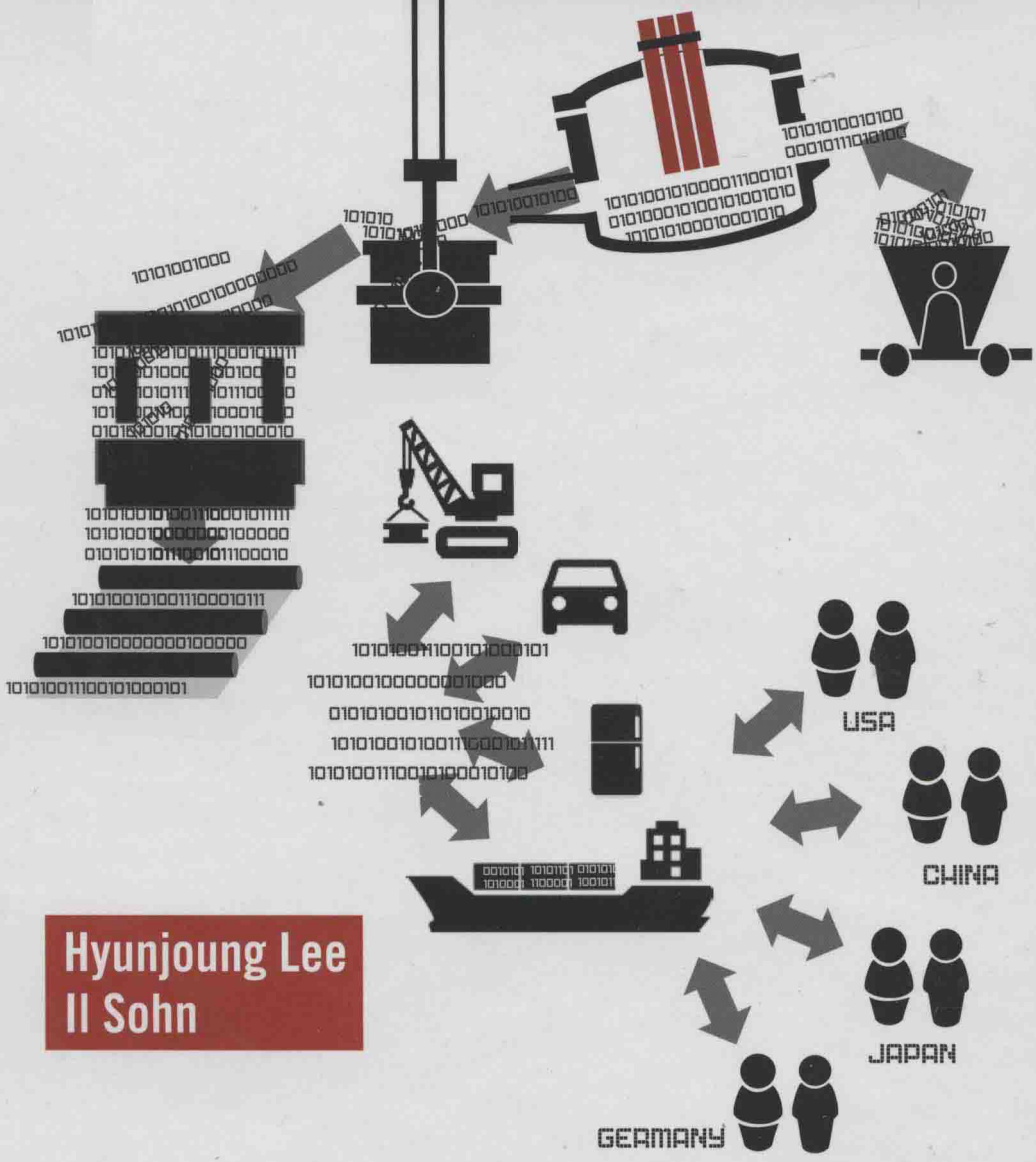
Fundamentals of Big Data Network Analysis for Research and Industry



