# Changyou Chen

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## Education Background

2010–2014 **PhD in College of Engineering and Computer Science, Australian National University**.
Canberra, Australia. Sep. 2010–Feb. 2014

2007–2010 **MS in School of Computer Science, Fudan University**.
Shanghai, China. Sep. 2007–Jun. 2010

2003–2007 **BS in School of Computer Science, Fudan University**.
Shanghai, China. Sep. 2003-Jun. 2007

## Employment

2017.8–Now **Assistant Professor**.
Department of Computer Science and Engineering, **University at Buffalo**, Buffalo, NY 14051, USA

2016.7–17.7 **Research Assistant Professor**.
Department of Electrical and Computer Engineering, **Duke University**, Durham, NC 27708, USA

2014.9–16.7 **Postdoctoral Associate**.
Department of Electrical and Computer Engineering, **Duke University**, Durham, NC 27708, USA

## Research Interests

- Large-Scale Bayesian Learning
  - Theory and applications of stochastic gradient Markov Chain Monte Carlo algorithms
- Bayesian Deep Learning
  - Bayesian interpretation/extension of traditional deep models.
  - Efficient Bayesian sampling and inference for deep neural networks.
  - Deep generative models such as VAE and GAN.
- Deep Reinforcement Learning
  - Focusing on incorporating Bayesian ideas into deep reinforcement to enhance performance, e.g., enhance agent's exploration ability.
- Distributed/Parallel Machine Learning
  - Large scale machine learning platforms (Hadoop, Parameter Servers, Caffe, Tensorflow)
  - Distributed/Parallel stochastic optimization algorithms and stochastic gradient MCMC algorithms
- Bayesian Nonparametrics
  - Poisson processes; Dependent normalized random measures/Poisson-Kingman processes
  - MCMC for hierarchical Bayesian nonparametric models (Poisson-Dirichlet processes)
  - Bayesian nonparametric max-margin clustering; Bayesian sparsity modeling; Scalable Bayesian nonparametric models
- Text Mining & Topic Models
  - Topic hierarchy modeling; topic differential modeling; topic dependency modeling, (semi-)supervised topic modeling

## Research and Project Experience

2017 **University at Buffalo**, *Assistant Professor*, September 2017–Now.

- Scalable Bayesian inference
- Deep generative models such as VAE and GAN
- Bayesian exploration for deep reinforcement learning

2014 **Duke University**, *Research Assistant Professor/Postdoctoral Associate*, September 2014–July 2017.

- Advisor: Professor Lawrence Carin
- Working on both theory and applications of stochastic gradient MCMC algorithms such as stochastic gradient thermostats
- Developing distributed stochastic gradient MCMC algorithms for highly scalable Bayesian learning
- Applying stochastic gradient MCMC algorithms for Bayesian learning of deep neural network models, such as deep sigmoid belief networks, feedforward neural networks and convolutional neural networks
- Investigation recent advance on deep learning and its applications

2014 **Alibaba Group**, *Intern*, June 2014–August 2014.

- Used machine learning techniques for advertisement based on Alibaba's Hadoop based advance large scale data processing platform ODPS
- Extracted large volumn of data from raw transaction records for advertisement

2010-2014 **Australian National University & National ICT**, *Research Student*.

- Supervisor: Professor Wray Buntine
- Worked on theory and applications of non-parametric Bayesian methods and topic models
- Topics include *Bayesian Nonparametric Max-margin Clustering* (NIPS'14), *Bayesian Sparsity Modeling*, *Topic Model and Author Network Modeling*, *Dependent Normalized Random Measures* (ICML'13), *Dynamic Topic Models* (ICML'12), *Differential Topic Models* (TPAMI'14), *MCMC for Hierarchical Poisson-Dirichlet Processes* (ECML'11)

2009 **Microsoft Research Asia (MSRA)**, *Intern*, Mar 2009–Apr 2009.

- Intern working at the Media Communication Group (mCom)

2007-2010 **Shanghai Key Lab of Intelligent Information Processing (IIPL)**, Sep 2007–Jun 2010.

- Worked on *Manifold Learning* and *Gait Recognition*

## Selected Papers

– **Working/submitted manuscripts**.

43. Bai Li, **Changyou Chen**, Hao Liu, Lawrence Carin. *On Connecting Stochastic Gradient MCMC and Differential Privacy*, Technical Report, 2018.

42. **Changyou Chen**, Ruiyi Zhang. *Particle Optimization in Stochastic Gradient MCMC*, Technical Report, 2018.

