

JONATHAN KUCK

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EDUCATION

Stanford University

PhD student in Computer Science

Advisor: Stefano Ermon

Fall 2015 - 12/2020

University of Illinois, Urbana-Champaign

B.S. in Engineering Physics, minor Computer Science

Fall 2007 - Spring 2015

RESEARCH INTERESTS

Machine learning and robotic perception problems that bridge theory and application. I am particularly interested in probabilistic inference, combining probabilistic modeling with deep learning, learning on irregular data (sets, graphs, and point clouds), robotic perception (e.g. object detection and tracking), and uncertainty quantification.

PUBLICATIONS

Belief Propagation Neural Networks

Jonathan Kuck, Shuvam Chakraborty, Hao Tang, Rachel Luo, Jiaming Song, Ashish Sabharwal, Stefano Ermon
In the *34th Conference on Neural Information Processing Systems*. **NeurIPS 2020**.

Approximating the Permanent by Sampling from Adaptive Partitions

Jonathan Kuck, Tri Dao, Hamid Rezaatofghi, Ashish Sabharwal, and Stefano Ermon.
In the *33rd Conference on Neural Information Processing Systems*. **NeurIPS 2019**.

Adaptive Hashing for Model Counting

Jonathan Kuck, Tri Dao, Shengjia Zhao, Burak Bartan, Ashish Sabharwal, and Stefano Ermon.
In the *35th Conference on Uncertainty in Artificial Intelligence*. **UAI 2019**.

Approximate Inference via Weighted Rademacher Complexity (Oral)

Jonathan Kuck, Ashish Sabharwal, and Stefano Ermon.
In *Proceedings of the 32nd AAAI Conference on Artificial Intelligence*. **AAAI 2018**.

Query-Based Outlier Detection in Heterogeneous Information Networks

Jonathan Kuck*, Honglei Zhuang*, Xifeng Yan, Hasan Cam, and Jiawei Han.
In the *18th International Conference on Extending Database Technology*. **EDBT 2015**.

PREPRINTS

Privacy Preserving Recalibration under Domain Shift

Rachel Luo, Shengjia Zhao, Jiaming Song, **Jonathan Kuck**, Stefano Ermon, Silvio Savarese

PROFESSIONAL EXPERIENCE

Research Intern: Lyft Self-Driving

With Qiangui Huang and Ashesh Jain

Summer 2019

Calibrated Uncertainties in Deep Learning

- Trained an object detector to predict bounding boxes with calibrated class and position uncertainties.
- Improved final mAP of object detector using learned uncertainty during non-maximum suppression.
- Prototyped a set transformer based approach for learning non-maximum suppression.

Research Assistant: Graphics Lab, Stanford

With Professor Pat Hanrahan

Summer-Fall 2015

Astronomy Image Processing

- Identified costly and common operations in the Large Synoptic Survey Telescope imaging pipeline.
- Prototyped a domain specific language for astronomical image processing.
- Achieved **5-10x speedups** for language primitives compared to the current method.

Research Assistant: Data Mining Group, UIUC

With Professor Jiawei Han

2014

Outlier Detection

- Developed an outlier detection algorithm for use in large heterogeneous information networks that supports **flexible user queries** for efficiently finding specific types of outliers.
- Evaluated practical effectiveness by conducting experiments on the DBLP database of CS publications.
- Published co-first author paper in EDBT 2015.

Research Assistant: Parallel Programming Laboratory, UIUC

With Professor Laxmikant Kale

2013

N-body Simulation

- Developed in Charm++, a portable, message driven, parallel programming system that includes dynamic load balancing, and fault tolerance.
- Implemented an n-body simulator for use with gravitational or electrical inter-body forces.
- Optimized simulation by dynamically splitting and merging processes during particle migration to eliminate a global synchronization barrier.

TEACHING

Probabilistic Graphical Models (head TA, Winter 2018): Recognized as one of the top 5% of CS course assistants this quarter.

Artificial Intelligence (TA, Fall 2020)

EXTRACURRICULAR

Speedskating: **Olympic medalist** (team pursuit), world champion (team pursuit), and world championship medalist (individual).