Chang Liu

Researcher, Microsoft Research Asia

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RESEARCH INTERESTS	My research interests are primarily on statistical machine learning. I develop general Bayesian inference methods, including variational inference methods and Markov chain Monte Carlo methods, such that they are more accurate and efficient for complex inference tasks, *e.g.*, for deep Bayesian models, hyperspherical data, and large-scale dataset. Particularly I accomplish this by collaborating with manifold structures. I also work on topic models, recommender systems, deep generative models and reinforcement learning.

EDUCATION

Tsinghua University, Beijing, China

- **Department of Computer Science and Technology**
  - **Ph.D.** (Computer Science)   08/2014 to 07/2019
  - Dissertation: *A Study on Efficient Bayesian Inference Methods Using Manifold Structures* (In Chinese; Tsinghua Outstanding Doc. Diss. Award).
  - Supervisor: Prof. Jun Zhu.
- **Department of Physics**
  - **Bachelor of Science** (Physics)   08/2010 to 07/2014
  - Thesis: *Maximum Entropy Discrimination Latent Dirichlet Allocation with Determinantal Point Process Prior* (In Chinese).
  - Supervisor: Prof. Jun Zhu.

RESEARCH EXPERIENCE

Microsoft Research Asia, Machine Learning Group

- **Researcher**   since 07/2019
- Bayesian reinforcement learning
- Supervisor: Dr. Tao Qin

Tsinghua University, Tsinghua Statistical Artificial Intelligence & Learning Group (TSAIL)

- **Research Assistant**   09/2013 to 07/2019
- Bayesian inference methods and Bayesian generative models
- Supervisor: Prof. Jun Zhu

Duke University, Department of Electrical and Computer Engineering

- **Visiting Scholar**   10/2017 to 10/2018
  (supported by the State Scholarship Fund under the China Scholarship Council)
- Variational inference methods with Riemannian gradient flow
- Academic Adviser: Prof. Lawrence Carin

PUBLICATIONS [Google Scholar Profile] [GitHub]

[1] **Chang Liu**, Jingwei Zhuo, and Jun Zhu. Understanding MCMC Dynamics as Flows on the Wasserstein Space. In *Proc. of the 36th International Conference on Machine Learning*, pp. 4093–4103, Long Beach, California USA, 2019. (ICML 2019)

[2] **Chang Liu**, Jingwei Zhuo, Pengyu Cheng, Ruiyi Zhang, Jun Zhu, and Lawrence Carin. Understanding and Accelerating Particle-Based Variational Inference. In *Proc. of the 36th International Conference on Machine Learning*, pp. 4082–4092, Long Beach, California USA, 2019. (ICML 2019)

[3] Chenyang Tao, Shuyang Dai, Liqun Chen, Ke Bai, Junya Chen, **Chang Liu**, Ruiyi Zhang, Georgiy Bobashev, and Lawrence Carin. Variational Annealing of GANs: A Langevin Perspective. In *Proc. of the 36th International Conference on Machine Learning*, pp. 6176–6185, Long Beach, California USA, 2019. (ICML 2019)

[4] Pengyu Cheng, **Chang Liu**, Chunyuan Li, Dinghan Shen, Ricardo Henao, and Lawrence Carin. Straight-Through Estimator as Projected Wasserstein Gradient Flow. In *Third workshop on Bayesian Deep Learning (NeurIPS 2018)*, Montréal, Canada, 2018.

[5] Jingwei Zhuo, **Chang Liu**, Jiaxin Shi, Jun Zhu, Ning Chen, and Bo Zhang. Message Passing Stein Variational Gradient Descent. In *Proc. of the 35th International Conference on Machine Learning*, pp. 6018–6027, Stockholm, Sweden, 2018. (ICML 2018)

[6] **Chang Liu**, and Jun Zhu. Riemannian Stein Variational Gradient Descent for Bayesian Inference. In *Proc. of the 32nd AAAI Conference on Artificial Intelligence*, pp. 3627–3634, New Orleans, Louisiana USA, 2018. (AAAI 2018)

[7] **Chang Liu**, Jun Zhu, and Yang Song. Stochastic Gradient Geodesic MCMC Methods. In *Proc. of the 30th Annual Conference on Advances in Neural Information Processing Systems*, pp. 3009–3017, Barcelona, Spain, 2016. (NeurIPS 2016)

PATENTS

[1] Jun Zhu, **Chang Liu**, and Yang Song. The Method and Deployment of Stochastic Gradient Geodesic Markov Chain Monte Carlo. App. No.: 201611084360X. Pub. No.: CN106599909A.

SERVICE AND TEACHING

- Reviewer: NeurIPS, ICML, UAI, AAAI, etc.
- Teaching Assistant, at Duke-Tsinghua Machine Learning Summer School, 08/2016.
- Teaching Assistant, in *Advanced Calculus* (undergraduate course, instructed by Prof. Yinghua Ai), 09/2014 to 01/2015.

HONORS AND AWARDS

Outstanding Ph.D. Graduate, Department of Computer Science and Technology	2019
Outstanding Doctoral Dissertation, Tsinghua University	2019
Ronghua Zhang Scholarship, Tsinghua University	2013
Artistic Activity Contribution Scholarship, Tsinghua University	2013, 2012
Sumitomo Corporation Scholarship, Tsinghua University	2012
Second Prize, China Undergraduate Physics Tournament	2012
Tsinghua Asia-Pacific President Federation Scholarship	2011

Skills
- Computer Programming: C/C++ (with Eigen, OpenMP), Python (with Theano, TensorFlow, PyTorch), MATLAB, Fortran, Bash, LaTeX, HTML/JavaScript.
- Language: Chinese (native), English (fluent), Japanese (basic).

Other
Experiences
Summer intern in Hualan Design and Consulting Group, Co. Ltd.	2016 Summer
Secretary of Tsinghua University Symphonic Band (THUMB)	09/2012 to 01/2013
Teaching volunteer in Hezhang County, Bijie, Guizhou, China	2011 Summer