

Katsuhiko Ishiguro, Ph. D.

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Preferred Networks, Inc.

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SUMMARY

Katsuhiko Ishiguro has been a researcher at Preferred Networks, Inc. since July 2018, engaging in R&D activities of various fields, including the statistical machine learning, graph neural networks, and personal robots, to name a few.

Before joining Preferred Networks, he served as a scientific researcher at NTT

Communication Science Laboratories, NTT Corporation, from April 2006 to June 2016.

Then he moved to Mirai Translate as a research engineer on Neural Machine Translation production system, as well served as a project manager at NTT DoCoMo.

He received the B. Engineering and M. Informatics degrees from The University of Tokyo in 2004 and 2006, respectively and the Ph. D. in engineering from University of Tsukuba in 2010.

He has been working on machine learning and statistical pattern recognition to develop new data-mining techniques for movies, still images, sound recordings, relational data and their mixtures. His research interests include probabilistic models and deep learning of structured data such as sequences and graphs, statistical pattern recognition for multimedia data, time series analysis and cognitive robotics.

He received the Presentation Award from the IPSJ Special Interest Group of Mathematical Modeling and Problem Solving in 2010, and the Interactive Presentation Award at MIRU2013. He is a member of IEEE.

EMPLOYMENT

Preferred Networks, Inc.

Researcher, July 2018, present.

- Researcher in various topics, including graph neural networks and 3D geometry prediction in computer vision.
 - Conduct research projects as the primal researcher: find and formulate problems,

- devising and implementing solutions, presenting achievements (papers, patents, talks)
 - Survey the status of technologies and share knowledge within the company.
 - Accept and lead internship students from various countries.
- Engineer in Personal Robot project
 - Training data preparations for a visual recognition system.
 - Operate robots in validations and on-site demonstration.
- Data Science Engineer in Meal Replacement Project
 - Propose a recommendation problem framework based on collaborative filtering.
 - Contribute one of the key algorithms in a PoC product.

MIRAI TRANSLATE, Inc.

Research engineer, July 2016, June 2018.

- All technical aspects to improve neural machine translation system in business.
 - * survey SOTA techniques of MT from NIPS, ICLR, ACL, EMNLP, etc.,
 - * manage a calendar for R&D issues to solve technical challenges.
 - * conduct and supervise R&D activities for new functionalities.
 - * support the system developments.

NTT DoCoMo, Inc.

Project Manager, July 2017, June 2018.

Scientific Researcher, July 2016, June 2017.

- concurrent post with Mirai Translate.

NTT COMMUNICATION SCIENCE LABORATORIES

Scientific Researcher, April 2009, June 2016..

Researcher, April 2006, March 2009.

- Conducting and leading research activities (w/o funding) in Statistics, Machine Learning for applications in Data Mining, Social Data Analysis, Multimedia processing.
 - * Survey the status of technologies.
 - * Find and formalize problems.
 - * Propose solutions with backgrounds of statistics and probabilistic modeling.
 - * Program implementations of solutions and conducting numerical experiments for validations.
 - * Write scientific articles to peer-reviewed journals. Write patents (in Japanese).
 - * Present solutions in international conferences.
 - * Collaborating research projects with universities (incl. MIT and University of Tokyo) and enterprise companies.
 - * Accepting internship students: suggesting research tasks, teaching technical (logical)

writings and presentations, submitting scientific articles.

NATIONAL INSTITUTE FOR ADVANCED SCIENCE AND TECHNOLOGY

Technical Staff, April 2005, March 2006.

EDUCATION

UNIVERSITY OF TSUKUBA:

Ph. D - Doctor of engineering, March 2010.

Dissertation title: "Statistical Approach to Time Series Data Analysis and Modeling"

Supervised by Prof. Nobuyuki Otsu

UNIVERSITY OF TOKYO:

M. Informatics, March 2006,

Supervised by Prof. Nobuyuki Otsu and Prof. Yasuo Kuniyoshi

B. Engineering, March 2004,

Supervised by Prof. Nobuyuki Otsu and Prof. Yasuo Kuniyoshi

HONORS AND AWARDS

1. **K. Ishiguro**, Distinguished Reviewer, IJCAI-18, 2018.
2. A. Kimura, **K. Ishiguro**, A. Marcos Alvarez, K. Kataoka, K. Murasaki, and M. Yamada,, Interactive Presentation award, The 16th Meeting on Image Recognition and Understanding (MIRU), 2013.
3. **K. Ishiguro**, Math & Stats Award, Purchase Log Data Analysis Contest, NTT Cyber Communication Laboratory Group, 2011.
4. **K. Ishiguro**, Director Encouraging Award, NTT Communication Science Laboratories, 2011.
5. **K. Ishiguro**, Presentation award, Information Processing Society of Japan (IPSJ), Special interest group of Mathematical modeling and Problem Solving (MPS), 2010.

