Chunyuan Li

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Research Interests

My PhD research interests focus on the intersection of deep learning and Bayesian statistic — enriching one with each other: (1) **Bayesian Deep Learning**: Scalable Bayesian learning methods for the weight uncertainty of deep neural networks, e.g., SG-MCMCs (2) **Deep Bayesian Learning**: Deep neural networks as flexible representation methods in Bayesian models, e.g., GANs and VAEs. These tools have been applied to various domains, including computer vision, natural language processing and deep reinforcement learning etc.

Education

- **Duke University**, Durham, NC   09/2014 - present
  Ph.D., Electrical and Computer Engineering, GPA: 3.9/4.0.

Bayesian and Modern Statistics	Statistical Computation
Probabilistic Machine Learning	Advanced Machine Learning
Discrete Optimization	Graphical Models & Inference
Information Theory	

- Concordia University, Montreal, Canada   09/2011 - 02/2013
  M.S., Information System Engineering, Concordia University Merit Award (top 0.5%)

- Huazhong University of Science and Technology, Wuhan, China   09/2007 - 06/2011
  B.S., Electrical Engineering, Excellent Undergraduate Thesis (top 1%)

Research Experiences

- **Information Initiative at Duke (iiD)**   09/2014 - present
  Research assistant. Advisor: Prof. Lawrence Carin

  (*i*) Stochastic gradient MCMC algorithms, investigate their connections to Dropout, with applications to convolutional/recurrent networks and reinforcement learning

  (*ii*) Deep generative models, inclduing adversarial learning and variational inference methods for sequence modeling

- **Uber AI Labs**, San Francisco, CA   Summer, 2017
  Research Scientist Intern. Mentor: Jason Yosinski
  (*i*) Product: Prediction problems in self-driving cars
  (*ii*) Science: End-to-end subspace training of neural networks; one paper&patent

- **Adobe Research**, San Jose, CA   Summer, 2016
  Data Scientist Intern. Mentors: H. Bui, M. Ghavamzadeh (DeepMind) and G. Theocharous
  (*i*) Product: Recurrent neural networks for digital market forecasting; one patent filed
  (*ii*) Science: Investigation of Bayesian deep reinforcement learning

- **National Institute of Standards and Technology**, MD   09/2013 - 08/2014
  Guest researcher.
  Benchmarking 3D shape search techniques. Organized and participated shape retrieval contests in Eurographics 2014

- **Geometrica Group of INRIA Saclay**, France   Summer, 2013
  Research intern. Mentors: Maks Ovsjanikov and Frederic Chazal
  Developed algorithms for object recognition via topological persistence

- Concordia University, Montreal, Canada   09/2011 - 04/2013
    Research assistant. Advisor: A. Ben Hamza
    Worked on algorithms for deformable 3D shape analysis via spectral geometry
- ANKON International   Summer, 2011
    Research intern.
    Developed novel online redundant image elimination algorithms for wireless capsule endoscopy
- Huazhong University of Science and Technology   2009 - 2011
    Research assistant. Advisor: Prof. Xiang Bai
    Worked on algorithms for 2D shape analysis and classification

Publications [Citations = 739, h-index = 14, i10-index=17]

Preprint

1. **C. Li**, G. Wang, J. Li, R. Henao and L. Carin
   "On the Reverse KL Divergence and GAN: Learning to Sample"

2. **C. Li**, C. Chen, Y. Pu, R. Henao and L. Carin
   "Communication-efficient Stochastic Gradient MCMC for Neural Networks"

3. C. Chen, **C. Li**, L. Chen, W. Wang, Y. Pu and L. Carin
   "Continuous-Time Flows for Deep Generative Models"

4. J. Lu, **C. Li**, and F. Wang
   "Seeds Cleansing CNMF for Neural Signal Extraction of Miniscope Imaging Data"

Recent Refereed Journal and Conference

1. **C. Li**, H. Farkhoor, R. Liu and J. Yosinski
   "Measuring the Intrinsic Dimension of Objective Landscapes"
   *International Conference on Learning Representations (**ICLR**) 2018*

