

Tsuyoshi Idé

(“Ide-san”; 井手 剛)

Ph.D., Head of Data Science, IBM Semiconductors at IBM Research

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Summary

I am passionate about modeling real-world business problems using advanced machine learning methods. I have a strong track record of successfully leading numerous customer engagements to deliver first-of-a-kind AI solutions across various industries. Many of the core algorithms I developed in these projects have been published in top AI and data mining conferences such as AAAI, IJCAI, ICDM, and SDM, establishing me as a leading expert in AI-powered industry solution development at IBM.

In particular, I am recognized as an expert in anomaly and change detection, as evidenced by the two textbooks I have authored. My primary interest lies in extracting actionable insights from AI algorithms. For example, you can read my thoughts on the explainability of AI in my LinkedIn article, which is based on my recent papers published in AAAI 2021 and KDD 2023. My other recent research interests include causal discovery from stochastic event data for AIOps (NeurIPS 2021) and graph neural networks (AAAI 2022, ICASSP 2023).

Currently, I serve as the Head of Data Science for IBM Semiconductors at the IBM Research Division. In this role, I lead several strategic initiatives, including defect causal analysis of the state-of-the-art 2-nanometer semiconductor fabrication process and simulation-based fab-wide optimization.

I am a Japanese citizen and a U.S. Green Card holder.

Professional Experience

- Present - **Head of Data Science, IBM Semiconductors, IBM Research.**
2023/04/01
- Formulate R&D roadmap for technical differentiation of IBM's Manufacturing Execution System (MES) using AI/ML technologies.
 - Lead technology development with data scientists for Fab-wide optimization in semiconductor manufacturing.
 - Provide consulting based on deep AI/ML expertise to address clients' pain points in semiconductor manufacturing.
- 2023/03/31 - **Senior Technical Staff Member, IBM Research, T.J. Watson Research Center.**
2015/01/01
- Perform basic and applied machine learning research as an independent contributor to publish research outcomes in world premier conferences and journals as well as patents.
 - Lead customer engagements and provide technical guidance.
 - Play a role of technical evangelist to influence IBM's technical roadmap based on a broad range of experiences on real business.
- 2014/12/31 - **Manager, Service Delivery & Risk Analytics, IBM Research, T.J. Watson Research Center.**
2013/09/04
- Engaged in people, project, and research strategy management.
 - Proposed new AI-based approaches to IT (information technology) system development, which resulted in two IBM Outstanding Technical Achievement Awards .
- 2013/09/03 - **Manager, Analytics & Optimization , IBM Research – Tokyo, Japan.**
2010/11/01
- Represented the entire area of AI at IBM Research – Tokyo.
 - Successfully established an organizational management model that achieves an optimal balance between business and academic contributions.
 - Major successful projects include the development of intelligent transportation system in Kenya and a monitoring system for ocean-going vessels. IBM Japan's General Manager Award was given to the latter.

- 2010/10/31 - **Senior/Advisory/Staff Researcher**, *IBM Research – Tokyo, Japan.*
 2005/01/01 — Led basic and applied research in AI as a technical leader.
 — Pioneered a new research field of sensor data analytics, which eventually evolved into IBM's IoT Business Unit.
 — Major research achievements include the establishment of dependency-based anomaly detection method, which was awarded Outstanding Technical Achievement Award later.
- 2004/12/31 - **Researcher**, *IBM Research – Tokyo, Japan.*
 2000/04/01 — Engaged in improving existing IBM products using mathematical science technologies.
 — Major contributions include a major improvement of luminance uniformity of IBM ThinkPad displays and the development anomaly detection solution of computer systems.

Industry knowledge

- Semiconductor manufacturing
- Financial (change detection, blockchains, federated/collaborative learning, etc.)
- Automotive (sensor analytics, simulation, failure analysis, etc.)
- Condition-based monitoring (petroleum, AIOps, mining, etc.)
- Transportation (railway, maritime, intelligent transportation system, traffic simulation, etc.)
- Human behavior modeling (questionnaire data analysis through psychometrics, trajectory analysis, etc.)
- Healthcare (diabetes data analytics)
- Quantitative project risk management
- Display optics design
- Power grid failure analysis

Language

- Japanese (native)
- English (professional proficiency)