PUBLICATIONS

BOOKS:

1. **K. Ishiguro** and K. Hayashi, "Learning from Relational Data", Koudansha Scientific, 2016. (in Japanese)

REFERRED JOURNAL ARTICLES:

1. T. Iwata and **K. Ishiguro**, "Robust Unsupervised Cluster Matching for Network Data", *Data Mining and Knowledge Discovery*, Vol. 31, Issue 4, pp. 1132-1154, 2017.
2. **K. Ishiguro**, I. Sato, and N. Ueda, "Averaged Collapsed Variational Bayes Inference", *Journal of Machine Learning Research*, Vol. 18, No. 1, pp. 1-29, 2017.
3. M. Morii, S. Ikeda, N. Tominaga, M. Tanaka, T. Morokuma, **K. Ishiguro**, J. Yamato, N. Ueda, N. Suzuki, N. Yasuda, and N. Yoshida, "Machine-learning Selection of Optical Transients in Subaru/Hyper Supreme-Cam Survey", *Publications of the Astronomical Society of Japan*, Vol. 68. Issue 6, 104, 2016.
4. N. Takaya, K. Esaki, **K. Ishiguro**, and Y. Ichikawa, "The Behavior Generation Modeling Method to Extract the Reason to Select Shops", *Journal of Information Processing*, Vol. 57, No. 1, pp. 145-156, 2016 (in Japanese).
5. A. Kimura, **K. Ishiguro**, A. Marcos Alvarez, M. Yamada, K. Kataoka, and K. Murasaki, "Discovering and Describing Image Contexts from Socially Curated Contents as Corpora", *IP SJ Transactions on Mathematical Modeling and its Applications*, Vol 8, No. 3, pp. 10-25, 2015 (in Japanese).
6. T. Ohtsuka, **K. Ishiguro**, T. Yoshioka, H. Sawada, and H. Okuno, "Multichannel Sound Source Dereverberation and Separation for Arbitrary Number of Sources based on Bayesian Nonparametrics", *IEEE Transactions on Audio, Speech and Language Processing*, Vol. 22, No. 12, pp 2218-2232, 2015.
7. K. Duh, A. Kimura, T. Hirao, **K. Ishiguro**, T. Iwata, and C.-M. Au Yeung, "Creating Stories: Social Curation of Twitter Messages", *IEICE Transactions on Information and Systems*, Vol. 397-D, No. 6, pp. 1557-1566 2014.
8. K. Takeuchi, **K. Ishiguro**, A. Kimura, and H. Sawada, "Multiple Matrix Factorization under the Non-negative Constraints and its Applications for Social Media Analysis", *IP SJ Transactions on Mathematical Modeling and its Applications*, Vol. 7, No. 1, pp. 71-83, 2014 (in Japanese).
9. T. Ohtsuka, **K. Ishiguro**, H. Sawada, and H. G. Okuno, "Bayesian Nonparametric for Microphone Array Processing", *IEEE Transactions on Audio, Speech and Language Processing*, Vol. 22, No. 2, pp. 493-504, 2014.
10. A. Kimura, M. Sugiyama, T. Nakano, H. Kameoka, H. Sakano, E. Maeda, and **K. Ishiguro**, "SemiCCA: An Efficient Semi-supervised Learning of Canonical Correlations", *IP SJ Transactions on MPS*, Vol. 16, No. 1, pp. 128-135, 2013.
11. **K. Ishiguro**, T. Yamada, S. Araki, T. Nakatani and H. Sawada, "Probabilistic Speaker Diarization with Bag-of-words Representations of Speaker Angle Information", *IEEE Transactions on Audio, Speech and Language Processing*, Vol. 20, No. 2, pp. 447-460, 2012.