2. **C. Li**, H. Liu, C. Chen, Y. Pu, L. Chen, R. Henao and L. Carin
   "ALICE: Towards Understanding Adversarial Training for Joint Distribution Matching"
   *Neural Information Processing Systems (**NIPS**) 2017*

3. R. Zhang, **C. Li**, C. Chen, and L. Carin
   "Learning Structural Weight Uncertainty for Sequential Decision-Making"
   *Artificial Intelligence and Statistics (**AISTATS**) 2018*

4. L. Chen, S. Dai, Y. Pu, **C. Li**, Q. Su, and L. Carin
   "Symmetric Variational Autoencoder and Connections to Adversarial Learning"
   *Artificial Intelligence and Statistics (**AISTATS**) 2018*

5. Y. Pu, Z. Gan, R. Henao, **C. Li**, S. Han and L. Carin
   "VAE Learning via Stein Variational Gradient Descent"
   *Neural Information Processing Systems (**NIPS**) 2017*

6. Y. Pu, W. Wang, R. Henao, L. Chen, Z. Gan, **C. Li**, and L. Carin
   "Adversarial Symmetric Variational Autoencoder",
   *Neural Information Processing Systems (**NIPS**) 2017*

7. Z. Gan, L. Chen, W. Wang, Y. Pu, Y. Zhang, H. Liu, **C. Li**, and L.Carin
   "Triangle Generative Adversarial Networks",
   *Neural Information Processing Systems (**NIPS**) 2017*

8. Z. Gan*, **C. Li***, C. Chen, Q. Su, Y. Pu, and L. Carin (* Equal contribution)
   "Scalable Bayesian Learning of Recurrent Neural Networks for Language Modeling"
   *Annual Meeting of the Association for Computational Linguistics (**ACL**) 2017*, **Oral**

9. Z. Gan, Y. Pu, R. Henao, **C. Li**, X. He and L. Carin
   "Unsupervised Learning of Sentence Representations using Convolutional Neural Networks"
   Empirical Methods on Natural Language Processing (**EMNLP**) 2017, **Oral**

10. Q. Su, X. Liao, **C. Li**, and Z. Gan, L. Carin
    "Restricted Truncated Gaussian Graphical Models"
    *AAAI Conference on Artificial Intelligence (***AAAI***)* 2017, **Oral**

11. **C. Li**, A. Stevens, C. Chen, Y. Pu, Z. Gan and L. Carin
    "Learning Weight Uncertainty with Stochastic Gradient MCMC for Shape Classification"
    *Computer Vision and Pattern Recognition (***CVPR***)* 2016 , **Spotlight**

12. **C. Li**, C. Chen, D. Carlson and L. Carin
    "Preconditioned Stochastic Gradient Langevin Dynamics for Deep Neural Networks"
    *AAAI Conference on Artificial Intelligence (***AAAI***)* 2016, **Oral**

13. **C. Li**, C. Chen, K. Fan and L. Carin
    "High-Order Stochastic Gradient Thermostats for Bayesian Learning of Deep Models"
    *AAAI Conference on Artificial Intelligence (***AAAI***)* 2016

14. C. Chen, N. Ding, **C. Li**, Y. Zhang and L. Carin
    "Stochastic Gradient MCMC with Stale Gradients"
    *Neural Information Processing Systems (***NIPS***)* 2016

15. Y. Pu, Z. Gan, R. Henao, Y. Xin, **C. Li**, A Stevens, and L. Carin
    "Variational Autoencoder for Deep Learning of Images, Labels and Captions"
    *Neural Information Processing Systems (***NIPS***)* 2016

16. K. Fan, **C. Li**, and K. Heller
    "Hierarchical Graph-Coupled HMM with an Application to Influenza Infection"
    *AAAI Conference on Artificial Intelligence (***AAAI***)* 2016

17. Y. Zhang, R. Henao, **C. Li** and L. Carin
    " Bayesian Dictionary Learning with Gaussian Processes and Sigmoid Belief Networks"
    *Int. Joint Conference on Artificial Intelligence (***IJCAI***)* 2016