Awards

- 2023 **Outstanding Technical Achievement Award**, *IBM Corporation.*
 For Scientific Contribution to AI for Combinatorial Sparsity
- 2021 **High Value Patent Award**, *IBM Corporation.*
 For the invention titled "Learning pattern dictionary from noisy numerical data in distributed networks"
- 2019 **Research Division Award**, *IBM Corporation.*
 For SROM–Smarter Resources and Operations Management Framework
- 2018 **Outstanding Technical Achievement Award**, *IBM Corporation.*
 For Business and Technical Leadership in Anomaly Analyzer of Correlational Data
- 2017 **Best Author Award**, *The Japan Society for Industrial and Applied Mathematics .*
 For his article titled "Predicting project risks using latent trait model"
- 2016 **Outstanding Technical Achievement Award**, *IBM Corporation.*
 For Financial Risk Analytics for Strategic Outsourcing
- Outstanding Technical Achievement Award**, *IBM Corporation.*
 For End-to-end Contract Profitability Analytics for ITS
- 2015 **Outstanding Technical Achievement Award**, *IBM Corporation.*
 For Fundamental Contributions to Anomaly Detection
- Research Division Award**, *IBM Corporation.*
 For Strategic Outsourcing T&T Repeatable Model Release 11 : Cost Analysis and Optimization
- 2013 **General Manager Award**, *IBM Japan.*
 For successful development of cloud-based vessel monitoring system
- 2007 **Winner, ICDM Data Mining Contest**, *IEEE ICDM 2007*, The 2007 Seventh IEEE International Conference on Data Mining.

- 2006 **JSAI Annual Conference Award**, *The Japanese Society for Artificial Intelligence*.
For his paper titled “Theoretical basis for subsequence time-series clustering” presented at the 20th Annual Conference of the Japanese Society for Artificial Intelligence
- 2004 **JSAI Annual Conference Award**, *The Japanese Society for Artificial Intelligence*.
For his paper titled “Eigenspace Approach to Anomaly Detection in Computer Systems” presented at the 18th Annual Conference of the Japanese Society for Artificial Intelligence
- 1993 **Hatakeyama Award**, *The Japan Society of Mechanical Engineers*.
- 1990 **Hatakeyama Award**, *The Japan Society of Mechanical Engineers*.

Academic degrees

- 2000/03/31 **Ph.D. University of Tokyo**, Department of Physics, Graduate School of Science.
Thesis : “Theoretical Study on Nonlocal Effects in Resonant X-Ray Emission Spectra of Strongly-Correlated Systems” (Supervisor : Prof. Kotani Akio)
- 1997/03/31 **MSc. in Physics, University of Tokyo**, Department of Physics, Graduate School of Science.
- 1993/03/31 **BEng in Mechanical Engineering, Tohoku University**, Department of Mechanical Engineering, School of Engineering.

Publications : Conference proceedings (refereed)

- Decentralized Collaborative Learning Framework with External Privacy Leakage Analysis**
Tsuyoshi Idé, Rudy Raymond, Dzung T. Phan,
Proceeding of 2023 International workshop Blockchain Kaigi (BCK 23, Oct. 28-29, 2024, Kobe, Japan), pp. TBD, 2024.
- Learning Granger Causality from Instance-wise Self-attentive Hawkes Processes**
Dongxia Wu, Tsuyoshi Idé, Georgios Kollias, Jiri Navratil, Aurelie Lozano, Naoki Abe, Yian Ma, and Rose Yu,
Proceedings of the 27th International Conference on Artificial Intelligence and Statistics (AISTATS 2024, May 2-4, 2024, Valencia, Spain), pp. 415-423, 2024.
- Generative Perturbation Analysis for Probabilistic Black-Box Anomaly Attribution**
Tsuyoshi Idé, Naoki Abe,
Proceedings of the 29th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD 2023, August 6-10, 2023, Long Beach, California, USA), pp.845–856, 2023.
- Direction aware positional and structural encoding for directed graph neural networks**
Yonas Sium, Georgios Kollias, Tsuyoshi Idé, Payel Das, Naoki Abe, Aurelie Lozano,
Proceedings of the 2023 IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP 2023, June 4-10, 2023, Rhodes Island, Greece), pp.1–5, 2023.
- Directed Graph Auto-Encoders**
Georgios Kollias, Vasileios Kalantzis, Tsuyoshi Idé, Aurelie Lozano, Naoki Abe,
Proceedings of the Thirty-Sixth AAAI Conference on Artificial Intelligence (AAAI 22, February 22-March 1, 2022, virtual), pp.7211–7219, 2022.
- Cardinality-Regularized Hawkes-Granger Model**
Tsuyoshi Idé, Georgios Kollias, Dzung T. Phan, Naoki Abe,
Advances in Neural Information Processing Systems 34 (NeurIPS 2021), pp.2682-2694, 2021.
- Decentralized Collaborative Learning with Probabilistic Data Protection**
Tsuyoshi Idé, Rudy Raymond
Proceedings of the 2021 IEEE International Conference on Smart Data Services (SMDS 21, September 5-10, 2021, virtual), pp.234-243, 2021.
- Anomaly Attribution with Likelihood Compensation**
Tsuyoshi Idé, Amit Dhurandhar, Jiří Navrátil, Moninder Singh, Naoki Abe
Proceedings of the Thirty-Fifth AAAI Conference on Artificial Intelligence (AAAI 21, February 2-9, 2021, virtual), pp.4131–4138, 2021.