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Fundamentals of Big Data Network Analysis for Research and Industry

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Preface

The concept of the book was first initiated and sponsored by the Future Steel Technology Forum, where future generations of steel researchers gathered to aggregate their knowledge to address the strategic implications of steel technology and product placement across the global trade community. Under the auspices of the Korea Iron and Steel Association, the authors initiated analysis on the steel commodity trade data and the social network relationships among the countries and products of steel currently being traded across the global frontier. From that initiation, the authors were inspired to provide the general public, industry analysts, and students of data analysis on the methodology of big data analysis using examples of steel product trade relations.

This book is separated into six chapters. Chapter 1 defines big data and how it can be applied to business management for higher productivity and efficiency. Chapter 2 describes the various programs related to big data analysis identifying the pros and cons of the commercially available analysis programs. Chapter 3 deals with network analysis and the basic concepts of the nodes and links related to the structure of social network relations between data. As we reach Chapter 4, details of setting up the research methodology for network analysis, methods of data gathering, and cleansing of unwarranted and unnecessary data is illustrated. In Chapter 5, the centrality analysis, which include degree of centrality, betweenness centrality, closeness centrality, is described in detail and the cohesive subgroup is presented. With the conclusion in Chapter 6, the property of the network and equivalence between node pairs or data pairs is outlined with emphasis on the connectivity of nodes. The appendix in the back of the book provides detailed examples of the network analysis performed using the NetMiner program on steel research topics from keyword analysis of journals published in Wiley.

We have come a long way to reach the final destination to inclusively understand the preceding analyses of big data. The various analyses methods and procedures related to big data network analysis introduced here are the most frequently used methods. This book is designed to comprehensively understand the fundamentals of big data and the expected analysis methods to be conducted within a relatively short time for the beginner and intermediate users. A large part of this effort to complete the book has only been possible through the support and sacrifice of many close to the present authors.

We would like to extend our gratitude to Professor Dong Joon Min for his helpful comments and insights for understanding the limitations of steel data analysis,

Dr. Jae Wook Ryu for his consistent support of the authors, and Professor Doo-Hee Lee for inspiration and the drive for academic excellence.

This book is dedicated to our families, whose sacrifice and support has never been fully appreciated by the authors.

Hyunjoung Lee and Il Sohn

About the Authors

Hyunjoung Lee (Ph.D., Korea University, 2007)
Hyunjoung Lee has published 20 articles on issues related to marketing and social network analysis. She is working on several proposals to study various industrial marketing strategies, focusing on trading network structures and underpinning factors behind those trading network structures. She works at Yonsei University as a research professor and teaches marketing, methodology, and statistics to both graduate and undergraduate students in South Korea.

Il Sohn (Ph.D., Carnegie Mellon University, 2007)
Il Sohn has been a faculty member of the Materials Science and Engineering Department at Yonsei University, Korea, since 2009. He received his doctorate from Carnegie Mellon University and has worked in the steel-related industry and academia for more than a decade at U.S. Steel Corporation and Yonsei University. His experience ranges from fundamental research in continuous casting and steel production to the economic analysis and optimization for raw materials utilization in steelmaking. He is currently an associate professor and the associate director for the Research Institute for Iron and Steel Technology, serves on the board of review for *Metals and Materials Transactions B*, is an advisory board member for Steel Research International and the Korean Institute of Metals and Materials, is an associate editor for the *Journal of Sustainable Metallurgy*, and is the founding chair of the Future Steel Technology Forum of Korea. Professor Sohn has been acknowledged by both the academic and the industrial community, receiving numerous awards for his contributions to the profession, including the AISI Medal, Charles-Herty Award, the Hunt-Kelly Award, Marcus A. Grossman Award, and the Iron and Steel Commendation Award from the Ministry of Trade, Industry, and Energy of Korea.

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