

Networks

Probability and Statistics

Cambridge Series in Statistical and Probabilistic
Mathematics

A. D. Barbour

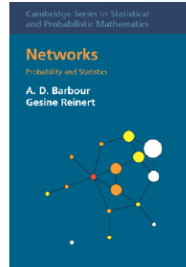
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From social networks to biological systems, networks are a fundamental part of modern life. Network analysis is increasingly popular across the mathematical, physical, life and social sciences, offering insights into a range of phenomena, from developing new drugs based on intracellular interactions, to understanding the influence of social interactions on behaviour patterns. This book provides a toolkit for analyzing random networks, together with theoretical justification of the methods proposed. It combines methods from both probability and statistics, teaching how to build and analyze plausible models for random networks, and how to validate such models, to detect unusual features in the data, and to make predictions. Theoretical results are motivated by applications across a range of fields, and classical data sets are used for illustration throughout the book. This book offers a comprehensive introduction to the field for graduate students and researchers.

1. Introduction; Part I. Basic Setting: 2. Network data sets; 3. Network summaries; 4. Models for networks; Part II. Probability Preliminaries: 5. Branching processes; 6. Some birth and death processes; 7. Poisson approximation; 8. Ramifications of Poisson approximation; 9. Normal approximation; 10. Multivariate normal approximation; Part III. Network Models: 11. The Bernoulli random graph; 12. Models related to the Bernoulli random graph; 13. The Chung–Lu model; 14. The configuration and GPDS models; 15. Random geometric graphs; 16. Small world graphs; 17. Preferential attachment models; 18. Dense graph limits and graphon models; 19. Random processes on networks; 20. Summary of Chapters 5–19; Part IV. Network Inference: 21. Sampling from networks; 22. Estimation: fitting a network model; 23. Assessing model fit; 24. Community detection; 25. Using networks for inference; 26. Some further topics; Appendix; References; Index.



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\$200.00	\$160.00

'An unusual blend of practical examples, probabilistic treatment of important random graph models, description and analysis of statistical methods, all written with clarity, insight, and competence. A wonderful addition to the current literature!'

Steffen Lauritzen,
*Emeritus Professor of Statistics,
Oxford University and University
of Copenhagen*

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