

# Zhiting Hu

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## Research Interests

My research interests lie in the broad area of artificial intelligence, machine learning, natural language processing. In particular, I am interested in principles, methodologies, and systems of training AI agents with all types of experiences (data, knowledge, rewards, adversaries, lifelong interplay, etc), and their applications in various domains.

## Positions

- 2021 – now Assistant Professor, Halicioğlu Data Science Institute, UC San Diego
- 2020 – now Visiting Academic, Amazon
- 2017 – 2020 Research Scientist, Petuum Inc.

## Education

- 2020 Ph.D., Machine Learning Department, Carnegie Mellon University  
Advisor: Eric P. Xing
- 2016 M.S., Language Technologies Institute, Carnegie Mellon University  
Advisor: Eric P. Xing
- 2014 B.S., Computer Science, Peking University, China

## Awards & Honors (Selected)

- 2019 **Best Demo Paper Nomination**, ACL 2019
- 2019 **Best Paper Award**, ICLR 2019 drrStructPred Workshop
- 2017 **NVIDIA Pioneering Research Award**
- 2017 **IBM Ph.D. Fellowship**
- 2017 **Baidu Ph.D. Scholarship**
- 2016 **Outstanding Paper Award**, ACL 2016
- 2014 Excellence Award of Stars of Tomorrow Internship Program, Microsoft Research Asia
- 2014 GPA 1st/140, EECS, Peking University
- 2013 Outstanding Undergraduate Award, China Computer Federation (CCF)
- 2013 Google Excellence Scholarship
- 2009 First Prize in China National Biology Olympiad for Senior High School

## Publications

[Google Scholar Profile](#)

### Preprints

- [1] **Zhiting Hu**, Eric P Xing.  
*Panoramic Learning with A Standardized Machine Learning Formalism*. 2021
- [2] Han Guo, Bowen Tan, Zhengzhong Liu, Eric P Xing, **Zhiting Hu**.  
*Text Generation with Efficient (Soft) Q-Learning*. 2021
- [3] Haoran Shi, Pengtao Xie, **Zhiting Hu**, Ming Zhang, Eric P Xing.  
*Towards Automated ICD Coding Using Deep Learning*. 2018.
- [4] Wanrong Zhu, **Zhiting Hu**, Eric P Xing.  
*Text Infilling*. 2018.

### Refereed Papers

- [1] Guangyi Liu, Zichao Yang, Tianhua Tao, Xiaodan Liang, Junwei Bao, Zhen Li, Xiaodong He, Shuguang Cui, **Zhiting Hu**.  
*Don't Take It Literally: An Edit-Invariant Sequence Loss for Text Generation*  
The North American Chapter of the Association for Computational Linguistics (**NAACL 2022**)
- [2] Di Jin, Zhijing Jin, **Zhiting Hu**, Olga Vechtomova, Rada Mihalcea.  
*Deep learning for text style transfer: A survey*  
Computational Linguistics, 2022
- [3] Wenhao Yu, Chenguang Zhu, Zaitang Li, **Zhiting Hu**, Qingyun Wang, Heng Ji, Meng Jiang.  
*A Survey of Knowledge-Enhanced Text Generation*  
ACM Computing Survey, 2022
- [4] **Zhiting Hu**, Erran Li.  
*A Causal Lens for Controllable Text Generation*  
Neural Information Processing Systems (**NeurIPS 2021**)
- [5] Mingkai Deng, Bowen Tan, Zhengzhong Liu, Eric P Xing, **Zhiting Hu**.  
*Compression, Transduction, and Creation: A Unified Framework for Evaluating Natural Language Generation*  
Conference on Empirical Methods in Natural Language Processing (**EMNLP 2021**).
- [6] Bowen Tan, Zichao Yang, Maruan Al-Shedivat, Eric P Xing, **Zhiting Hu**.  
*Progressive Generation of Long Text*  
The North American Chapter of the Association for Computational Linguistics (**NAACL 2021**).
- [7] Yue Wu, Pan Zhou, Andrew Gordon Wilson, Eric P Xing, **Zhiting Hu**.  
*Improving GAN Training with Probability Ratio Clipping and Sample Reweighting*  
Neural Information Processing Systems (**NeurIPS 2020**).
- [8] Bowen Tan, Lianhui Qin, Eric P Xing, **Zhiting Hu**.  
*Summarizing Text on Any Aspects: A Knowledge-Informed Weakly-Supervised Approach*  
Conference on Empirical Methods in Natural Language Processing (**EMNLP 2020**), short.
- [9] Shuai Lin, Wentao Wang, Zichao Yang, Xiaodan Liang, Frank Xu, Eric P Xing, **Zhiting Hu**.  
*Record-to-Text Generation with Style Imitation*  
Conference on Empirical Methods in Natural Language Processing (**EMNLP 2020**), Findings.