41. **Changyou Chen**, Chunyuan Li, Liqun Chen, Wenlin Wang, Yunchen Pu, Lawrence Carin. *Continuous-Time Flows for Efficient Inference and Density Estimation*, submitted, 2018.

40. Ruiyi Zhang, **Changyou Chen**, Chunyuan Li, Lawrence Carin. *Bayesian Deep Q-Learning via Continuous-Time Flows*, NIPS Deep Reinforcement Learning Symposium, 2017.

39. **Changyou Chen**, Wenlin Wang, Yizhe Zhang, Qinliang Su, Lawrence Carin. *A Convergence Analysis for A Class of Practical Variance-Reduction Stochastic Gradient MCMC*, submitted, 2017.

38. Wenlin Wang, **Changyou Chen**, Wenqi Wang, Piyush Rai, Lawrence Carin. *Earliness-Aware Deep Convolutional Networks for Early Time Series Classification*, submitted, 2016.

37. Chunyuan Li, **Changyou Chen**, Ricardo Henao, Lawrence Carin. *Communication-Efficient Stochastic Gradient MCMC*, submitted, 2016.

36. Chunyuan Li, **Changyou Chen**, David Carlson, Lawrence Carin. *Stochastic Average Gradient Langevin Dynamics*, submitted, 2016.

35. Karwai Lim, **Changyou Chen**, Wray Buntine. *Twitter-Network Topic Model: A Full Bayesian Treatment for Social Network and Text Modeling*. NIPS Workshop on Topics Model: Computation, Application, and Evaluation, 2013.

34. **Changyou Chen**, Wray Buntine, Nan Ding.*Theory of Dependent Hierarchical Normalized Random Measures*. Technical Report arXiv:1205.4159, NICTA and ANU, 2012.

– **Refereed Journal and Conference Publications**.

33. Liqun Chen, Shuyang Dai, Yunchen Pu, Erjin Zhou, Chunyuan Li, Qinliang Su, **Changyou Chen**, Lawrence Carin. *Symmetric Variational Autoencoder and Connections to Adversarial Learning*, International Conference on Artificial Intelligence and Statistics (AISTATS), 2018.

32. Ruiyi Zhang, Chunyuan Li, **Changyou Chen**, Lawrence Carin. *Learning Structural Weight Uncertainty for Sequential Decision-Making*, International Conference on Artificial Intelligence and Statistics (AISTATS), 2018.

31. Wenlin Wang, Yunchen Pu, Vinay Verma, Kai Fan, Yizhe Zhang, **Changyou Chen**, Piyush Rai, Lawrence Carin. *A Flexible Probabilistic Framework for Learning to Predict Unseen Classes* , Association for the Advancement of Artificial Intelligence (AAAI), 2018.

30. Chunyuan Li, Hao Liu, **Changyou Chen**, Yunchen Pu, Liqun Chen, Ricardo Henao, Lawrence Carin. *ALICE: Towards Understanding Adversarial Learning for Joint Distribution Matching* , Neural Information Processing Systems (NIPS), 2017.

29. Yizhe Zhang, **Changyou Chen**, Zhe Gan, Ricardo Henao, Lawrence Carin. *Stochastic Gradient Monomial Gamma Sampler*, International Conference on Machine Learning (ICML), 2017.

28. Zhe Gan, Chunyuan Li, **Changyou Chen**, Yuchen Pu, Qinliang Su, Lawrence Carin. *Scalable Bayesian Learning of Recurrent Neural Networks for Language Modeling* , Annual meeting of the Association for Computational Linguistics (ACL), 2017.

27. Shengyang Sun, **Changyou Chen**, Lawrence Carin. *Learning Structured Weight Uncertainty in Bayesian Neural Networks*, International Conference on Artificial Intelligence and Statistics (AISTATS), 2017.

26. **Changyou Chen**, Nan Ding, Chunyuan Li, Yizhe Zhang, Lawrence Carin. *Stochastic Gradient MCMC with Stale Gradients*, Neural Information Processing Systems (NIPS), 2016.

25. Yizhe Zhang, Xiangyu Wang, **Changyou Chen**, Ricardo Henao, Lawrence Carin. *Towards Unifying Hamiltonian Monte Carlo and Slice Sampling*, Neural Information Processing Systems (NIPS), 2016.

24. Kar Wai Lim, Wray Buntine, **Changyou Chen**, Lan Du. *Nonparametric Bayesian topic modelling with the hierarchical Pitman-Yor processes*, International Journal of Approximate Reasoning (IJAR), vol. 78, pp. 172-191, 2016.

