

Liu, Song (Doctor of Engineering)

<http://allmodelsarewrong.org>

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
 - Probabilistic Graphical Models, Markov Random Fields (Markov Networks),
 - Sparsity Learning, Density Ratio Estimation
- Applications
 - Generative Adversarial Network (GAN), 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
 - Thesis: Protein Interaction Exaction by Convolution Tree Kernel (**Excellent Thesis Award**)
- 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.

Language Skills

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

Research Grant

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%

Workshop Organization

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

Major Research Papers (Ordered by Time)

- 2017
 - Liu, S., Takeda, A., Suzuki, T., Fukumizu K.,
Robust Density Ratio Estimation: Trimming the Likelihood Ratio
To appear in *Neural Information Processing Systems (NIPS)*, 2017 (**Acceptance rate ~21%**)
 - 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*, 2017
 - 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, 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.
To appear in *Annals of Statistics*.
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

Academic Services

- 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)

Leadership

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

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