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Networks, Crowds, and Markets: Reasoning about a Highly Connected World

By David Easley and Jon Kleinberg. Cambridge Univ. Press, U.K., 2010, 744 pages.

The complexity and volume of connections of modern society are increasing. The growth in our connections is found in many activities: in the rapid growth of the Internet, in financial markets, in global communication services, in the spread of news and information, as well as epidemics and monetary crises. These are phenomena that involve networks, incentives, and the aggregate behavior of groups of people; they are based on the links that connect us. The book, *Networks, Crowds, and Markets: Reasoning about a Highly Connected World,* describes an emerging field addressing fundamental questions about how the information, social, economic, and physical worlds are connected. The book was written by two authors at Cornell University, teaching in departments of Economics and Computer Science, who are particularly sensitive to interaction between computing and the social sciences. Kleinberg is a winner of a MacArthur "genius" grant. Their book has been awarded the Lanchester Prize for the best recent work on operations and management science.

"Network" is flexibly defined in this work. A network is any collection of objects in which some pairs of the objects are connected by links. As relationships or connections are universal in the real world and modern society, researchers from different domains can contribute to network science research.

The goal of the authors is to give the reader multidisciplinary perspectives to understand networks at various levels. The book is based on an undergraduate course titled Networks, that they developed and taught at Cornell. Many real world examples are used to explain the theories referred to in the book. Readers who have varied knowledge and understanding of networks will probably find the content that they are interested in.

The book is vast. There are 744 pages and 423 references, and graph and game theory are the foundations of the entire work. Each part provides strict proofs of key results and rich literature references, while remaining accessible to the undergraduate with only a general mathematics background.

The text combines economics, sociology, information science, and applied mathematics to explain networks, behaviors, and interactions. It describes the emerging fields of study that are growing at the interface of these areas. Through the book, the reader can appreciate the beauty of mathematical abstraction in network and market areas. The confluence of ideas inspires the beginnings of new intersections for study.

The book can be used at both an introductory and advanced levels. It helps readers understand the structure, function, and dynamics of networks in society. This book successfully combines graph theory and game theory to enhance the study of social, economic, and computer networks. It is a good beginning

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Meetoo-Appavoo et al. examine the benefits and costs of open-source software for developing countries. They consider the barriers to adoption through an examination of current open-source software usage in Mauritius and the likely challenges to future implementation projects. They argue that open-source software can provide numerous benefits to individuals, companies, and software developers in developing nations, but that a number of key challenges need to be addressed.

Reihana Mohideen considers the connection between access to clean and renewable energy and the quality of life of women in South Asia. Her work highlights the many difficulties faced by women without access to electrification, especially among the rural-poor of South Asia, and suggests that while providing access to clean and renewable energy in and of itself has many quality of life benefits for these women, it also provides an opportunity to address many other social issues associated with gender inequalities.

Finally, in "Salient Perception of a Wearable Monitoring Device," Moran *et al*. consider the impact of ubiquitous monitoring systems on people's behavior in a Japanese university. While acknowledging that ubiquitous monitoring technologies can have many benefits, there are also many issues for people associated with undesirable behavior change, coercive effects, data sharing, and privacy that also need to be considered in designing these technologies.

Many papers at ISTAS'12 adopted a positive, or "optimistic," perspective and considered how beneficial technologies can be developed to address social problems.

These articles highlight the enormous potential of technologies to improve people's quality of life and well-being. They also prompt us to critically consider the social implications of new technologies and to consider how technologies can be developed to create positive social benefits. Nowhere is this need for critical reflection more profoundly felt than within the rapidly developing, and developed, nations of Asia. We hope you enjoy this special issue.

References

[1] M. Arnold et al., Eds,. *Proc. IEEE 2012 Conference on Technology and Society in Asia*. New York, IEEE Press, 2012.

[2] K. D. Stephan et al., "Social implications of technology: The past, the present, and the future," *Proc. IEEE*, vol. 100, pp. 1752–1781, May 2012.

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for students learning the emerging fields of network science. It also provides more advanced literature in some important areas. With this in mind, the authors provide optional sections labeled *advanced material* at the ends of most chapters. The advanced sections are qualitatively different from the other sections; some draw on sophisticated mathematics. For example we find in section 3.6 a treatment of betweenness measures and graph partitioning that describes networks in terms of their tightly-knit regions and weaker ties. Additionally, the Girvan-Newman graph partitioning method is summarized, which is based on edge betweenness measures. Similarly, in section 5.5 we find another advanced topic, an attempt to generalize the definition of structural balance. The advanced sections are self-contained; they are optional, so that nothing else in the book depends on them.

Notably absent from the book are questions about security and risk problems in networks, which might well have been included along with issues of privacy. For example, David Kirkpatrick reports in his book *The Facebook Effect* that Facebook developers made a sport of spotting budding romantic alliances based on messaging and profile viewing patterns [1]. Security problems in social networks are difficult and I think that this book would be enhanced by a chapter explaining challenges and solutions for social network security.

A complete mastery of the book would require that a reader have acquired basic network theory and mathematical modeling in advance. In summary, this work describes many kinds of connections in modern society and the real world, and is a good bridge between network technology and social science.

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Reference

[1] C. Dwyer, "Privacy in the Age of Google and Facebook," *IEEE Technology & Society Mag.*, vol. 30, no. 3, pp. 58–63, 2011.