- [10] Zhengzhong Liu, Guanxiong Ding, Avinash Bukkittu, Mansi Gupta, Pengzhi Gao, Atif Ahmed, Shikun Zhang, Xin Gao, Swapnil Singhavi, Linwei Li, Wei Wei, Zecong Hu, Haoran Shi, Xiaodan Liang, Teruko Mitamura, Eric P Xing, **Zhiting Hu**.  
*A Data-Centric Framework for Composable NLP Workflows*  
Conference on Empirical Methods in Natural Language Processing (**EMNLP 2020**), demo.
- [11] **Zhiting Hu**, Zichao Yang, Ruslan Salakhutdinov, Tom Mitchell, Eric P Xing.  
*Learning Data Manipulation for Augmentation and Weighting*  
Neural Information Processing Systems (**NeurIPS 2019**).
- [12] **Zhiting Hu**, Haoran Shi, Bowen Tan, Wentao Wang, Zichao Yang, Tiancheng Zhao, Junxian He, Lianhui Qin, Di Wang, Xuezhe Ma, Zhengzhong Liu, Xiaodan Liang, etc.  
*Texar: A Modularized, Versatile, and Extensible Toolkit for Text Generation*  
Annual Meeting of the Association for Computational Linguistics (**ACL 2019**).  
**Best Demo Paper Nomination**, <https://github.com/asym1>
- [13] **Zhiting Hu\***, Bowen Tan\* (equal contrib.), Zichao Yang, Ruslan Salakhutdinov, Eric P Xing.  
*Connecting the Dots between MLE and RL for Sequence Prediction*  
**ICLR 2019 Workshop** on Deep Reinforcement Learning Meets Structured Prediction,  
**Best Paper Award**
- [14] Luchen Liu, Haoran Li, **Zhiting Hu**, Haoran Shi, Zichang Wang, Jian Tang, Ming Zhang.  
*Learning Hierarchical Representations of Electronic Health Records for Clinical Outcome Prediction*  
**AMIA 2019 Annual Symposium**.
- [15] Christy Y. Li, Xiaodan Liang, **Zhiting Hu**, Eric P Xing.  
*Knowledge-Driven Encode, Retrieve, Paraphrase for Medical Image Report Generation*  
AAAI Conference on Artificial Intelligence (**AAAI 2019**).
- [16] Jianheng Tang, Tiancheng Zhao, Chenyan Xiong, Xiaodan Liang, Eric P Xing, **Zhiting Hu**.  
*Target-Guided Open-Domain Conversation*  
Annual Meeting of the Association for Computational Linguistics (**ACL 2019**).
- [17] Haowen Xu, Hao Zhang, **Zhiting Hu**, Xiaodan Liang, Ruslan Salakhutdinov, Eric P Xing.  
*AutoLoss: Learning Discrete Schedules for Alternate Optimization*.  
International Conference on Learning Representations (**ICLR 2019**).
- [18] **Zhiting Hu**, Zichao Yang, Ruslan Salakhutdinov, Xiaodan Liang, Lianhui Qin, Haoye Dong, Eric P Xing.  
*Deep Generative Models with Learnable Knowledge Constraints*  
Neural Information Processing Systems (**NeurIPS 2018**).
- [19] **Zhiting Hu**, Zichao Yang, Ruslan Salakhutdinov, Eric P Xing.  
*On Unifying Deep Generative Models*  
International Conference on Learning Representations (**ICLR 2018**).
- [20] Christy Y. Li, Xiaodan Liang, **Zhiting Hu**, Eric P Xing.  
*Hybrid Retrieval-Generation Reinforced Agent for Medical Image Report Generation*  
Neural Information Processing Systems (**NeurIPS 2018**).
- [21] Zichao Yang, **Zhiting Hu**, Chris Dyer, Eric P Xing, Taylor Berg-Kirkpatrick.  
*Unsupervised Text Style Transfer using Language Models as Discriminators*  
Neural Information Processing Systems (**NeurIPS 2018**).
- [22] Xiaodan Liang, **Zhiting Hu**, Eric P Xing.  
*Symbolic Graph Reasoning Meets Convolutions*  
Neural Information Processing Systems (**NeurIPS 2018**).

