

Acknowledgement

This research is supported by MEXT Grand-in-Aid for Scientific Research (B) 25282086.

References

- [1] R. Cooley, B. Mobasher, and J. Srivastava, "Data Preparation for Mining World Wide Web Browsing Patterns," *Knowledge and Information Systems*, vol. 1, Issue. 1, pp. 5-32, February 1999.
- [2] M. Deshpande and G. Karypis, "Selective Markov models for predicting Web page accesses," *ACM Transactions on Internet Technology (TOIT)*, vol. 4, Issue. 2, pp. 163-184, May, 2004.
- [3] J. Keilson, *Markov chain Models-Rarity and Exponentiality*, Applied Mathematical Sciences Series, vol. 28 Springer-Verlag, 1974.
- [4] A. L. Montgomery, S. Li, K. Srinivasan, and J. C. Liechty, "Modeling online browsing and path analysis using clickstream data," *Marketing Science* vol. 23, Issue. 4, pp. 579-595, 2004.
- [5] Ramesh. R. Sarukkai, "Link prediction and path analysis using Markov chains," *Computer Networks* vol. 33, Issue. 1, pp. 377-386, 2000.

Biography

Mikio Komatsu graduated from Faculty of Engineering, Tokyo Institute of Technology, majoring in Industrial Engineering and Management. Upon graduation, he entered Graduate School of Business Administration, Keio University, and is now a second year MBA student at Keio. He is interested in development of marketing strategies, utilizing various tools in big data analytics. Of particular interest to him is to extract the latent consumer needs from massive SNS data for facilitating new product development and services. He will assume a position of Consultant at SIGMAXYZ Inc. next April.

Masahito Mori is a second year MBA student at Graduate School of Business Administration, Keio University. Prior to entering Keio, he had worked in the financial industry of Japan for more than 24 years, including as a Managing Director, Partner and Chief Investment Officer at Platinum Grove Asset Management Japan Ltd. and as a Fixed Income Fund Manager at the Mitsubishi Bank Ltd. By taking advantage of his extensive experiences in asset management with specialty in alternative investment and hedge fund, his research interest is centered on development of practical management tools in big data analytics. In particular, his interest includes the methodological tools for solving problems related to demand forecasting, measurement of effectiveness of advertisement, and machine learning with integration of vast data across different areas. He earned a B.E. in industrial engineering and management from the Tokyo University of Science.

Ushio Sumita is a Research Project Professor at Graduate School of Business Administration, Keio University, Japan. Prior to joining Keio, he has worked for such universities as Graduate School of Systems and Information Engineering, University of Tsukuba, Japan, for which he is a Professor Emeritus, Graduate School of International Management, The International University of Japan, William E. Simon Graduate School of Business Administration, University of Rochester, U.S.A, and Department of Industrial Engineering and Operations Research, Syracuse University, U.S.A. With his first Ph.D. in 1981 from the University of Rochester, U.S.A. and his second Ph.D. in 1987 from the Tokyo Institute of Technology, Japan, he has a wide range of research interests in both theoretical and functional areas, including applied probability, stochastic processes, financial engineering, e-marketing, information and communication technology, production and logistics systems, organizational theory, and comparative analysis of global management approaches, among others. He has published more than 160 papers in leading archive journals in such areas. He also has extensive experiences in business consulting in both the United States and Japan.

Masahiro Okada is a Professor of Strategic Management at the Graduate School of Business Administration, Keio University, Japan. He earned his Ph.D. in Business Administration from The Ohio State University in 1999. He also has an extensive working experience both as an administrator in Honda Motor Company and as a consultant in Arthur D. Little (Japan), a strategy consulting company. His research interests lie in the strategy theories and their application to business activities in emerging markets such as South East Asian countries and Sub-Saharan African countries. His current research topic includes how to measure the value of firm strategy not only in terms of economic value but also in terms of social value, which is the value generated by firms for stakeholders other than shareholders. His recent published articles include "Can Creating Shared Value Be a Source of Competitive Advantage? The Destination of a New View of the Firm" *Diamond Harvard Business Review* (Japanese edition) January 2015.

Takaki Hayashi is Professor of Management Science at Keio Business School. Previously, he was Assistant Professor of Statistics at Columbia University in the City of New York. He was also appointed as COE Visiting Associate Professor at the Graduate School of Mathematical Sciences, the University of Tokyo in 2004. Prior to joining academia, he worked as a financial engineer at the Industrial Bank of Japan, Ltd. His research interests are in statistical science for business and management, quantitative finance and financial econometrics, in particular statistical modeling and analysis of large-scale, high-frequency data. His research has appeared in a number of academic journals, including Bernoulli, Mathematical Finance, and Stochastic Processes and their Applications. He earned his Ph.D. in statistics from the University of Chicago. He earned his master's and bachelor's degrees in engineering from the University of Tokyo. He has been a Director of the Japanese Association of Financial Econometrics and Engineering (JAFEE) since 2006.