Zhe Zeng | Curriculum Vitae

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EDUCATION

University of California, Los Angeles (UCLA) — Los Angeles, CA
Ph.D. Student in Computer Science, Advisor: Guy Van den Broeck — *Sept. 2018 – Present*
Focused on Artificial Intelligence and Machine Learning

Ohio State University — Columbus, OH
Exchange Student in Mathematics — *Aug. 2016 – Dec. 2016*

Zhejiang University — Hangzhou, China
Bachelor of Science in Mathematics with honors — *Sept. 2014 – Jul. 2018*

RESEARCH INTERESTS

My research interests primarily lie in the intersection of Artificial Intelligence and formal methods. The goal of my research is to combine probabilistic and formal verification techniques to deal with both uncertainty as well as relational structure, and to build AI systems that are able to efficiently and reliably make inference and learn from heterogeneous data.

RESEARCH EXPERIENCE

UCLA StarAI Lab — Los Angeles, CA, USA
Graduate Student Researcher | Advisor: Guy Van den Broeck — *Sept. 2018 – Present*

- *Hybrid Probabilistic Inference under Algebraic Constraints:* performed efficient exact inference on probabilistic relational models defined on hybrid domains with logical and numeric constraints, by proposing state-of-the-art weighted model integration solvers.
- *RCR-based Approximate Probabilistic Inference:* proved the hardness of hybrid probabilistic inference under constraints and proposed a relax-compensate-recovery based approximate solver that achieves the state-of-the-art performance for inference.
- *Learning Hybrid Constrained Models:* proposed an efficient parameter learning algorithm for learning weight functions of hybrid probabilistic models with algebraic constraints via weighted model integration solvers from heterogeneous data
- *Kernel-method based Tractable Probabilistic Inference:* proposed black-box importance sampling for probabilistic graphical models leveraging the tractable probabilistic circuits to allow efficient computation of empirical Kernelized Stein Discrepancy.

Dartmouth College — Hanover, NH, USA
Undergrad Research Intern | Advisor: Qiang Liu — *Summer 2017*

- *Stein-method based Variational Inference:* proposed a novel distributed inference algorithm for continuous graphical models which outperformed a variety of baselines, by extending Stein variational gradient descent to leverage local kernel functions.
- *Subset Selection:* proposed Stein lower bound for estimating Bayesian optimal risk with guarantees on finite-sample confidence bounds, and applied the Stein lower bound to subset selection tasks on probabilistic graphical models

PUBLICATIONS

[1] **Zhe Zeng**, Paolo Morettin, Fanqi Yan, Antonio Vergari, and Guy Van den Broeck. Scaling up hybrid probabilistic inference with logical and arithmetic constraints via message passing. In *Proceedings of the 37th International Conference on Machine Learning (ICML)*, 2020.

[2] **Zhe Zeng**, Paolo Morettin, Fanqi Yan, Antonio Vergari, and Guy Van den Broeck. Probabilistic inference with algebraic constraints: Theoretical limits and practical approximations. In *Advances in Neural Information Processing Systems (NeurIPS)*, 2020. ***Spotlight presentation, acceptance rate 280/9454 = 2.96%***.

[3] **Zhe Zeng** and Guy Van den Broeck. Efficient search-based weighted model integration. In *Proceedings of the 35th Conference on Uncertainty in Artificial Intelligence (UAI)*, 2019.

[4] **Zhe Zeng**, Fanqi Yan, Paolo Morettin, Antonio Vergari, and Guy Van den Broeck. Hybrid probabilistic inference with logical constraints: Tractability and message-passing. In *Workshop on Knowledge Representation & Reasoning Meets Machine Learning at Neural Information Processing Systems (NeurIPS)*, 2019.

[5] Dilin Wang, **Zhe Zeng**, and Qiang Liu. Stein variational message passing for continuous graphical models. In *Proceedings of the 36th International Conference on Machine Learning (ICML)*, 2018.

SERVICES

Program Committees for *UAI 2021; IJCAI 2021; ICML 2020, 2021; AISTATS 2020, 2021; NeurIPS 2020; AAAI 2020*
Teaching Assistant for Fundamentals of Artificial Intelligence, CS161 at UCLA, 2020

SKILLS

Programming Python, Matlab, C++, Julia, LaTeX
Framework PyTorch, Scikit-learn, Numpy