23. Wenlin Wang, **Changyou Chen**, Wenlin Chen, Lawrence Carin. *Deep Metric Learning with Data Summarization*, The European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD), 2016.

22. Yizhe Zhang, **Changyou Chen**, Ricardo Henao, Lawrence Carin. *Laplacian Hamiltonian Monte Carlo*, The European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD), 2016.

21. Qinliang Su, Xuejun Liao, **Changyou Chen**, Lawrence Carin. *Nonlinear Statistical Learning with Truncated Gaussian Graphical Models*, International Conference on Machine Learning (ICML), 2016.

20. Chunyuan Li, Andrew Steven, **Changyou Chen**, Lawrence Carin. *Learning Weight Uncertainty with Stochastic Gradient MCMC for Shape Classification*. Conference on Computer Vision and Pattern Recognition (CVPR), 2016.

19. **Changyou Chen**, David Carlson, Zhe Gan, Chunyuan Li, Lawrence Carin. *Bridging the Gap between Stochastic Gradient MCMC and Stochastic Optimization*. International Conference on Artificial Intelligence and Statistics (AISTATS), 2016.

18. Chunyuan Li, **Changyou Chen**, David Carlson, Lawrence Carin. *Preconditioned Stochastic Gradient Langevin Dynamics for Deep Neural Networks*. Association for the Advancement of Artificial Intelligence (AAAI), 2016.

17. Chunyuan Li, **Changyou Chen**, Lawrence Carin. *High-Order Stochastic Gradient Thermostats for Bayesian Learning of Deep Models*. Association for the Advancement of Artificial Intelligence (AAAI), 2016.

16. **Changyou Chen**, Nan Ding, Lawrence Carin. *On the Convergence of Stochastic Gradient MCMC Algorithms with High-Order Integrators*, Neural Information Processing Systems (NIPS), 2015.

15. Changwei Hu, Piyush Rai, **Changyou Chen**, Matthew Harding, Lawrence Carin. *Scalable Bayesian Non-Negative Tensor Factorization for Massive Count Data*. European Conference on Machine Learning (ECML), 2015. (**Best Student Paper Award**)

14. Zhe Gan, **Changyou Chen**, Ricardo Henao, David Carlson, Lawrence Carin. *Scalable Deep Poisson Factor Analysis for Topic Modeling*. International Conference on Machine Learning (ICML), 2015.

13. Nan Ding, Youhan Fang, Ryan Babbush, **Changyou Chen**, Robert Skeel, Hartmut Neven. *Bayesian Sampling Using Stochastic Gradient Thermostats*. Neural Information Processing Systems (NIPS), 2014.

12. **Changyou Chen**, Jun Zhu, Xinhua Zhang. *Robust Bayesian Max-Margin Clustering*. Neural Information Processing Systems (NIPS), 2014.

11. **Changyou Chen**, Wray Buntine, Nan Ding, Lexing Xie, Lan Du. *Differential Topic Models*. IEEE Transactions on Pattern Recognition and Machine Intelligence (TPAMI), vol. 37, no. 2, pp. 230–242, 2015.

10. **Changyou Chen**, Vinayak Rao, Wray Buntine, Yee Whye Teh. *Dependent Normalized Random Measures*. International Conference on Machine Learning (ICML), 2013.

9. **Changyou Chen**, Nan Ding, Wray Buntine.*Dependent Hierarchical Normalized Random Measures for Dynamic Topic Modeling*. International Conference on Machine Learning (ICML), 2012.

8. Lan Du, Wray Buntine, Huidong Jin, **Changyou Chen**.*Sequential Latent Dirichlet Allocation*. Knowledge and Information Systems, vol. 31, no. 3, pp. 475–503, 2012.

7. **Changyou Chen**, Lan Du, Wray Buntine.*Sampling Table Configurations for the Hierarchical Poisson-Dirichlet Process*. The European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD), 2011.

6. **Changyou Chen**, Junping Zhang, Xuefang He, Zhi-hua Zhou.*Non-Parametric Kernel Learning with Robust Pairwise Constraints*. International Journal of Machine Learning and Cybernetics, 2011.

5. Junping Zhang, Jian Pu, **Changyou Chen**, Rudolf Fleischer.*Low Resolution Gait Recognition*. IEEE Transaction on System, Man, Cybernetic, Part B, 2009.

