JONATHAN KUCK

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EDUCATION

Stanford University   *Fall 2015 - 12/2020 (expected graduation)*
PhD student in Computer Science
Advisor: Stefano Ermon

University of Illinois, Urbana-Champaign   *Fall 2007 - Spring 2015*
B.S. in Engineering Physics, minor Computer Science

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

Approximating the Permanent by Sampling from Adaptive Partitions
Jonathan Kuck, Tri Dao, Hamid Rezatofighi, Ashish Sabharwal, and Stefano Ermon.
In *the 32nd 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
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

Belief Propagation Neural Networks
Jonathan Kuck, Shuvam Chakraborty, Hao Tang, Rachel Luo, Jiaming Song, Ashish Sabharwal, Stefano Ermon
In *arXiv preprint arXiv:2007.00295.*

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   Summer 2019
With Qiangui Huang and Ashesh Jain   *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 *Summer-Fall 2015*
With Professor Pat Hanrahan *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 *2014*
With Professor Jiawei Han *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 *2013*
With Professor Laxmikant Kale *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.

EXTRACURRICULAR

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