the limiting form of a histogram. As well as having exercises at the end of each chapter, with selected answers at the back of the book, Bolstad also includes a bullet point list of main points for each chapter. This is an excellent idea, not only helping the learning process but also providing an additional means to navigate the book. Another feature that gives this book a modern feel is the inclusion of Monte Carlo exercises. These are based on Minitab and R programs that can be obtained via the web.

The final three chapters of Lee cover more advanced topics that are not in Bolstad at all. These include brief discussions of the likelihood principle, stopping rules, Bayesian decision theory, hierarchical models and numerical methods such as the Gibbs sampler. It is the addition of these last two topics, given a

chapter each, that makes up the main changes since the previous edition. Clearly it is difficult to cover too much in a single chapter on hierarchical models, and I am not sure Lee has succeeded in whetting the reader's appetite for more. The final chapter gives a reasonable explanation of the various numerical methods currently used. I was pleased to see WinBUGS introduced, but disappointed with the rather unorthodox example used to demonstrate its application.

Perhaps in line with his more applied approach, Bolstad does include some discussion of how meaningful prior information could be elicited. Lee focuses on reference priors, with Bernardo's work in this area being added to the latest edition. Bolstad also illustrates how to assess the sensitivity of the inferences to the choice of prior. In fact, he goes beyond this by including a final chapter on how to develop a model that is robust to an incorrectly specified prior. This is done via a mixture of conjugate priors, which is motivated and explained in a very convincing manner. Although I was initially surprised to see this topic covered in an introductory text, I believe it not only follows on nicely from the earlier discussion of informative priors but also provides a practical example of how the prior can justifiably be used to provide a real advantage over the classical approach. In summary, Lee's book provides a reasonable introduction to Bayesian statistics, which is written very much in the style of a final year undergraduate text. I believe Bolstad's book could be used to cover the same ground, albeit with some of the more fundamental theoretical aspects missing. However, Bolstad's is the book I would recommend to anyone wanting to self-study. My only gripes with it are the paucity of references for the reader who seeks more detail on a particular topic (only 15 references in the whole book), the tack of critical discussion of the use of statistical hypothesis tests (instead of simply providing a Bayesian version of these) and the absence of a chapter introducing the need for Markov chain Monte Carlo software including worked examples using a free-to-user package such as WinBUGS.

I will keep both of these books on my shelf, but I expect that Bolstad wilt be the one most borrowed by my colleagues.

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