4. **Changyou Chen**, Junping Zhang, Rudolf Fleischer.*Distance Approximating Dimension Reduction of Riemannian Manifolds*. IEEE Transaction on System, Man, Cybernetic, Part B, 2009.

3. **Changyou Chen**, Junping Zhang, Rudolf Fleischer.*Multilinear Tensor-based Nonparametric Dimension Reduction*. The 3rd IAPR/IEEE International Conference on Biometrics (ICB 2009).

2. Junping Zhang, Yuan Cheng, **Changyou Chen**.*Low Resolution Gait Recognition with High Frequency Super Resolution*. The Tenth Pacific Rim International Conference on Artificial Intelligence (PRICAI 08).

1. **Changyou Chen**, Junping Zhang.*An Iterative Gait Prototype Learning Algorithm based on Tangent Distance*(in Chinese). Journal of Computer Research and Development, 2008. (**Outstanding Student Paper at Agent 2008**)

## Awards

2015 'Best Student Paper' award at European Conference on Machine Learning (ECML'15)

2013 Google travel prize by ANU and Google

2012 ICML student travel scholarship award

2011 Shanghai Excellent Master Thesis award

2009 IBM Outstanding Students Scholarship (2 recipients in our department)

2008 Morgan Stanley Scholarship (top 5 students)

2008 'Outstanding Student Paper' award at Agen'08

2007-2010 First class prize of Academic Scholarship at Fudan University (rank 2 and 3 out of more than 100 students), *3 times*

2003-2007 Third class prize of Renmin Scholarship at Fudan University, *3 times*

## Professional Activities

– **Committee Member/Reviewer**.

International Conference Committee Member / Reviewer: ICML'18, UAI'18, IJCAI'18 (senior PC), ICLR'18, NAACL-HLT'18, AAAI'18, ICML'17, UAI'17, AAAI'17, NIPS'16, UAI'16, IJCAI'16, AAAI'16, NIPS'15, ICML'15, UAI'15, IJCAI'15, KDD'15, ICML'14, CVPR'14, AISTATS'14, AISTATS'13, CIKM'13, ICCV'13, ACML'13, IJCAI'13, ICML'12, IJCAI'11, KDD'11, Workshop on Divergence Methods for Probabilistic Inference

International Journal Reviewer: 1) Journal of Machine Learning Research (JMLR); 2) IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI); 3) Machine Learning (ML); 4) IEEE Transactions on Neural Networks and Learning Systems (TNNLS); 5) ELSEVIER Signal Processing; ACM Transactions on Intelligent Systems and Technology (TIST); 6) Transactions on Intelligent Transportation Systems (TITS); 7) IEEE Intelligent Systems (IS)

– **Invited/Contributed Talks**.

Lecturer: Invited lecturer for the Duke-Tsinghua Machine Learning Summer School–Deep Learning for Big Data in 2016. See https://dukekunshan.edu.cn/en/events/machine-learning-2016.

2016.8 *Large-Scale Bayesian Learning with Stochastic Gradient Markov Chain Monte Carlo*, Xidian University.

2016.8 *Introduction to Stochastic Gradient Markov Chain Monte Carlo*, Kunshan-Duke University.

2013.12 *Dependent Normalised Random Measures and Extensions*, Helsinki.

2012.6 *Dependent Normalised Random Measures*, UCL & Cambridge University

2012.6 *Dependent Hierarchical Normalized Random Measures for Dynamic Topic Modeling*, ICML.

2011.9 *Sampling Table Configurations for the Hierarchical Poisson-Dirichlet Process*, ECML.

– **Academic Visits**.

2013.7 Visited Prof. Lancelot James at Hong Kong University of Science and Technology

2013.7 Visited Prof. Jun Zhu at Tsinghua University, Beijing, China

2012.6 Visited Prof. Yee Whye Teh at University College London, UK

2012.6 Visited Prof. Zoubin Ghahramani at Cambridge University, UK

## Teaching Experiences

2018 Lecturer for Spring seminar "Recent Developments on Deep Generative Models and Deep Reinforcement Learning" at University at Buffalo, Buffalo, NY

2017 Lecturer for Fall course "Recent Advances on Deep Learning" at University at Buffalo, Buffalo, NY

2013 Tutor for summer course "Computational Social Science: Foundations and Frontiers" at Beihang University, Beijing, China

2013 Tutor for undergraduate course "Advance Databases and Data Mining" at ANU

2012 Tutor for undergraduate course "Advance Databases and Data Mining" at ANU

2008 Teaching assistant for undergraduate course "College Physics" at Fudan University