9. **Predicting Nocturnal Hypoglycemia under Free-Living Conditions from Continuous Glucose Monitoring Data with Extended Prediction Horizon**
Long Vu, Sarah Kefayati, Tsuyoshi Idé, Venkata Pavuluri, Gretchen Jackson, Lisa Latts, Yuxiang Zhong, Pratik Agrawal, and Yuan-chi Chang
Proceedings of the AMIA 2019 Annual Symposium (AIMA 19), pp.874-882, 2019.
10. **Efficient Protocol for Collaborative Dictionary Learning in Decentralized Networks**
Tsuyoshi Idé, Rudy Raymond, and Dzung T. Phan
Proceedings of the Twenty-Eighth International Joint Conference on Artificial Intelligence (IJCAI 19), pp. 2585–2591, 2019.
11. **ℓ_0 -Regularized Sparsity for Probabilistic Mixture Models**
Dzung T. Phan and Tsuyoshi Idé
Proceedings of the SIAM International Conference on Data Mining (SDM 19), pp.172-180, 2019.
12. **Tensorial Change Analysis using Probabilistic Tensor Regression**
Tsuyoshi Idé
Proceedings of the Thirty-Third AAAI Conference on Artificial Intelligence (AAAI-19), pp.3902–3909, 2019.
13. **Collaborative Anomaly Detection on Blockchain from Noisy Sensor Data**
Tsuyoshi Idé
Proceedings of 2018 IEEE International Conference on Data Mining Workshops (ICDMW); Workshop on Blockchain Systems for Decentralized Mining (BSDM), pp.120-127, 2018.
14. **Multi-task Multi-modal Models for Collective Anomaly Detection**
Tsuyoshi Idé, Dzung T. Phan, and Jayant Kalagnanam
Proceedings of 2017 IEEE International Conference on Data Mining (ICDM 17), pp. 177-186, 2017.
15. **A Novel ℓ_0 -constrained Gaussian Graphical Model for Anomaly Localization**
Dzung T. Phan, Tsuyoshi Idé, Jayant Kalagnanam, Matt Menickelly, and Katya Scheinberg
Proceedings of the 17th International Conference on Data Mining Workshops (ICDMW 2017), pp.830-833, 2017.
16. **Sparse Gaussian Markov random field mixtures for anomaly detection**
Tsuyoshi Idé, Ankush Khandelwal, and Jayant Kalagnanam
Proceedings of 2016 IEEE International Conference on Data Mining (ICDM 16), pp. 955-960, 2016.
17. **Unsupervised object counting without object recognition**
Takayuki Katsuki, Tetsuro Morimura, and Tsuyoshi Idé
Proceedings of the 23rd International Conference on Pattern Recognition (ICPR 2016), pp. 3616-3621, 2016.
18. **Change detection using directional statistics**
Tsuyoshi Idé, Dzung T. Phan, and Jayant Kalagnanam
Proceedings of the Twenty-Fifth International Joint Conference on Artificial Intelligence (IJCAI 16), pp. 1613-1619, 2016.
19. **Informative prediction based on ordinal questionnaire data**
Tsuyoshi Idé and Amit Dhurandhar
Proceedings of 2015 IEEE International Conference on Data Mining (ICDM 15), pp.191-200, 2015.
20. **Probabilistic text analytics framework for information technology service desk tickets**
Kuan-Yu Chen, Ee-Ea Jan, and Tsuyoshi Idé
Proceedings of the 14th IFIP/IEEE International Symposium on Integrated Network Management (IM 2015), pp.870-873, 2015.
21. **Latent trait analysis for risk management of complex information technology projects**
Tsuyoshi Idé, Sinem Güüven, Ee-Ea Jan, Sergey Makogon, and Alejandro Venegas
Proceedings of the 14th IFIP/IEEE International Symposium on Integrated Network Management (IM 2015), pp.305-312, 2015.
22. **Probabilistic two-level anomaly detection for correlated systems**
Bin Tong, Tetsuro Morimura, Einoshin Suzuki, and Tsuyoshi Idé
Proceedings of the 21st European Conference on Artificial Intelligence (ECAI 2014), pp.21-23, 2014.