12. **K. Ishiguro**, T. Iwata and N. Ueda, "Dynamic Infinite Relational Model for Time-dependent Relational Data Analysis", IPSJ Transactions on Mathematical Modeling and its Applications, Vol. 3, No. 1, pp. 1 – 12, 2010 (in Japanese).
13. H. Sakano, T. Yamada and **K. Ishiguro**, "A Preliminary Study of Human Motion Recognition Using Error Correction Learning", IPSJ Transactions on Mathematical Modeling and its Applications, Vol. 2, No. 3, pp. 153-161, 2009 (in Japanese).
14. **K. Ishiguro**, T. Yamada and N. Ueda, "Clustering and Tracking Multi-target Time Series Data Based on Nonparametric Bayes Model", IEICE Transactions on Information and Systems, Vol. J92-D, No. 3, pp. 371-381, 2009 (in Japanese).
15. **K. Ishiguro**, N. Otsu, M. Lungarella and Y. Kuniyoshi, "Comparison of Nonlinear Granger Causality Extensions for Low-Dimensional Systems", Physical Review E, Vol. 77, No. 3, 036217, 2008.
16. **K. Ishiguro**, N. Otsu, M. Lungarella and Y. Kuniyoshi, "Detecting Direction of Causal Interactions between Dynamically Coupled Signals", Physical Review E, Vol. 77, No. 2, 026216, 2008.
17. M. Lungarella, **K. Ishiguro**, Y. Kuniyoshi and N. Otsu, "Methods for Quantifying the Causal Structure of Bivariate Time Series", International Journal of Bifurcation and Chaos, Vol. 17, No. 3, pp. 903-921, 2007.

REFERRED INTERNATIONAL CONFERENCES:

1. R. Zhang, M. Koyama, and **K. Ishiguro**, "Learning Structured Latent Factors from Dependent Data: A Generative Model Framework from Information-Theoretic Perspective", Proceedings of the 37th International Conference on Machine Learning (ICML2020), 2020.
2. **K. Ishiguro**, I. Sato, M. Nakano, A. Kimura, and N. Ueda, "Infinite Plaid Models for Infinite Bi-clustering", Proceedings of the 30th AAAI Conference on Artificial Intelligence (AAAI), 2016.
3. **K. Ishiguro**, I. Sato, and N. Ueda, "Averaged Collapsed Variational Bayes Inference of Infinite Relational Model", in Advances in Variational Inference Workshop (at NIPS2014), 2014.
4. T. Ohtsuka, **K. Ishiguro**, H. Sawada, and H. Okuno, "Bayesian Nonparametrics for Microphone Array Processing", Proceedings of the IEEE Global SIP, 2014.
5. M. Nakano, **K. Ishiguro**, A. Kimura, T. Yamada, and N. Ueda, "Rectangular Tiling Process", Proceedings of the 31st International Conference on Machine Learning (ICML), 2014.

6. K. Takeuchi, R. Tomioka, **K. Ishiguro**, A. Kimura, and H. Sawada, "Non-negative Multiple Tensor Factorization", Proceedings of the 2013 IEEE International Conference on Data Mining (ICDM), 2013.
7. A. Kimura, **K. Ishiguro**, A. Marcos Alvarez, K. Kataoka, K. Murasaki, and M. Yamada, "Image Context Discovery from Socially Curated Contents", Proceedings of the 21st ACM International Conference on Multimedia (ACMMM2013), pp. 565-568, 2013.
8. K. Takeuchi, **K. Ishiguro**, A. Kimura and H. Sawada, "Non-negative Multiple Matrix Factorization", Proceedings of the 2013 International Joint Conference on Artificial Intelligence (IJCAI-13), 2013.
9. **K. Ishiguro**, A. Kimura and K. Takeuchi, "Towards Automatic Image Understanding and Mining via Social Curation", Proceedings of the IEEE International Conference on Data Mining (ICDM12), pp. 906-911, 2012.
10. H. Sakano, T. Ohashi, A. Kimura, H. Sawada and **K. Ishiguro**, "Extended Fisher Criterion based on Auto-correlation Matrix Information", Proceedings of the 9th International Workshop on Statistical Techniques in Pattern Recognition and 14th International Workshop on Structural and Syntactic Pattern Recognition (S+SSPR2012), 2012 (accepted as an oral session paper).
11. T. Otsuka, **K. Ishiguro**, H. Sawada and H. G. Okuno, "Unified Auditory Functions based on Bayesian Topic Model", Proceedings of the 2012 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2012), 2012.
12. T. Otsuka, **K. Ishiguro**, H. Sawada and H. G. Okuno, "Bayesian Unification of Sound Source Localization and Separation with Permutation Resolution", Proceedings of the 26th AAAI Conference on Artificial Intelligence (AAAI2012), pp. 2038-2045, 2012 (as an oral session paper).
13. K. Duh, T. Hirao, A. Kimura, **K. Ishiguro**, T. Iwata and C. -M. Au Yueng, "Creating Stories: Social Curation of Twitter Messages", Proceedings of the 6th International AAAI Conference on Weblogs and Social Media (ICWSM2012), 2012.
14. **K. Ishiguro**, N. Ueda and H. Sawada, "Subset Infinite Relational Models", Proceedings of the 15th International Conference on Artificial Intelligence and Statistics (AISTATS2012), pp. 547-555, 2012.
15. T. Fujino, **K. Ishiguro** and H. Sawada, "Logitboost Extension for Early Classification of Sequences", Lecture Notes in Computer Science: Computer Analysis of Images and Patterns (Proceedings of CAIP2011), Vol. 6854, Part I. pp. 579-588, 2011.
16. T. Matsubayashi and **K. Ishiguro**, "Mobile Topigraphy: Large-scale tag cloud visualization for mobiles", Proceedings of the 20th International World Wide Web Conference (WWW2011), 2011.

