

Shachi Deshpande

PHD CANDIDATE · DEPARTMENT OF COMPUTER SCIENCE
Cornell Tech and Cornell University, New York, NY 10044

Education

Cornell University

PHD IN COMPUTER SCIENCE

• Advisor: Prof. Volodymyr Kuleshov

New York
Present

Cornell University

MS IN COMPUTER SCIENCE

• Advisor: Prof. Volodymyr Kuleshov

New York
Aug 2022

Indian Institute of Technology, Bombay

BTECH WITH HONORS IN COMPUTER SCIENCE

• Advisor: Prof. Sudarshan

Mumbai
Aug 2018

Publications

Online Calibrated Regression for Adversarially Robust Forecasting.

Volodymyr Kuleshov and **Shachi Deshpande**. (In Review)

Calibrated Uncertainty Estimation Improves Bayesian Optimization.

Shachi Deshpande and Volodymyr Kuleshov. (In Review)

Deep Multi-Modal Structural Equations For Causal Effect Estimation With Unstructured Proxies.

Shachi Deshpande, Kaiwen Wang, Dhruv Sreenivas, Zheng Li and Volodymyr Kuleshov. In Neural Information Processing Systems 2022

Calibrated and Sharp Uncertainties in Deep Learning via Simple Density Estimation.

Volodymyr Kuleshov and **Shachi Deshpande**. In International Conference on Machine Learning 2022. (Spotlight)

New Genome Similarity Measures based on Conserved Gene Adjacencies.

Daniel Doerr, Luis Antonio B. Kowada, Eloi Araujo, **Shachi Deshpande**, Simone Dantas, Bernard M.E. Moret, and Jens Stoye. In Journal of Computational Biology 2017.

Research and Internships

CALIBRATION OF LEARNED PROPENSITY SCORE MODELS FOR CAUSAL INFERENCE

NOV 2022- CURRENT

Prof. Volodymyr Kuleshov | Research at Cornell University

We propose post-hoc calibration techniques to improve the predictive quality of propensity score models in causal effect estimation. We analyse the theoretical properties of a calibrated model and demonstrate improved estimation of causal effect sizes in Genome-Wide Association Studies by calibrating learned base propensity score models.

DEEP GENERATIVE MODELS FOR ESTIMATING CAUSAL EFFECTS OF GENETIC VARIANTS

JAN 2023- CURRENT

Prof. Volodymyr Kuleshov | Research at Cornell University

We are designing an end-to-end system to perform improved causal effect estimation for high-dimensional sequences of genetic variants by encoding non-linear confounding mechanisms via deep structural equations. We also aim to reduce the computational and memory requirements of GWASs allowing causal effect estimation of millions of genetic variants.

DEEP MULTIMODAL STRUCTURAL EQUATIONS FOR CAUSAL INFERENCE

AUG 2021-MAY 2022

Prof. Volodymyr Kuleshov | Research at Cornell University

We incorporate multi-modal, unstructured information in modern datasets within the framework of causal inference using deep structural equations. We propose new generative architectures and novel inference algorithms that scale to multi-modal setups with missing data. We create multimodal causal inference benchmarks and apply these techniques to correct for confounding and reduce the bias in treatment effect estimation.

LEARNING SPATIAL RELATIONSHIPS FOR ROBOTIC MANIPULATION

JUNE 2022-AUG 2022

Dr. Chaitanya Mitash | Research at Amazon Robotics

We enable spatial reasoning between objects in cluttered scenes with zero-shot generalization to unseen object classes.

CALIBRATING UNCERTAINTIES FOR BAYESIAN OPTIMIZATION

JAN 2021-MAY 2021

Prof. Volodymyr Kuleshov | Research at Cornell University

We propose a simple algorithm to calibrate the uncertainty of posterior distributions over the objective function as part of the Bayesian optimization process. We show that by improving the uncertainty estimates of the posterior distribution with calibration, Bayesian optimization makes better decisions and arrives at the global optimum in fewer steps.

STREAMING QUERY OPTIMIZATION

AUG 2017-MAY 2018

Prof. S Sudarshan | Undergraduate Thesis, IIT Bombay

We proposed dynamic tuple routing policies to optimize join computation in streaming query application within a distributed computing environment. We designed parallel query execution policies for reducing latency of computation without compromising the application throughput.

DERIVATIVE CLOUDS

AUG 2017-MAY 2018

Prof. Umesh Bellur | R & D Project, IIT Bombay

We analysed several derivative setups and virtualization frameworks to create models of application performance in response to CPU and memory overcommitment. We empirically determined efficient Virtual Machine cluster configurations corresponding to application requirements.

MAXIMUM LIKELIHOOD ESTIMATION OF PHYLOGENETIC TREES

JUNE 2016-AUG 2016

Prof. Bernard Moret | Summer@EPFL Scholar, EPFL, Switzerland

We derived the evolutionary history of plant genomes using gene sequence data based on maximum likelihood estimation. We used a graphical gene connection model to incorporate gene similarities and demonstrated significant reduction in the computational requirements of phylogenetic (evolutionary) tree reconstruction for plant species.

Awards and Fellowships

2022	Doctoral Travel Grant for Grace Hopper Celebration , Cornell University
2018	Cornell University Fellowship , Cornell University
2013	INSPIRE Scholarship , Dept of Science and Technology, Govt of India
2013	Dhirubhai Ambani Scholarship , Reliance Foundation
2008	National Talent Search Examination Scholarship , NCERT, Govt of India

Teaching Experience

Spring 2021	Deep Probabilistic and Generative Models , Teaching Assistant
Fall 2020	Applied Machine Learning , Teaching Assistant
Summer 2020	Introduction to Programming Using Python , Teaching Assistant
Spring 2020	Interactive Computer Graphics , Teaching Assistant
Fall 2017, Spring 2018	Computer Programming and Utilization , Teaching Assistant

Key Coursework

Causal Machine Learning, Reinforcement Learning, Decision Theory, Topics in Machine Learning and Natural Language Processing (Seminars), Emerging Cloud Technologies, Model Checking, Computer Graphics, Information Retrieval, Probability Theory, Stochastic Processes

Outreach & Professional Development

SERVICE AND OUTREACH

2021-2022 **Computer Science Graduate Organization, Cornell Tech**, Vice-President
2021-2022 **Dept of Computer Science, Cornell**, Mentor for incoming Graduate students
2019-2020 **CS Graduate Admissions Committee, Cornell**, Reviewer
2017-2018 **Dept of Computer Science, IIT Bombay**, Academic mentor

REVIEWER

ICML 2023
AISTATS 2022, 2023
NeurIPS 2021, 2022

EXTRACURRICULAR

Coordinator for internship recruitment of undergraduate students at IIT Bombay	2016-2017
Panelist for BitStream Newsletter at IIT Bombay	2015-2016
Organizer of programming competition CodeBlitz at Techfest, IIT Bombay	Winter 2014