
Zhe Gan

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Research Interests

I am a Senior Researcher at Microsoft Cloud and AI, primarily working on generative models, vision plus NLP, natural language understanding and generation. I also have broad interests on various machine learning topics.

Education

- Duke University, Durham, NC
Ph.D., Electrical and Computer Engineering 09/2013 - 03/2018
- Peking University, Beijing, China
M.S., Electrical Engineering 09/2010 - 07/2013
B.S., Electrical Engineering 09/2006 - 07/2010

Experience

- **Microsoft Cloud and AI** 04/2018 - present
Researcher. Manager: Jingjing Liu under Yi-Min Wang's org
Vision plus NLP, natural language understanding and generation (NLU & NLG)
- **Information Initiative at Duke (iiD)** 09/2013 - 03/2018
Research Assistant. Advisor: Prof. Lawrence Carin
(i) Deep Bayesian Learning: developing deep generative models for computer vision and natural language processing applications, including VAE and GAN
(ii) Bayesian Deep Learning: designing stochastic gradient variational inference algorithms and stochastic gradient MCMC methods for scalable Bayesian inference
- **Microsoft Research Redmond** 05/2017 - 08/2017
Research Intern. Advisor: Xiaodong He, Lihong Li, Ph.D
Deep reinforcement learning for vision and language intelligence, with focus on the visual storytelling task.
- **Microsoft Research Redmond** 05/2016 - 08/2016
Research Intern. Advisor: Xiaodong He, Jianfeng Gao, Li Deng, Ph.D
(i) image captioning: using deep learning techniques to improve the state-of-the-art of image and video captioning.
(ii) deep conflation: using deep learning techniques to implement conflation for business data analytics.
- **Adobe Research** 06/2015 - 09/2015
Data Scientist Intern. Advisor: Hung Bui, Ph.D
Recurrent neural networks (RNN) for NLP applications, including sentence classification, sentence retrieval and sentence generation

Publications

arXiv preprints

1. Y. Chen*, L. Li*, L. Yu*, A. Kholy, F. Ahmed, **Z. Gan**, Y. Cheng and J. Liu "UNITER: Learning UNiversal Image-Text Representations", *arXiv preprint arXiv:1909.11740*
2. C. Zhu, Y. Cheng, **Z. Gan**, S. Sun, T. Goldstein and J. Liu "FreeLB: Enhanced Adversarial Training for Language Understanding", *arXiv preprint arXiv:1909.11764*
3. J. Xu, **Z. Gan**, Y. Cheng and J. Liu "Discourse-Aware Neural Extractive Model for Text Summarization", *arXiv preprint arXiv:1910.14142*, 2019.
4. W. Chen, **Z. Gan**, L. Li, Y. Cheng, W. Wang and J. Liu "Meta Module Network for Compositional Visual Reasoning", *arXiv preprint arXiv:1910.03230*, 2019.
5. S. Dai, Y. Cheng, Y. Zhang, **Z. Gan**, J. Liu and L. Carin "Contrastively Smoothed Class Alignment for Unsupervised Domain Adaptation", *arXiv preprint arXiv:1909.05288*
6. Y. Cheng, **Z. Gan**, Y. Li, J. Liu and J. Gao "Sequential Attention GAN for Interactive Image Editing via Dialogue", *arXiv preprint arXiv:1812.08352*
7. R. Zhang, C. Chen, **Z. Gan**, W. Wang, L. Chen, D. Shen, G. Wang and L. Carin "Sequence Generation with Guider Network", *arXiv preprint arXiv:1811.00696*

2020

1. W. Wang, H. Xu, **Z. Gan**, B. Li, G. Wang, L. Chen, Q. Yang, W. Wang and L. Carin "Graph-Driven Generative Models for Heterogeneous Multi-Task Learning", *Proc. American Association of Artificial Intelligence (AAAI)*, 2020
2. J. Hu, Y. Cheng, **Z. Gan**, J. Liu, J. Gao and G. Neubig "What Makes A Good Story? Designing Composite Rewards for Visual Storytelling", *Proc. American Association of Artificial Intelligence (AAAI)*, 2020

