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Random networks for communication: from statistical physics to information systems

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BOOK REVIEW

Random networks for communication: from statistical physics to information systems, by Massimo Franceschetti and Ronald Meester, Cambridge, Cambridge University Press, 2008, xiii+196 pp., £35.00 or US$60.00 (hardback), ISBN 978 0521854429

The subject of random networks is, as the authors state, at the intersection of mathematics, physics, and information theory of systems. It is a useful modelling technique that has been fruitfully used in fields ranging from wireless communication to biological systems. In short, it has proven to be an extremely useful tool.

This text is an outgrowth of courses given by the authors and one gets the feeling of sitting in a lecture room when reading this book. The book is well suited to self-study as the authors' style is conversational, an outline is presented of most of the proofs prior to the complete proof, many interim steps are given in proofs and computations, and numerous diagrams elucidate the presentation.

The authors unashamedly state in the introduction that they have omitted some (important) results that lack the geometric flavour of the other results presented in the text. These omissions do create a more uniform presentation and the authors credit and reference other articles and books freely, thereby never leaving one in doubt as to where one can find more information about a specific topic. They also provide a 'Historical notes and further reading' section at the end of each chapter which I found invaluable.

Numerous exercises (homework assignments) are given at the end of each chapter. These exercises extend rather than complete the text as some other texts tend to do in an effort to reduce size.

The lecture style of the book, I believe, made the authors decide to label every displayed formula (last line in the case of multi-line formula). The result of this is that about half the labelled formulas are never referenced. This is one trivial critique on a book that is nicely typeset and reflects course-tested ideas. Another critique would be on the introduction of the term 'exponential signal attenuation' which gets supplanted immediately by 'exponential attenuation'. This results in 'exponential signal attenuation' being mentioned only twice, once in the text and once in the index.

Aimed as a book suitable for both engineers and mathematicians (whereby I will include statisticians), the authors have only assumed the absolute minimum prerequisite knowledge and have created a text that should be accessible, in part, to a curious advanced undergraduate student. This does imply that for some of the more advance results, the reader is referred to more mathematically orientated books and articles, but this does not at all imply a lack of rigour.

The book is aimed at laying a foundation which will open the field of random networks to researchers from engineering, mathematics, and statistics. In doing so, the authors are more

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concerned with fundamental ideas and concepts than possible applications and real-life problems. But this is completely normal as nobody would expect an introductory calculus book to focus more on practical examples than concepts.

I would recommend this book to anyone wanting an accessible introduction to random networks.

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