23. **Mining for gold : How to predict service contract performance with optimal accuracy based on ordinal risk assessment data**
Sinem Güüven, Mathias Steiner, Tsuyoshi Idé, Sergey Makogon, and Alejandro Venegas
Proceedings of the 11th IEEE International Conference on Services Computing (IEEE SCC 2014), pp.315-322, 2014.
24. **Solving inverse problem of Markov chain with partial observations**
Tetsuro Morimura, Takayuki Osogami, and Tsuyoshi Idé
Proceedings of Neural Information and Processing Systems (NIPS 2013), pp.1655-1663, 2013.
25. **Monitoring entire-city traffic using low-resolution web cameras**
Tsuyoshi Idé, Takayuki Katsuki, Tetsuro Morimura, and Robert Morris
Proceedings of ITS World Congress Tokyo 2013, Number 3143, 2013.
26. **Identifying the optimal road closure with simulation**
Takayuki Osogami, Hideyuki Mizuta, and Tsuyoshi Idé
Proceedings of ITS World Congress Tokyo 2013, Number 3178, 2013.
27. **Predicting battery life from usage trajectory patterns**
Toshiro Takahashi and Tsuyoshi Idé
Proceedings of the 19th International Conference on Pattern Recognition (ICPR 2012), pp.2946-2949, 2012.
28. **X10-based massive parallel large-scale traffic flow simulation**
T. Suzumura, S. Kato, T. Imamichi, M. Takeuchi, H. Kanezashi, Tsuyoshi Idé, and T. Onodera
Proceedings of the ACM SIGPLAN 2012 X10 Workshop (X10 12), pp.3 :1-3 :4, 2012
29. **Nonlinear optimization to generate non-overlapping random dot patterns**
Takashi Imamichi, Hidetoshi Numata, Hideyuki Mizuta, and Tsuyoshi Idé
Proceedings of the Winter Simulation Conference 2011 (WSC 11), pp.2419-2430, 2011.
30. **Trajectory regression on road networks**
Tsuyoshi Idé and Masashi Sugiyama
Proceedings of AAAI Conference on Artificial Intelligence (AAAI 11), pp.203-208, 2011.
31. **Proximity-based anomaly detection using sparse structure learning**
Tsuyoshi Idé, Aurelie C. Lozano, Naoki Abe, and Yan Liu
Proceedings of 2009 SIAM International Conference on Data Mining (SDM 09), pp.97-108, 2009.
32. **Travel-time prediction using Gaussian process regression : A trajectory-based approach**
Tsuyoshi Idé and Sei Kato
Proceedings of 2009 SIAM International Conference on Data Mining (SDM 09), pp.1185-1196, 2009.
33. **Semi-supervised local Fisher discriminant analysis for dimensionality reduction**
Masashi Sugiyama, Tsuyoshi Idé, Shinichi Nakajima, and Jun Sese
Proceedings of the Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD 08), pp.333-344, 2008.
34. **Unsupervised change analysis using supervised learning**
Shohei Hido, Tsuyoshi Idé, Hisashi Kashima, Harunobu Kubo, and Hirofumi Matsuzawa
Proceedings of the Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD 08), pp.148-159, 2008.
35. **Computing correlation anomaly scores using stochastic nearest neighbors**
Tsuyoshi Idé, Spiros Papadimitriou, and Michail Vlachos
Proceedings of the Seventh IEEE International Conference on Data Mining (ICDM 07), pp.523-528, 2007.
36. **Change-point detection using Krylov subspace learning**
Tsuyoshi Idé and Koji Tsuda
Proceedings of 2007 SIAM International Conference on Data Mining (SDM 07), pp.515-520, 2007.
37. **Why does subsequence time-series clustering produce sine waves ?**
Tsuyoshi Idé

Proceedings of the 10th European Conference on Principles and Practice of Knowledge Discovery in Databases (PKDD 06), pp.311-322, 2006.

