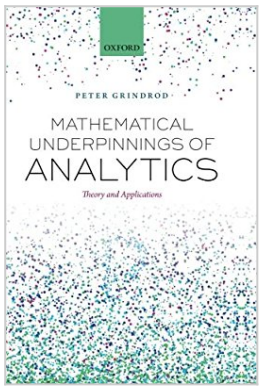

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Analytics is the application of mathematical and statistical concepts to large data sets so as to distil insights that offer the owner some options for action and competitive advantage or value. This makes it the most desirable and valuable part of big data science.

Driven by the increased data capture from digital platforms, commercial fields are becoming data rich and analytics is growing in many sectors. This book presents analytics within a framework of mathematical theory and concepts building upon firm theory and foundations of probability theory, graphs and networks, random matrices, linear algebra, optimization, forecasting, discrete dynamical systems, and more.

Following on from the theoretical considerations, applications are given to data from commercially relevant interests: supermarket baskets; loyalty cards; mobile phone call records; smart meters; 'omic' data; sales promotions; social media; and microblogging.

Each chapter tackles a topic in analytics: social networks and digital marketing; forecasting; clustering and segmentation; inverse problems; Markov models of behavioural changes; multiple hypothesis testing and decision-making; and so on. Chapters start with background mathematical theory explained with a strong narrative and then give way to practical considerations and then to exemplar applications.

Exercises (and solutions), external data resources, and suggestions for project work are given. The book includes an appendix giving a crash course in Bayesian reasoning, for both ease and completeness.

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About the Author

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Peter Grindrod researches a range of topics in analytics for customer-facing industries and in particular for the digital society. He is in an almost unique position of having experience within commercial settings as well as within academia. He is a former President of the Institute of Mathematics and its Applications, member of the EPSRC and Chair of the EPSRC's User Panel. He authored Patterns and Waves (OUP 1991, 2nd edn 1996) and has been awarded a CBE for his contribution to mathematics R&D. In 1998 he was co-founder and Technical Director of a start-up company, Numbercraft Limited, supplying analytics services and software to retailers and consumer goods manufacturers. He is a co-founder of Cignifi Inc, a Boston-based company that uses mobile phone records to provide behaviour based credit referencing for pre pay customers in emerging economies. He is a founder of Counting Lab Ltd, a UK-based start-up translating state of the art mathematics into prototype products and services.

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