2019

1. W. Wang, C. Tao, **Z. Gan**, G. Wang, L. Chen, X. Zhang, R. Zhang, Q. Yang, R. Henao and L. Carin "Improving Textual Network Learning with Variational Homophilic Embeddings", *Neural Information Processing Systems (NeurIPS)*, 2019
2. S. Sun, Y. Cheng, **Z. Gan**, and J. Liu "Patient Knowledge Distillation for BERT Model Compression", *Conf. on Empirical Methods in Natural Language Processing (EMNLP)*, 2019
3. H. Wang, **Z. Gan**, X. Liu, J. Liu, J. Gao and H. Wang "Adversarial Domain Adaptation for Machine Reading Comprehension", *Conf. on Empirical Methods in Natural Language Processing (EMNLP)*, 2019
4. D. Li, Y. Zhang, **Z. Gan**, Y. Cheng, C. Brockett, M. Sun and B. Dolan "Domain Adaptive Text Style Transfer", *Conf. on Empirical Methods in Natural Language Processing (EMNLP)*, 2019
5. M. Jiang, Q. Huang, L. Zhang, X. Wang, P. Zhang, **Z. Gan**, J. Diesner and J. Gao "TIGER: Text-to-Image Grounding for Image Caption Evaluation", *Conf. on Empirical Methods in Natural Language Processing (EMNLP)*, 2019
6. L. Li, **Z. Gan**, Y. Cheng and J. Liu "Relation-Aware Graph Attention Network for Visual Question Answering", *Int. Conf. on Computer Vision (ICCV)*, 2019
7. **Z. Gan**, Y. Cheng, A. Kholy, L. Li, J. Liu and J. Gao "Multi-step Reasoning via Recurrent Dual Attention for Visual Dialog", *Association for Computational Linguistics (ACL)*, 2019
8. L. Ke, X. Li, Y. Bisk, A. Holtzman, **Z. Gan**, J. Liu, J. Gao, Y. Choi, and S. Srinivasa "Tactical Rewind: Self-Correction via Backtracking in Vision-and-Language Navigation", *Computer Vision and Pattern Recognition (CVPR)*, 2019 **Oral**
9. Y. Li, **Z. Gan**, Y. Shen, J. Liu, Y. Cheng, Y. Wu, L. Carin, D. Carlson and J. Gao "StoryGAN: A Sequential Conditional GAN for Story Visualization", *Computer Vision and Pattern Recognition (CVPR)*, 2019

10. W. Wang, **Z. Gan**, H. Xu, R. Zhang, G. Wang, D. Shen, C. Chen and L. Carin “Topic-Guided Variational Autoencoders for Text Generation”, *North American Chapter of the Association for Computational Linguistics (NAACL)*, 2019 **Oral**
11. L. Chen, Y. Zhang, R. Zhang, C. Tao, **Z. Gan**, H. Zhang, B. Li, D. Shen, C. Chen and L. Carin “Improving Sequence-to-Sequence Learning via Optimal Transport”, *Int. Conf. Learning Representations (ICLR)*, 2019
12. Q. Huang*, **Z. Gan***, A. Celikyilmaz, D. Wu, J. Wang and X. He “Hierarchically Structured Reinforcement Learning for Topically Coherent Visual Story Generation”, *Proc. American Association of Artificial Intelligence (AAAI)*, 2019 **Spotlight**

2018

1. Y. Zhang, M. Galley, J. Gao, **Z. Gan**, X. Li, C. Brockett and B. Dolan “Generating Informative and Diverse Conversational Responses via Adversarial Information Maximization”, *Neural Information Processing Systems (NeurIPS)*, 2018
2. L. Chen, S. Dai, C. Tao, D. Shen, **Z. Gan**, H. Zhang, Y. Zhang and L. Carin “Adversarial Text Generation via Feature-Mover’s Distance”, *Neural Information Processing Systems (NeurIPS)*, 2018
3. X. Zhang, R. Henao, **Z. Gan**, Y. Li and L. Carin “Multi-Label Learning from Medical Plain Text with Convolutional Residual Models”, *Machine Learning for Healthcare (MLHC)*, 2018 **Spotlight**
4. Y. Pu, S. Dai, **Z. Gan**, W. Wang, G. Wang, Y. Zhang, R. Henao and L. Carin “JointGAN: Multi-Domain Joint Distribution Learning with Generative Adversarial Nets”, *Int. Conf. Machine Learning (ICML)*, 2018
5. T. Xu, P. Zhang, Q. Huang, H. Zhang, **Z. Gan**, X. Huang and X. He “AttnGAN: Fine-Grained Text to Image Generation with Attentional Generative Adversarial Networks”, *Computer Vision and Pattern Recognition (CVPR)*, 2018
6. W. Wang, **Z. Gan**, W. Wang, D. Shen, J. Huang, W. Ping, S. Satheesh and L. Carin “Topic Compositional Neural Language Model”, *Artificial Intelligence and Statistics (AISTATS)*, 2018
7. Y. Pu, M. R. Min, **Z. Gan** and L. Carin “Adaptive Feature Abstraction for Translating Video to Text”, *Proc. American Association of Artificial Intelligence (AAAI)*, 2018