- [23] Qinyong Wang, Hongzhi Yin, **Zhiting Hu**, Defu Lian, Hao Wang, Zi Huang.  
*Neural Memory Streaming Recommender Networks with Adversarial Training*  
ACM SIGKDD international conference on Knowledge discovery and data mining (**KDD 2018**).
- [24] **Zhiting Hu**, Zichao Yang, Xiaodan Liang, Ruslan Salakhutdinov, Eric P Xing.  
*Toward Controlled Generation of Text*  
International Conference on Machine Learning (**ICML 2017**).
- [25] **Zhiting Hu\***, Junxian He\* (equal contrib.), Taylor Berg-Kirkpatrick, Ying Huang, Eric P Xing.  
*Efficient Correlated Topic Modeling with Topic Embedding*  
ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (**KDD 2017**).
- [26] Zichao Yang, **Zhiting Hu**, Ruslan Salakhutdinov, and Taylor Berg-Kirkpatrick.  
*Improved Variational Autoencoders for Text Modeling using Dilated Convolutions*  
International Conference on Machine Learning (**ICML 2017**).  
**NVAIL Pioneering Research Award**
- [27] Xiaodan Liang, **Zhiting Hu**, Hao Zhang, Chuang Gan, Eric P Xing.  
*Recurrent Topic-Transition GAN for Visual Paragraph Generation*  
International Conference on Computer Vision (**ICCV 2017**).
- [28] Prasoon Goyal, **Zhiting Hu**, Xiaodan Liang, Chenyu Wang, Eric P Xing.  
*Nonparametric Variational Auto-encoders for Hierarchical Representation Learning*  
International Conference on Computer Vision (**ICCV 2017**).
- [29] Hao Zhang, Zeyu Zheng, Shizhen Xu, Wei Dai, Qirong Ho, Xiaodan Liang, **Zhiting Hu**, Jinliang Wei, Pengtao Xie, Eric P Xing.  
*Poseidon: An Efficient Communication Architecture for Distributed Deep Learning on GPU Clusters*  
The USENIX Annual Technical Conference (**ATC 2017**).
- [30] Lianhui Qin, Zhisong Zhang, Hai Zhao, **Zhiting Hu**, Eric P Xing.  
*Adversarial Connective-exploiting Networks for Implicit Discourse Relation Classification*  
Annual Meeting of the Association for Computational Linguistics (**ACL 2017**).
- [31] Zichao Yang, **Zhiting Hu**, Yuntian Deng, Chris Dyer, Alex Smola.  
*Neural Machine Translation with Recurrent Attention Modeling*  
Conference of European Chapter of the Association for Computational Linguistics (**EACL 2017**).
- [32] Xuezhe Ma, Yingkai Gao, **Zhiting Hu**, Yaoliang Yu, Yuntian Deng, Eduard Hovy.  
*Dropout with Expectation-Linear Regularization*  
International Conference on Learning Representations (**ICLR 2017**).
- [33] **Zhiting Hu**, Xuezhe Ma, Zhengzhong Liu, Eduard Hovy, Eric P Xing.  
*Harnessing Deep Neural Networks with Logic Rules*  
Annual Meeting of the Association for Computational Linguistics (**ACL 2016**).  
**Outstanding Paper Award**
- [34] **Zhiting Hu**, Zichao Yang, Ruslan Salakhutdinov, Eric P Xing.  
*Deep Neural Networks with Massive Learned Knowledge*  
Conference on Empirical Methods in Natural Language Processing (**EMNLP 2016**).
- [35] **Zhiting Hu\***, Andrew Gordon Wilson\* (equal contrib.), Ruslan Salakhutdinov, Eric P Xing.  
*Stochastic Variational Deep Kernel Learning.*  
Neural Information Processing Systems (**NeurIPS 2016**).
- [36] **Zhiting Hu\***, Andrew Gordon Wilson\* (equal contribution), Ruslan Salakhutdinov, Eric P Xing.  
*Deep Kernel Learning*  
Artificial Intelligence and Statistics (**AISTATS 2016**).

