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Random Phenomena: Fundamentals of Probability and Statistics for Engineers

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specialists and non-specialists. The non-technical approach of the presentation of the material makes the reader comprehend the material and at the same time understand the capabilities of the methods and models discussed. The inclusion of several examples makes the book much more attractive than its competitors.

In conclusion, the book provides a comprehensive overview of frailty models and it is well written and easy to read and understand. It serves nicely the purpose for which it was written, namely to introduce and attract attention to various issues associated with the frailty models. The book is well suited primarily for bioscience practitioners but also for students, professionals, and researchers.

References

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Random Phenomena: Fundamentals of Probability and Statistics for Engineers, by Babatunde A. Ogunnaike, Boca Raton, CRC Taylor & Francis, 2010, xii + 1015 pp., £51.99 or US$129.95 (hardback), ISBN 978-1-4200-4497-3

'Random phenomena' is a hefty introduction of over a thousand pages into fundamental probability theory and statistics. As the title states, this book is clearly written from an engineering perspective and uses only a basic level of mathematics. The theory is built up from real-life examples from which the first principles are deduced. This works well as it becomes immediately clear that these principles are relevant and useful in practical situations. More examples are then used to further stress this point, deepen understanding and highlight practical problems that can be encountered in actual applications.

The book clearly explains both probabilistic and statistical concepts in minute detail and none of the essentials seem to be missing. All this is done without ever resorting to abstract mathematics, which is quite an achievement. It is hardly possible to summarise all the areas that are covered as part of this review. Suffice it to say that all the topics that one would expect to be present in an introductory course are amply covered, and that a number of more advanced topics such as hypothesis testing, regression analysis, probability model validation, nonparametric methods, reliability and life testing, quality assurance and control, multivariate analysis and experimental design are also discussed in considerable detail.

As an engineer involved in statistical data analysis, I would have loved to be taught from a book like this and I heartily recommend this book as a classroom textbook for both the clarity of the explanations and the amount of material covered. The book further accommodates such use with a large amount of review questions, exercises, application problems, and project assignments. However, the book is also suitable for self-study, to which the narrative style of the book is particularly well suited. It will allow engineers who have to deal with statistics, but lack sufficient

statistical background, to easily gain fundamental insights that are readily applicable in their working environment.

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Bayesian Nonparametrics, edited by Nils Lid Hjort, Chris Holmes, Peter Müller and Stephen G. Walker, New York, Cambridge University Press, 2010, xx + 299 pp., £35.00 or US$59.00 (hardback), ISBN 978 0 521 51346 3

This book consists of a collection of articles concerning Bayesian nonparametric methods. The recent theoretical and practical aspects of Dirichlet processes are discussed. The book covers the theoretical aspects in the first four chapters, while the last four chapters document a wide range of applications from biostatistics to signal processing.

The theory of Bayesian nonparametrics presents flexible models, whose complexity increases with increasing amount of data and dimensionality. The theorems of 'stick-breaking' representation, Chinese restaurant process, Indian buffet process, and Bernstein–von Mises have been covered repeatedly throughout the first four chapters.

On the practical aspects, the Bayesian nonparametric techniques (such as the hierarchical Dirichlet process) have been widely applied to the areas of information retrieval, speaker diarisation, word segmentation, bioinformatics, and microarrays.

The contribution of this book is to collect most recent research of Bayesian nonparametric techniques together, with main emphasis on the use of Dirichlet process. The popularity of Dirichlet process is because that the Dirichlet prior is nonparametric and conjugate, thus presenting many opportunities to flexibly model complex data structure. The book incorporates the Bayesian philiosophy into the nonparametric concept. It also introduces Bayesian computational tools (such as the Metropolis-Hasting and Gibbs algorithms) to deal with possibly infinite number of parameters. A statistical software package in R called DRpackage has been introduced to implement Dirichlet process mixture density estimation, Pólya tree priors for density estimation, and nonparametric random effects models including generalized linear models.

The authors have fulfilled their main aim which is to introduce Bayesian nonparametrics. However, I feel this book could go even further by combining the Bayesian computational techniques with frequentist nonparametric methods. In other words, could the Bayesian techniques be well suited for solving frequentist nonparametric problems? If so, this would bring the Bayesian philosophy and frequentist philiosophy one step closer.

Overall, I enjoyed reading and reviewing this book and I feel that this book gives nice theoretical and practical viewpoints on Bayesian nonparametrics. The use of Bayesian nonparametric techniques is suitable for any statistician, who aims to analyse complex data structures with possibly infinite number of parameters. Although this book concentrates mainly on the Dirichlet process, it serves perfectly as a reference for scientists and graduate students working in the field of Bayesian data analysis.

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