2017

1. **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 (NeurIPS)*, 2017
2. Y. Pu, W. Wang, R. Henao, L. Chen, **Z. Gan**, C. Li, and L. Carin “Adversarial Symmetric Variational Autoencoder”, *Neural Information Processing Systems (NeurIPS)*, 2017
3. Y. Pu, **Z. Gan**, R. Henao, C. Li, S. Han and L. Carin “VAE Learning via Stein Variational Gradient Descent”, *Neural Information Processing Systems (NeurIPS)*, 2017
4. Y. Zhang, D. Shen, G. Wang, **Z. Gan**, R. Henao and L. Carin “Deconvolutional Paragraph Representation Learning”, *Neural Information Processing Systems (NeurIPS)*, 2017
5. **Z. Gan**, Y. Pu, R. Henao, C. Li, X. He and L. Carin “Learning Generic Sentence Representations Using Convolutional Neural Networks”, *Conf. on Empirical Methods in Natural Language Processing (EMNLP)*, 2017 **Oral**
6. Y. Zhang, **Z. Gan**, K. Fan, Z. Chen, R. Henao, D. Shen and L. Carin “Adversarial Feature Matching for Text Generation”, *Int. Conf. Machine Learning (ICML)*, 2017
7. Y. Zhang, C. Chen, **Z. Gan**, R. Henao and L. Carin “Stochastic Gradient Monomial Gamma Sampler”, *Int. Conf. Machine Learning (ICML)*, 2017
8. **Z. Gan***, C. Li*, C. Chen, Y. Pu, Q. Su and L. Carin “Scalable Bayesian Learning of Recurrent Neural Networks for Language Modeling”, *Association for Computational Linguistics (ACL)*, 2017 **Oral**
9. **Z. Gan**, C. Gan, X. He, Y. Pu, K. Tran, J. Gao, L. Carin and L. Deng “Semantic Compositional Networks for Visual Captioning”, *Computer Vision and Pattern Recognition (CVPR)*, 2017 **Spotlight**
10. C. Gan, **Z. Gan**, X. He, J. Gao and L. Deng “StyleNet: Generating Attractive Visual Captions with Styles”, *Computer Vision and Pattern Recognition (CVPR)*, 2017

11. **Z. Gan**, P. D. Singh, A. Joshi, X. He, J. Chen, J. Gao and L. Deng “Character-level Deep Conflation for Business Data Analytics”, *Int. Conf. Acoustics, Speech and Signal Processing (ICASSP)*, 2017
12. Y. Xian, Y. Pu, **Z. Gan**, L. Lu and A. Thompson “Adaptive DCTNet for Audio Signal Classification”, *Int. Conf. Acoustics, Speech and Signal Processing (ICASSP)*, 2017
13. Q. Su, X. Liao, C. Li, **Z. Gan** and L. Carin “Unsupervised Learning with Truncated Gaussian Graphical Models”, *Proc. American Association of Artificial Intelligence (AAAI)*, 2017 **Oral**

2016

1. Y. Zhang, **Z. Gan** and L. Carin “Generating Text via Adversarial Training”, *NeurIPS Workshop*, 2016
2. Y. Xian, Y. Pu, **Z. Gan**, L. Lu and A. Thompson “Modified DCTNet for Audio Signals Classification”, *Journal of the Acoustical Society of America*, 2016
3. Y. Pu, **Z. Gan**, R. Henao, X. Yuan, C. Li, A. Stevens and L. Carin “Variational Autoencoder for Deep Learning of Images, Labels and Captions”, *Neural Information Processing Systems (NeurIPS)*, 2016
4. J. Song, **Z. Gan** and L. Carin “Factored Temporal Sigmoid Belief Networks for Sequence Learning”, *Int. Conf. Machine Learning (ICML)*, 2016
5. 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**
6. 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**

