

Liu, Song (Doctor of Engineering)

<http://www.cs.bris.ac.uk/~song/>

Email: song.liu@bristol.ac.uk, **Gender:** Male, **Birthday:** 08/OCT/1987, **Place of Birth:** Nanjing, China

Current Position: Lecturer in Data Science and A.I., University of Bristol, UK

Research Interests

- Statistical Machine Learning
 - Intractable Model Inference, Sparse Structure Inference,
 - Probabilistic Graphical Models, Markov Random Fields (Markov Networks),
 - Density Ratio Estimation, Robust M-Estimators.
- Applications
 - Change-point Detection, Anomaly Detection.

Education

- 2011–2014 **DEng**, Tokyo Institute of Technology, Japan.
 - Subject: Statistical Machine Learning
 - Thesis: Statistical Machine Learning Approaches on Change Detection
 - Advisor: Prof. **Masashi Sugiyama**
- 2009–2010 **MSc (Distinction)** in Advanced Computing, University of Bristol, UK.
 - Subject: Machine Learning and Data Mining
 - Thesis: Generic Multiplicative Methods for Implementing Machine Learning Algorithms on MapReduce
 - Advisor: **Prof. Peter Flach**
- 2005–2009 **BEng** in Computer Science, Soochow University, China.
 - Subject: Computer Science
- 2002–2005 High School Diploma, Nanjing NO.1 Middle School, China

Professional Activities

- Lecturer in Data Science and A.I., University of Bristol, UK.
 - Duration: 2017.9 - present
- Project Assistant Professor, Fukumizu Lab., The Institute of Statistical Mathematics, Japan
 - Duration: 2015.4-2017.9
- Postdoctoral, Sugiyama Lab., Tokyo Institute of Technology, Japan.
 - Duration: 2014.4-2015.3
- Internship, Central Research Laboratories, NEC, Japan.
 - Duration: 2012.9–2012.12

See bottom of this CV for more professional activities.

Research Grant Awarded

2013.4-2015.3 JSPS Grants-in-Aid for Scientific Research, for DC2 fellowship:

- Time-dependent High-dimensional Change Detection via Density Ratio Estimation
 - Acceptance Rate: 25%

2015.4-2017.3 JSPS Grants-in-Aid for Scientific Research, for Startups

- Onsite Transfer Learning
 - Acceptance Rate: ~21%

Major Research Papers (Ordered by Time)

- 2017
 - Liu, S., Takeda, A., Suzuki, T., Fukumizu K.,
Trimmed Density Ratio Estimation
Neural Information Processing Systems (NIPS), 2017 (Acceptance rate ~21%)
arXiv:1703.03216
 - Yamada, M., Liu, S., Kaski, S.,
Interpreting Outliers: Localized Logistic Regression for Density Ratio Estimation.
arXiv: 1702.06354
 - Noh, Y-K., Sugiyama, M., Liu, S., du Plessis, M.C., Park, F.C., and Lee, D. D.,
Bias Reduction and Metric Learning for Nearest-Neighbor Estimation of Kullback-Leibler
Divergence
To appear in *Neural Computation*, 2018
 - Liu, S. Suzuki, T., Fukumizu K.,
Learning Sparse Structural Changes in High-dimensional Markov Network: A Review on
Methodologies and Theories.
Behaviormetrika 44:265, 2016, **Invited Paper**
- 2016
 - Liu, S. Suzuki, T., Sugiyama, M. Fukumizu K.,
Structure Learning of Partitioned Markov Networks
Proceedings of The 33rd International Conference on Machine Learning (ICML), pp. 439-448,
2016.
arXiv: 1504.00624. **Acceptance Rate (~23%)**
 - Liu, S., Suzuki, T., Relator R., Sese J., Sugiyama, M., Fukumizu, K.
Support consistency of direct sparse-change learning in Markov networks.
Annals of Statistics, Volume 45, Number 3, 959-990
arXiv: 1407.0581.
- 2015
 - Yacine, C., Liu, S., Sugiyama M., Hideaki I.,
Statistical outlier detection for diagnosis of cyber-attacks in power state estimation
2016 IEEE Power and Energy Society General Meeting (PESGM), pp. 1-5, 2016
 - Liu, S., Fukumizu K.,
Estimating Posterior Ratio for Classification: Transfer Learning from Probabilistic Perspective
Presented at *NIPS 2015 workshop on Transfer and Multi-Task Learning*.

Proceedings of 2016 SIAM International Conference on Data Mining (SDM2016), pp. 747-755, 2016. **Acceptance Rate (~25%)**
arXiv: 1506.02784.