17. **K. Ishiguro**, T. Iwata, N. Ueda and J. Tenenbaum, "Dynamic Infinite Relational Model for Time-varying Relational Data Analysis", *Advances in Neural Information Processing Systems 23 (Proceedings of NIPS2010)*, 2010.
18. **K. Ishiguro**, H. Sawada and H. Sakano, "Multi-Class Boosting for Early Classification of Sequences", *Proceedings of the 21st British Machine Vision Conference (BMVC2010)*, pp. 24.1-24.10, 2010.
19. A. Kimura, H. Kameoka, M. Sugiyama, E. Maeda, H. Sakano and **K. Ishiguro**, "SemiCCA: Efficient Semi-supervised Learning of Canonical Correlations", *Proceedings of the 20th International Conference on Pattern Recognition (ICPR2010)*, pp. 2933-2936, 2010.
20. T. Maekawa, Y. Yanagisawa, Y. Kishino, **K. Ishiguro**, K. Kamei, Y. Sakurai and T. Okadome, "Object-based Activity Recognition with Heterogeneous Sensors on Wrist", *Proceedings of the Eighth International Conference on Pervasive Computing (Pervasive 2010)*, pp. 246-264 2010.
21. **K. Ishiguro**, T. Yamada, S. Araki and T. Nakatani, "A Probabilistic Speaker Clustering for DOA-based Diarization", *Proceedings of the IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA 2009)*, pp. 241-244, 2009.
22. **K. Ishiguro**, T. Yamada and N. Ueda, "Simultaneous Clustering and Tracking Unknown Number of Objects", *Proceedings of the IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR '08)*, pp. 1-8, 2008.
23. T. Shiraki, H. Saito, Y. Kamoshida, **K. Ishiguro**, R. Fukano, T. Shirai, K. Taura, M. Otake, T. Sato and N. Otsu, "Real-Time Motion Recognition Using CHLAC Features and Cluster", *Proceedings of IFIP International Conference on Network and Parallel Computing (NPC 2006)*, pp. 50-56, 2006.
24. **K. Ishiguro**, N. Otsu and Y. Kuniyoshi, "Inter-modal Learning and Object Concept Acquisition", *Proceedings of IAPR Conference on Machine Vision Applications (MVA2005)*, pp. 148-151, 2005.

REFERRED DOMESTIC (JAPANESE) CONFERENCES:

1. **K. Ishiguro**, H. Sawada and H. Sakano, "Multiclass Boosting for Sequence Early Classification and its Applications", *Proceedings of 13th Meeting on Image Recognition and Understanding (MIRU10)*, OS10-2, pp. 1452-1458, 2010 (in Japanese).
2. **K. Ishiguro**, T. Yamada and N. Ueda, "Multi-target tracking with multiple dynamics estimation", *Proceedings of 11th Meeting on Image Recognition and Understanding (MIRU08)*. pp. 294 -301, 2008 (in Japanese).
3. Y. Kamoshida, K. Taura, T Shirai, H. Saito, T. Shiraki, **K. Ishiguro**, R. Fukano, M Otake,

T Sato and N Otsu, "A low-latency parallel real-time motion recognition system utilizing redundant processors", Proceedings of Symposium on Advanced Computing Systems and Infrastructures (SACSIS), IPSJ Symposium Series Vol. 2006, No. 5, pp. 533-540, 2006 (in Japanese).