18. C. Chen, D. Carlson, Z. Gan, **C. Li** and L. Carin
    "Bridging the Gap Between Stochastic Gradient MCMC and Stochastic Optimization"
    *Artificial Intelligence and Statistics (***AISTATS***)* 2016, **Oral**

19. Y. Pu, X. Yuan, A. Stevens, **C. Li** and L. Carin
    "A Deep Generative Deconvolutional Image Model"
    *Artificial Intelligence and Statistics (***AISTATS***)* 2016

20. D. Pickup, X. Sun, P. L. Rosin, R. R. Martin, **C. Li** *et al.*
    "Shape Retrieval of Non-Rigid 3D Human Models",
    *Int. Journal of Computer Vision (***IJCV***)* 2016

21. Z. Gan, **C. Li**, R. Henao, D. Carlson and L. Carin
    "Deep Temporal Sigmoid Belief Networks for Sequence Modeling",
    *Neural Information Processing Systems (***NIPS***)* 2015

22. B. Li, Y. Lu, **C. Li**, A. Godil, T. Schreck, *et al.*
    "A Comparison of 3D Shape Retrieval Methods: A Benchmark with Multimodal Queries",
    *Computer Vision and Image Understanding (***CVIU***)* 2015

23. **C. Li**, M. Ovsjanikov and F. Chazal
    "Persistence-based Structural Recognition"
    *Computer Vision and Pattern Recognition (***CVPR***)* 2014

24. Z. Ren, J. Yuan, **C. Li** and W. Liu
    "Minimum Near-Convex Decomposition for Shape Representation"
    *International Conference on Computer Vision (***ICCV***)* 2011

25. **C. Li** and A. Ben Hamza
    "Spatially Aggregating Spectral Descriptors for Non-Rigid 3D Shape Retrieval: A Comprehensive Comparison", *Multimedia Systems*, 2014

26. **C. Li** and A. Ben Hamza
    "Symmetry Discovery and Retrieval of Nonrigid 3D Shapes using Geodesic Skeleton Paths",
    Multimedia Tools and Applications, 2014

27. **C. Li** and A. Ben Hamza
    "A Multi-Resolution Descriptor for Deformable 3D Shape Retrieval",
    Visual Computer (Computer Graphics International, AR = 18%), 2013

Patents

"Metric Forecasting Employing a Similarity Determination in a Digital Medium Environment"
C. Li H. Bui, M. Ghavamzadeh and G. Theocharous, *Filed in March, 2017*

"Compressing Neural Networks while Remaining a High Degree of Accuracy"
J. Yosinski, **C. Li**, J. Clune, K. Stanley and Z. Ghahramani, *Submitted, 2017*

Teaching Experiences

Teaching assistant. Besides grading and office hours, I feel honored for giving the following lectures.

STA571 Machine Learning: Design discussion material and lead the discussion lecture every week

ECE681 Pattern Classification: Guest Lecture on *Introduction to Deep Neural Networks*

Academic Activities

Reviewer: ICML 2018, ACL 2018, CVPR 2018, ICLR 2018, AISTATS 2018, AAAI 2018/2017/2016, NIPS 2016, UAI 2016, IJCAI 2016, Computer Vision and Image Understanding, Pattern Recognition

Organizer: Two SHREC 3D shape retrieval contests in *Eurographics workshop on 3DOR* 2014

Talks

- "Scalable Bayesian Learning of Recurrent Neural Networks for Language Modeling", *ACL*, Vancouver, Canada, August 2017
- "Scalable Bayesian Methods for Deep Learning", OpenAI, San Francisco, Feb. 2017
- "Learning Weight Uncertainty with Stochastic Gradient MCMC for Shape Classification", *Computer Vision and Pattern Recognition*, Las Vegas, NV, June 2016
- "Preconditioned Stochastic Gradient Langevin Dynamics for Deep Neural Networks", *AAAI Conference on Artificial Intelligence*, Phoenix, AZ, Feb. 2016
- "Large-scale Comprehensive 3D Shape Retrieval", *Eurographics workshop on 3DOR*, Strasbourg, France, April 2014

Software Skills

Python (Tensorflow and Keras), Matlab, R and C