- 2014

- Liu, S., Suzuki, T., Sugiyama, M.,
Support consistency of direct sparse-change learning in Markov networks.
Presented at NIPS 2014 workshop on Transfer and Multi-Task Learning.
In the *Proceedings of Twenty-Ninth AAAI Conference on Artificial Intelligence (AAAI-2015)*.
Acceptance Rate (~25%)
- Liu, S., Quinn, J. A., Gutmann, M. U., Suzuki, T., and Sugiyama, M.,
Direct learning of sparse changes in Markov networks by density ratio estimation.
Neural Computation, vol. 26(6), pp. 1169–1197, 2015
- Noh, Y.-K., Sugiyama, M., Liu, S., du Plessis, M.C., Park, F.C., and Lee, D.D.,
Bias reduction and metric learning for nearest-neighbor estimation of Kullback-leibler divergence.
In Proceedings of Seventeenth International Conference on Artificial Intelligence and Statistics (AISTATS2014), vol. 33, pp. 669–677, 2014

- 2013

- Liu, S., Quinn, J.A., Gutmann, M. U., and Sugiyama, M.,
Direct learning of sparse changes in Markov networks by density ratio estimation.
Machine Learning and Knowledge Discovery in Databases, Part II, Lecture Notes in Computer Science, vol.8189, pp.596-611 (2), 2013
- Liu, S., Yamada, M., Collier, N., and Sugiyama, M.,
Change-point detection in time-series data by relative density-ratio estimation.
Neural Networks, vol.43, pp.72–83, 2013
(Citation on Google Scholar so far: 140, Mar 15, 2017)
- Sugiyama, M., Kanamori, T., Suzuki T., du Plessis, M.C., Liu, S., and Takeuchi, I.,
Density- difference estimation.
Neural Computation, vol. 25(10), pp. 2734–2775, 2013
- Sugiyama, M., Liu, S., du Plessis, M.C., Yamanaka, M., Yamada, M., Suzuki, T., and Kanamori, T.,
Direct divergence approximation between probability distributions and its applications in machine learning.
Journal of Computing Science and Engineering (JCSE), vol. 7(2), pp. 99–111, 2013

- 2012

- Liu, S., Yamada, M., Collier, N., and Sugiyama, M.,
Change-point detection in time-series data by relative density-ratio estimation.
In Structural, Syntactic, and Statistical Pattern Recognition, Lecture Notes in Computer Science, pp. 363–372, 2012
- Sugiyama, M., Kanamori, T., Suzuki T., du Plessis, M.C., Liu, S., and Takeuchi, I.,
Density- difference estimation.
In Advances in Neural Information Processing Systems 25, pp. 692–700, 2012

Workshop Organization

- 2018, Workshop on Learning from Structural and Dynamic Data (June 2018)
 - Organizer, Sponsored by Jean Golding Institute.

- 2017, Probabilistic Graphical Model Workshop: Sparsity, Structure and High-dimensionality (Feb 2017)
 - Organizer, <https://sites.google.com/site/2017pgm/>
- 2016, Probabilistic Graphical Model Workshop: Sparsity, Structure and High-dimensionality (Mar 2016)
 - Organizer, <https://sites.google.com/site/2016pgm/>

Academic Services

- 2018, Reviewer of International Conference of Machine Learning (ICML), Neural Information Processing Systems (NIPS), International Conference on Learning Representations (ICLR), Journal of Machine Learning Research (JMLR).
- 2017, Reviewer of International Conference of Machine Learning (ICML), Neural Information Processing Systems (NIPS) and IJCAI.
- 2016, Reviewer of AISTATS, Neural Information Processing Systems (NIPS), Statistics and Computing, IEEE Transactions on Neural Networks and Learning Systems, Journal of Machine Learning Research (JMLR)
- 2015 Reviewer of IEICE transactions, Journal of The Japan Statistical Society, Annals of the Institute of Statistical Mathematics
- 2014 Reviewer of IEICE transactions, International Conference of Machine Learning (ICML), SIAM International Conference on Data Mining (SDM15)
- 2013 Volunteer of Neural Information Processing Systems (NIPS)

Scholarships and Honors

- 2013-2015, **Research Fellowship** (DC2), Japan Society for the Promotion of Science.
- 2010, **Distinction**, MSc in Machine Learning and Data Mining, University of Bristol, UK.
- 2008-2009, **People's Scholarship**, twice, Soochow University, China.
- 2008, **Zhongchuang Scholarship**, Soochow University, China

Other Professional Activities

- Research Assistant, JSP PRESTRO Project.
 - Duration: 2012.4 – 2013.3
- Internship, NEC Soft, Ltd. Japan.
 - Duration: 2011.8–2012.1
- Research Assistant, Global COE program, "Computationism as a Foundation for the Sciences".
 - Duration: 2011.4 – 2012.3
- Visiting Researcher, National Institute of Informatics, Japan.
 - Duration: 2010.11–2011.4

Leadership

- 2007-2008 President of Student Union, Department of Computer Science & Technology,
 - Soochow University, China.

Language Skills

- **Chinese:** First Language, **English:** Fluent, TOFEL: 102, TOEIC: 980, **Japanese:** JPLT (日本語能力試験) N2