PREPRINTS:

1. **K. Ishiguro**, K. Ujihara, R. Sawada, H. Akita, and M. Kotera, "Data Transfer Approach to Improve Seq-to-Seq Retrosynthesis", arXiv: 2020.00792 [cs.LG], 2020.
2. **K. Ishiguro**, K. Oono, and K. Hayashi, "Weisfeiler-Lehman Embedding for Molecular Graph Neural Networks", arXiv: 2006.06909 [cs.LG], 2020.
3. S. Honda, H. Akita, **K. Ishiguro**, T. Nakanishi, and K. Oono, "Residual Flow for Molecular Graph Generation", arXiv: 1909.13521 [cs.LG], 2019.
4. K. Madhawa, **K. Ishiguro**, K. Nakago, and M. Abe, "GraphNVP: An Intertible Flow Model for Generating Molecular Graphs", arXiv: 1905.11600 [cs.LG], 2019.
5. **K. Ishiguro**, S. Maeda and M. Koyama, "Graph Warp Module: an Auxiliary Module for Boosting the Power of Graph Neural Networks", arXiv: 1902.01020 [cs.LG], 2019.
6. **K. Ishiguro**, T. Yamada and N. Ueda, "Collapsed Variational Bayes Inference of Infinite Relational Moel", arXiv: 1409.4757 [cs.LG], 2014.

OTHER PUBLICATIONS:

1. N. Tominaga, T. Morokuma, M. Tanaka, N. Yasuda, H. Furusawa, M. Morii, S. Ikeda, N. Ueda, J. Yamato, **K. Ishiguro**, Y. Nakamura, A. Yamanaka, N. Yoshida, N. Suzuki, J. Jiang, T. Kato, Y. Taniguchi, T. Shibata, S. Miyazaki, T. J. Moriya, J. Noumaru, K. Schubert, and T. Takata, "Supernova candidates discovered with Subaru/Hyper Suprime-Cam", The Astronomer's Telegram, ATel #7927, 2015.
2. **K. Ishiguro** and K. Takeuchi, "Extracting Essential Structure from Data", NTT Technical Review, Vol. 10, No. 11, 2012.
3. **K. Ishiguro**, "Complex Data Analysis using Mixture Models", NTT Technical Review, Vol. 9, No. 1, 2011.

LECTURES AND TUTORIALS:

1. **K. Ishiguro**, "An Introduction to Graph Neural Networks: Basics and Applications", a special lecture on Data Science at Nara Institute of Science and Technology (NAIST), Sep 2020.
2. D. Mochihashi, **K. Ishiguro**, and T. Iwata, "Probabilistic Topic Models", Public Lecture of the Institute of Statistical Mathematics, 2013.

3. D. Mochihashi and **K. Ishiguro**, “Probabilistic Topic Models”, Public Lecture of the Institute of Statistical Mathematics, 2013.

INVITED TALKS:

1. **K. Ishiguro** and A. Kimura, “A survey of the topic models for statistical pattern recognition researchers”, IEICE Technical Committee Conferences on Pattern Recognition and Media Understanding, 2015.
2. **K. Ishiguro**, “Introduction of Relational Data Clustering”, Graph mining & WEB & AI seminar, 2014.
3. **K. Ishiguro**, “Introduction of Relational Data Modeling by Statistical Machine Learning Techniques”, The 3rd ICT basic research seminars, 2012 (in Japanese).
4. **K. Ishiguro**, “Analysis of Nonstationary Time-varying Relational Data”, The 14th Information-Based Induction Science Workshop (IBIS2011), 2011 (in Japanese).
5. **K. Ishiguro**, “Estimating Nonstationary Latent Structure within Time-varying Relational Data”, The 2nd Latent Dynamics Workshop, 2011 (in Japanese).

PATENTS (Japanese, partially):

1. Patent 5771573, 2015.
2. Patent 5746086, 2015.
3. Patent 5684055, 2015.
4. Patent 5499362, 2014.
5. Patent 5499361, 2014.
6. Patent 5462748, 2014.
7. Patent 5281990, 2013.
8. Patent 5022387, 2012.
9. Patent 4972016, 2012.

PROFESSIONAL MEMBERSHIPS & SERVICES

Member of: IEEE

Program Committee: IBIS2014, IBIS2017

Journal Reviewer (partially): ACM Transactions on Intelligent Systems and Technology (English), IEICE Transactions (English, Japanese), IPSJ Transactions (English, Japanese).

Conference Reviewer (partially): NIPS, ICML, ICLR, IJCAI, AAAI, ICPR, NIPS workshop on Advances in Approximate Bayesian Inferences, IROS, ACCV. .

ADDITIONAL INFORMATION

LANGUAGES: Japanese (native tongue), English (research/technical discussion level; TOEIC: 935, TOEFL iBT: 95), Spanish (elementary), German(elementary)

PROGRAMING LANGUAGES(in order of the expertise): Java(15+ yr.), Matlab(10+,yr), Python(5+ yr.), Perl(10+ yr.), C, Lua, C++, JavaScript.

CITIZENSHIP: Japan

DATE OF BIRTH: 02 March, 1982

SEX: Male