Aniket Deshpande

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Researching numerical linear algebra, high-dimensional statistics, generative models.

Education

University Of Illinois, Urbana-Champaign — Urbana, IL
B.S. Physics, Specialization in Learning Theory — 2023 – 2027

- High-Dimensional Statistics[G], Deep Learning Theory[G], Dynamical Systems[G], Representation Theory[G], Deep Generative Models, Machine Learning, Time Series Analysis, Stochastic Processes, Quantum Information Theory, Data Structures & Algorithms

[G] *denoting graduate coursework*

Grants & Fellowships

Vector Institute Research Grant, *Visiting Research Internship* — *CAD $7500*
Classical Shadow Tomography

Talks & Posters

Approximating Tensor Contractions with Annealed Importance Sampling, *08.2025*
Poster developed for *QSim 2025, New York, NY*

Quantum Circuit Volume for Graph Models, *12.2024*
Poster developed for the *Illinois Mathematics Lab Open House*

Research

Vector Institute for Artificial Intelligence | Toronto, Ontario — *Spring 2026*

- PI: Dr. Alán Aspuru-Guzik
- Learning quantum spectroscopy data with machine learning algorithms
- Implementing numerical algorithms to train, and optimize machine learning models

Computation & Neurodynamics Lab | Urbana, IL — 01.2025 – Present

- PI: Dr. Matthew Singh
- Developing symbolic AI methods for Floquet decomposition of linear time-periodic systems using exponential maps with structured generators and implementing closed-form monodromy matrix factorizations.
- Applying block-diagonal parameterizations with zero-mean constraints to neural oscillator networks, enabling analytic recovery of periodic dynamics from discrete trajectory samples without time-ordering integrals for interpretable neural code analysis.

Lab for Parallel Numerical Algorithms | Urbana, IL — 09.2024 - Present

- PI: Dr. Edgar Solomonik
- Collaborating on the development of a novel Monte Carlo algorithm for contracting general tensor networks, with applications to quantum circuit simulation.
- Developing Bayesian models for tensor CP decomposition, showing how likelihood maximization under structured covariance priors connects to alternating Mahalanobis distance minimization.

Industry

Space Dynamics Laboratory | Ionospheric Analyst Intern — 05 - 08.2024

- Developed a `Python` scraper to expedite the data collection of NICT ionograms to $600+$ ionograms downloaded per hour.
- Researched numerical analysis methods to improve the noise reduction of ionograms using various filtering methods. Implemented filters in `Python` and `Julia` and ran statistical analysis (PSNR, MSE, SSIM) to compare efficiencies.
- Researched methods to improve automatic ionogram scalers using deep learning architecture (CNNs) and techniques.

Learning

Independent Study– ***Information Geometry***, *08.2025-Present*
with Dr. Matthew Singh

QSim Summer School – ***NSF RQS (hosted at IBM, NYC)***, *08.2025*
Lectures covering theoretical and experimental perspectives on quantum error correction, simulation, and algorithms.

Uncertainty Quantification & Machine Learning for Physical Systems – ***IMSI hosted at the University of Chicago***, *05.2025*
Lectures on Bayesian inference, sensitivity analysis, and physics-informed neural networks, with applications to complex physical systems.

LPNA Reading Group – ***University of Illinois***, *01.2025 – Present*
Weekly discussions on random matrix theory, graph partitioning, tensor network applications, and quantum error correction.

Outreach

Membership Director *SIAM @ University of Illinois*, *05.2025 - Present*
SIAM@UIUC executive officer. Responsibilities include managing membership status, involvement, and recruitment.

Professional Affiliations

Society of Industrial & Applied Mathematics, *05.2025 - Present*
Member

Skills

Programming: Python, C/C++, Java, Julia, Mathematica
Libraries & Frameworks: NumPy, SciPy, Pandas, Matplotlib, scikit-learn, SymPy, Jupyter
Tools & Environments: Git, LaTeX, Conda, Shell, Jupyter