



Journal of Statistical Software

September 2016, Volume 72, Book Review 3.

doi: 10.18637/jss.v072.b03

Reviewer: Norman Matloff
University of California, Davis

A User's Guide to Network Analysis in R

Douglas A. Luke
Springer-Verlag, New York, 2015.
ISBN 978-3-319-23882-1. 238 pp. USD 59.99 (P).
<http://www.springer.com/9783319238821>

This is a nice little book, useful for several different types of audiences, including readers with little or no background in the subject, as I will explain this later in this review.

This field, variously called *networks*, *random graphs* and so on, involves relations between entities, such as between people in a social network. It has grown tremendously in the last decade or two, attracting computer scientists, statisticians, biologists, economists, sociologists and even physicists. Indeed, researchers in the field have disproportionately come from physics, due in part to similarity of some of the models to lattice and other structures in physics.

It will serve to compare this book to the earlier *Practical Graph Mining with R*, by Samatova, Hendrix, Jenkins, Padmanabhan, and Chakraborty (2014). Compared to the Luke book, the work by Samatova *et al.* (2014) is more extensive (473 pages), has much more mathematics, and has much less R. I would recommend Samatova *et al.* (2014) to anyone in the networks field, whether they use R or not, due to that book's excellent coverage of the subject in general. The book by Luke then serves a complementary role, really living up to its title, explaining in detail how to use CRAN packages such as **igraph**. There is R code or R output on almost every page.

The Luke book (from this point on, simply "the book") is attractively produced. The networks field lends itself to beautiful pictures, and this book has plenty. Most are in color. Even the code listings are syntax-colored. A major problem is the lack of an index, continually frustrating me as I browsed through the book. The author may consider posting an index on the book's web page. There is, however, a good bibliography.

The reader is assumed to have a basic knowledge of R, including some data wrangling skills. Needed mathematical background is rather minimal, limited to occasional references to, for instance, the Poisson distribution family and the `exp()` function.

The book is organized into four main sections, of approximately equal length: *Network Analysis Fundamentals* (nodes, edges, diameter, clustering coefficient etc.); *Visualization* (how to make informative and aesthetically pleasing pictures); *Description and Analysis* (details of

centrality measures, cliques etc.); and *Modeling* (Erdős-Renyi, small world, scale-free, exponential random graph models (ERGMs)).

So, who would find this book useful? The author mentions a possible role as a supplementary resource for a course in network analysis, and indeed this would be quite appropriate. But I would add that someone with little or no background in networks could actually use this book as a brief introduction to the subject. The writing style is very clear, and the examples are well-chosen. A reader without background should be able to follow most of the exposition fairly easily.

This is true even in Part IV, where the coverage becomes slightly more abstract, especially in the material on ERGMs. Concerning the latter, the author should have drawn an analogy to log-linear models, a topic likely familiar to many of the book's readers.

References

Samatova NF, Hendrix W, Jenkins J, Padmanabhan K, Chakraborty A (eds.) (2014). *Practical Graph Mining with R*. Chapman and Hall/CRC, Boca Raton.

Reviewer:

Norman Matloff
University of California, Davis
Department of Computer Science
Davis, CA 95616, United States of America
E-mail: matloff@cs.ucdavis.edu