- [37] **Zhiting Hu**, Gang Luo, Mrinmaya Sachan, Eric P Xing, and Zaiqing Nie.  
*Grounding Topic Models with Knowledge Bases*.  
International Joint Conference on Artificial Intelligence (**IJCAI 2016**).
- [38] Hao Zhang, **Zhiting Hu**, Yuntian Deng, Mrinmaya Sachan, Zhicheng Yan, Eric P Xing.  
*Learning Concept Taxonomies from Multi-modal Data*  
Annual Meeting of the Association for Computational Linguistics (**ACL 2016**).
- [39] Yuezhong Li, Ronghuo Zheng, Tian Tian, Rahul Iyer, **Zhiting Hu**, and Katia Sycara.  
*Joint Embedding of Hierarchical Categories and Entities for Concept Categorization and Dataless Classification*  
International Conference on Computational Linguistics (**COLING 2016**).
- [40] Hongzhi Yin, **Zhiting Hu**, Xiaofang Zhou, Hao Wang, and Shazia Sadiq.  
*Discovering Interpretable Geo-Social Communities for User Behavior Prediction*  
IEEE International Conference on Data Engineering (**ICDE 2016**).
- [41] Zhuo Wang, Jile Zhu, Xiang Li, **Zhiting Hu**, and Ming Zhang.  
*Structured Knowledge Tracing Models for Student Assessment on Coursera*  
Annual Meeting of the ACM Conference on Learning at Scale (**L@S 2016**).
- [42] **Zhiting Hu**, Qirong Ho, Avinava Dubey, Eric P Xing.  
*Large-scale Distributed Dependent Nonparametric Trees*  
International Conference on Machine Learning (**ICML 2015**).
- [43] **Zhiting Hu**, Poyao Huang, Yuntian Deng, Yingkai Gao, Eric P Xing.  
*Entity Hierarchy Embedding*  
Annual Meeting of the Association for Computational Linguistics (**ACL 2015**).
- [44] **Zhiting Hu**, Junjie Yao, Bin Cui, Eric P Xing.  
*Community Level Diffusion Extraction*  
ACM SIGMOD International Conference on Management of Data (**SIGMOD 2015**).
- [45] Hongzhi Yin, Bin Cui, Ling Chen, **Zhiting Hu**, Xiaofang Zhou.  
*Dynamic User Modeling in Social Media Systems*  
ACM Transactions on Information Systems (**TOIS 2015**).
- [46] **Zhiting Hu**, Junjie Yao, and Bin Cui.  
*User Group Oriented Temporal Dynamics Exploration*  
AAAI Conference on Artificial Intelligence (**AAAI 2014**).
- [47] Hongzhi Yin, Bin Cui, Ling Chen, **Zhiting Hu**, Zi Huang.  
*A Temporal Context-aware Model for User Behavior Modeling in Social Media Systems*  
ACM SIGMOD International Conference on Management of Data (**SIGMOD 2014**).
- [48] Hongzhi Yin, Bin Cui, Yizhou Sun, **Zhiting Hu**, Ling Chen.  
*LCARS: A Spatial Item Recommender System*  
ACM Transactions on Information Systems (**TOIS 2014**).
- [49] Hongzhi Yin, Bin Cui, Ling Chen, **Zhiting Hu**, Zi Huang.  
*LCARS: A Location-content-aware Recommender System*  
ACM SIGKDD international conference on Knowledge discovery and data mining (**KDD 2014**).
- [50] Hongzhi Yin, Bin Cui, Ling Chen, **Zhiting Hu**, Chengqi Zhang.  
*Modeling Location-based User Rating Profiles for Personalized Recommendation*  
ACM Transactions on Knowledge Discovery from Data (**TKDD 2014**).