38. **Network-based problem detection for distributed systems**
H. Kashima, T. Tsumura, Tsuyoshi Idé, T. Nogayama, R. Hirade, H. Etoh, and T. Fukuda
Proceedings of the 21st International Conference on Data Engineering (ICDE 2005), pp.978-989, 2005.
39. **Pairwise symmetry decomposition method for generalized covariance analysis**
Tsuyoshi Idé
Proceedings of the Fifth IEEE International Conference in Data Mining (ICDM 05), pp.657-660, 2005.
40. **Knowledge discovery from heterogeneous dynamic systems using change-point correlations**
Tsuyoshi Idé and Keisuke Inoue
Proceedings of 2005 SIAM International Conference on Data Mining (SDM 05), pp.571-575, 2005.
41. **Eigenspace-based anomaly detection in computer systems**
Tsuyoshi Idé and Hisashi Kashima
Proceedings of ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD 04), pp.440-449, 2004.
42. **Moiré-free collimating light guide with low-discrepancy dot patterns**
Tsuyoshi Idé, H. Numata, H. Mizuta, Y. Taira, M. Suzuki, M. Noguchi, and Y. Katsu
Digest of Technical Papers of Society for Information Display 2002 (SID 02), pp.1232-1235, 2002.

Publications : Journal (refereed)

1. **Diagnostic Spatio-temporal Transformer with Faithful Encoding**
Jokin Labaien, Tsuyoshi Idé, Ekhi Zugasti, Xabier De Carlos
Knowledge-Based Systems, Vol. 274 (110639), 2023.
2. **Signal and noise extraction from analog memory elements for neuromorphic computing**
N. Gong, Tsuyoshi Idé, S. Kim, I. Boybat, A. Sebastian, V. Narayanan, and T. Ando
Nature Communications, Vol. 9, pp.2102, 2018.
3. **City-wide traffic flow estimation from limited number of low quality cameras**
Tsuyoshi Idé, Tetsuro Morimura Takayuki Katsuki, and Robert Morris
IEEE Transactions on Intelligent Transportation Systems, Vol. 18, No. 4, pp.950-959, 2017.
4. **Supervised item response models for informative prediction**
Tsuyoshi Idé and Amit Dhurandhar
Knowledge and Information Systems, 51 :235-257, 2017.
5. **Toward simulating entire cities with behavioral models of traffic**
Takayuki Osogami, Takaashi Imamichi, Hideyuki Mizuta, and Tsuyoshi Idé
IBM Journal of Research and Development, 57 :6 :1-6 :10, 2013.
6. **Vehicle near-miss situation prediction from probe-car data using statistical machine learning**
Tetsuro Morimura, Yusuke Tanizawa, Shinya Yamasaki, and Tsuyoshi Idé
Journal of Information Processing, 43 :573-578, 2012.
7. **Modeling patent quality : A system for large-scale patentability analysis using text mining**
Shohei Hido, Shoko Suzuki, Risa Nishiyama, Takashi Imamichi, Rikiya Takahashi, Tetsuya Nasukawa, Tsuyoshi Idé, Yusuke Kanehira, Rinju Yohda, Takeshi Ueno, Akira Tajima, and Toshiya Watanabe
Journal of Information Processing, 20 :667-671, 2012.
8. **Trajectory regression for travel-time prediction**
Tsuyoshi Idé and Sei Kato
Transactions of the Japanese Society for Artificial Intelligence, 25 :377-382, 2010.
9. **Unsupervised change analysis using supervised learning**
H. Matsuzawa, S. Hido, Tsuyoshi Idé, and H. Kashima
The IEICE Transactions on Information and Systems, E93-D :816-825, 2010.
10. **Semi-supervised local Fisher discriminant analysis for dimensionality reduction**
M. Sugiyama, Tsuyoshi Idé, S. Nakajima, and J. Sese
Machine Learning, 78 :35-61, 2010.