2015

1. **Z. Gan**, C. Li, R. Henao, D. Carlson and L. Carin “Deep Temporal Sigmoid Belief Networks for Sequence Modeling”, *Neural Information Processing Systems (NeurIPS)*, 2015
2. R. Henao, **Z. Gan**, J. Lu and L. Carin “Deep Poisson Factor Modeling”, *Neural Information Processing Systems (NeurIPS)*, 2015
3. **Z. Gan**, C. Chen, R. Henao, D. Carlson and L. Carin “Scalable Deep Poisson Factor Analysis for Topic Modeling”, *Int. Conf. Machine Learning (ICML)*, 2015
4. **Z. Gan**, R. Henao, D. Carlson and L. Carin “Learning Deep Sigmoid Belief Networks with Data Augmentation”, *Artificial Intelligence and Statistics (AISTATS)*, 2015

Book Chapter

1. **Z. Gan**, X. Yuan, R. Henao, E. Tsalik and L. Carin “Inference of Gene Networks Associated with the Host Response to Infectious Disease”, Chapter 13 of Book *Big Data Over Networks*. Cambridge University Press. In Press.

PhD Dissertation

1. **Z. Gan** “Deep Generative Models for Vision and Language Intelligence”, Duke University.

Teaching Experience

Teaching Assistant	09/2014-12/2014
STA 601 - Bayesian and Modern Statistics	
Instructor: David Dunson, Ph.D	
Teaching Assistant	01/2015-05/2015
ECE 587 - Information Theory	
Instructor: Ahmad Beirami, Ph.D	

Professional Activities

Area Chair: NeurIPS 2019

Senior Program Committee (SPC) Member: AAAI 2020

Conference Reviewer/PC Member:

- 2020: ICLR, CVPR, ACL
- 2019: ICML, ICLR, AAAI, CVPR, ICCV, ACMMM, EMNLP, CoNLL
- 2018: NeurIPS, EMNLP, CVPR, ACCV
- 2016: NIPS

Journal Reviewer: Transactions on Pattern Analysis and Machine Intelligence, Science China, Transactions on Knowledge and Data Engineering, Transactions on Multimedia Computing Communications and Applications, Transactions on Cybernetics, IET Computer Vision, Entropy

Workshop Reviewer/PC Member:

- 2019: ICCV Workshop on Closing the loop between Vision and Language
- 2019: ICLR Workshop on Deep Generative Models for Highly Structured Data
- 2018: ICML Workshop on Theoretical Foundations and Applications of Deep Generative Models

Talks

- “Deep Generative Models for Vision and Language Intelligence”, *Ph.D. Final Defense*, Durham, NC, February 2018
- “Deep Generative Models for Vision and Language Intelligence”, IBM Thomas J. Watson Research Center, Yorktown, NY, October 2017
- “Deep Generative Models for Vision and Language Intelligence”, NVIDIA, Santa Clara, CA, September 2017
- “Deep Generative Models for Vision and Language Intelligence”, Apple, Cupertino, CA, September 2017
- “Learning Generic Sentence Representations Using Convolutional Neural Networks”, *EMNLP*, Copenhagen, Denmark, September 2017
- “Semantic Compositional Networks for Visual Captioning”, *CVPR*, Hawaii, July 2017
- “Semantic Compositional Networks for Visual Captioning”, *Ph.D. Preliminary Exam*, Durham, NC, April 2017
- “Deep Generative Models for Sequence Learning”, *Ph.D. Qualifying Exam*, Durham, NC, December 2015

Competitions

2019/09: Rank 1st in GLUE benchmark

2019/06: Rank 2nd in Visual Dialog Challenge 2019

2018/09: Rank 3rd in Visual Dialog Challenge 2018

Software Skills

Python (Theano, Tensorflow, PyTorch), Matlab, R and C

Awards

ECE Fellowship, Duke University, 2013

National Scholarship, Department of Minister of Education of China, 2010-2013.

Graduate Coursework

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