## Professional Activities & Service

**Co-organizer**, NeurIPS 2019 Workshop on Learning with Rich Experience: Integration of Learning Paradigms  
**Co-organizer**, CVPR 2019 Workshop on Towards Causal, Explainable and Universal Medical Visual Diagnosis  
**Co-organizer**, ICML 2019 Workshop on Learning and Reasoning with Graph-Structured Representations  
**Co-organizer**, ICML 2018 Workshop on Theoretical Foundations and Applications of Deep Generative Models  
**Reviewer**, NeurIPS, ICML, ACL, EMNLP, NAACL, CVPR, AAAI, KDD, WWW, JMLR, MLJ, TPAMI, etc  
**Outstanding reviewer**, EMNLP 2020

## Tutorials & Invited Talks

- 2021 Tutorial *"Knowledge-Enriched Natural Language Generation"*.
- 2021 Invited Talk *"Text Generation with No (Good) Data: New Reinforcement Learning and Causal Frameworks"*. ETH; MSR; NUS
- 2020 Tutorial *"Learning from All Types of Experiences: A Unifying Machine Learning Perspective"*. KDD 2020, with Eric P Xing and Qirong Ho
- 2020 Tutorial *"Modularizing Natural Language Processing"*. AAAI 2020, with Zhengzhong Liu and Eric P Xing
- 2020 Invited Talk *"Training AI Agents with All Types of Experiences"*. UCSD AI Seminar; Bytedance; Max Planck Institute, etc.
- 2019 Tutorial *"Texar: An Open-source Modularized Toolkit for Text Generation and Beyond"*. ICML 2019 Expo Day
- 2019 Invited Talk *"Knowledge-guided Medical Image Report Generation"*. CVPR 2019 Medical Computer Vision Workshop
- 2019 Invited Talk *"Medical Image Report Generation and Beyond"*. Brown Univ. ICERM Workshop on Image Description for Consumer & Overhead Imagery
- 2018 Talk & Poster *"Theory and Algorithms for Parallel Probabilistic Inference"*. NSF Big Data PI Meeting
- 2018 Invited Talk *"Controllable Text Generation: Algorithms and Tools"*. The National Center of Excellence for Computational Drug Abuse Research (CDAR)
- 2017 Invited Talk *"On Unifying Deep Generative Models"*. CMU AI Seminar
- 2016 Invited Talk *"Integrating Structured Knowledge with Deep Neural Networks"*. Microsoft Research, Redmond

## Teaching

- Fall 2021 **Instructor**, Machine Learning with Few Labels, UCSD
- Spring 2019 **Guest Lecturer**, Probabilistic Graphical Models, CMU
- Spring 2017 **Guest Lecturer**, Probabilistic Graphical Models, CMU

## Student Advising

### *Graduate Students*

Andre Wang (Now PhD student at UCSD)  
Bowen Tan (Now PhD student at CMU)  
Han Guo (Now PhD student at CMU)  
Mingkai Deng (Now MS student at CMU)  
Wenwen Si (CMU MS, 2019 → PhD student at UPenn)  
Wei Wei (CMU MS, 2019 → Amazon)  
Zecong Hu (CMU MS, 2019 → Hudson River Trading)  
Christy Li (CMU MS, 2018 → PhD student at Duke)  
Yuezhong Li (CMU MS, 2015 → Google)

### *Undergraduate Students*

Yihan Wang (Now at UCSD)  
Rabona Gao (Now at UCSD)  
Yuheng Zha (Now at UCSD)  
Lechuan Wang (Now at UCSD)  
Holmes Yue Wu (CMU undergrad, 2019 → PhD student at CMU)  
Jianheng Tang (SYSU undergrad, 2018 → MS student at SYSU)  
Wanrong Zhu (PKU undergrad, 2018 → PhD student at UCSB)  
Haoran Shi (PKU undergrad, 2017 → MS student at CMU)  
Prasoon Goyal (visiting scholar, 2016 → PhD student at UT Austin)  
Junxian He (SJTU undergrad, 2016 → PhD student at CMU)