11. **Recent advances and trends in large-scale kernel methods**
H. Kashima, Tsuyoshi Idé, T. Kato, and M. Sugiyama
IEICE Transactions on Information and Systems, E92-D :1338-1353, 2009.
12. **Network-based problem detection for distributed systems**
H. Kashima, T. Tsumura, Tsuyoshi Idé, T. Nogayama, R. Hirade, H. Etoh, and T. Fukuda
IEICE Transactions on Information and Systems, J89-D :183-198, 2006.
13. **Dot pattern generation technique using molecular dynamics**
Tsuyoshi Idé, H. Mizuta, H. Numata, Y. Taira, M. Suzuki, M. Noguchi, and Y. Katsu
Journal of the Optical Society of America A20 :242-255, 2003.
14. **A novel dot-pattern generation to improve luminance uniformity of an LCD backlight**
Tsuyoshi Idé, H. Numata, H. Mizuta, Y. Taira, M. Suzuki, M. Noguchi, and Y. Katsu
Journal of the Society for Information Display, 11 :659-665, 2003.
15. **Nonlocal screening effect in Cu 4*p*-1*s* resonant X-ray emission spectra of Nd₂CuO₄**
Tsuyoshi Idé and Akio Kotani
Journal of the Physical Society of Japan, 69 :3107-3114, 2000.
16. **Interplay between raman and uorescence-like components in resonant X-ray emission spectra of degenerate *d*₀ and *d*₁ systems**
Tsuyoshi Idé and Akio Kotani
Journal of the Physical Society of Japan, 69 :1895-1906, 2000.
17. **Polarization and momentum dependence of a charge-transfer excitation in Nd₂CuO₄**
K. Hämäläinen, J. P. Hill, S. Huotari, C. C. Kao, L. E. Berman, A. Kotani, Tsuyoshi Idé, J. L. Peng, and R. L. Greene
Physical Review, B61 :1836-1840, 2000.
18. **Local and nonlocal excitations in Cu 4*p*-1*s* resonant X-ray emission spectra of Nd₂CuO₄**
Tsuyoshi Idé and Akio Kotani
Journal of the Physical Society of Japan, 68 :3100-3109, 1999.
19. **Theoretical study on cluster size effects on X-ray absorption and resonant X-ray emission spectra in *d* and *f* electron systems**
Akio Kotani and Tsuyoshi Idé
Journal of Synchrotron Radiation, 6 : 208-309, 1998.
20. **A model study on cluster size effects of resonant X-ray emission spectra**
Tsuyoshi Idé and Akio Kotani
Journal of the Physical Society of Japan, 67 :3621-3629, 1998.

Publications : Book

Author

1. **Introduction to Anomaly Detection using Machine Learning — A Practical Guide with R**
Tsuyoshi Idé, Corona Publishing (in Japanese), 2015.
2. **Anomaly Detection and Change Detection**
Tsuyoshi Idé and Masashi Sugiyama, Kodansha (in Japanese), 2015.

Translation

1. **Computer Age Statistical Inference**
H. Fujisawa, Tsuyoshi Idé, Kyoritsu, 2020 (Japanese translation of the book of the same title by Bradley Efron and Trevor Hastie, Cambridge University Press, 2016).
2. **The Elements of Statistical Learning**
M. Sugiyama, Tsuyoshi Idé, T. Kamishima, T. Kurita, and E. Maeda, Kyoritsu, 2014 (Japanese translation of the book of the same title by Jerome H. Friedman, Robert Tibshirani, and Trevor Hastie, Springer, 2001).
3. **Pattern Recognition and Machine Learning**
H. Motoda, et al., Maruzen, 2012, Chap. 12 (Japanese translation of the book of the same title by Christopher Bishop, Springer, 2006).

Chapter contributions

1. **Decentralized Collaborative Learning and Risk Management**
Tsuyoshi Idé, in From Anomaly Detection to Risk Management, Saiensu-Sha, Chap. 4, 2022.
2. **Making relationships simple – A story of graphical lasso**
Tsuyoshi Idé, in Iwanami Data Science, Vol.5, pp.48-63, 2016.
3. **Continuous Latent Variables**
Tsuyoshi Idé, in Pattern Recognition and Machine Learning, H. Motoda, T. Kurita, T. Higuchi, Y. Matsumoto, and N. Murata, ed., Maruzen (in Japanese), Chap.12, 2014.
4. **Change detection from heterogeneous data sources**
Tsuyoshi Idé, in Pattern Data Mining for Service, K. Yada, ed., Springer, pp.221-243, 2014.

Patents

I have 50+ granted patents in the US, Japan, Taiwan, China, and other countries.