JULES BERMAN

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SUMMARY

Second year PhD Student in computer science with research focus on developing numerical methods for nonlinear model reduction and high dimensional PDEs using neural networks and other machine learning techniques.

EDUCATION

B.S.   Computer Science, New York University. *2017*
Ph.D.   Computer Science, New York University. *2025*

EXPERIENCE

NYU, Courant Institute of Mathematical Sciences   *Sept 2022 – Current*
Ph.D Candidate, advised by Benjamin Peherstorfer

> Formulated new method for reduced order modeling using sparse approximations of deep networks to solve PDEs both an order of magnitude faster and more accurate than comparable methods.

> Conducted research into the use of score based diffusion models for uncertainty quantification of SDEs.

> Developed method to use neural networks to approximate the solution of high dimensional PDEs with applications to the 6 dimensional Vlasov-Poisson equation for plasma simulation.

Flatiron Institute   *May 2021 – Aug 2022*
Research Analyst, Center for Computational Neuroscience

> Developed method which used point cloud representations to improve segmentation of 3D brain images.

> Built software platform to train deep networks at scale. Trained 100k+ models, and built tools for analysis.

Bloomberg LP   *April 2018 – April 2021*
Software Engineer, Global Infrastructure Team

> Maintained the full stack of a company-wide infrastructure procurement web application.

> Built a machine learning model which used historical data to project future infrastructure usage.

PUBLICATIONS

Randomized Sparse Neural Galerkin Schemes with Deep Networks   Neurips 2023 • *Spotlight*
   J. Berman, B. Peherstorfer   [arxiv]

Representational Dissimilarity Metric Spaces for Stochastic Neural Networks   ICLR 2023 • *Accepted*
   L. Duong, J. Nassar, J. Zhou, **J. Berman**, J. Olieslagers, A Williams.   [arxiv]

Nonlinear embeddings for conserving quantities with Neural Galerkin schemes SISC 2023 • *In Review*
   P. Schwerdtner, P. Schulze, **J. Berman**, B. Peherstorfer   [arxiv]

Neuronal Temporal Filters as Normal Mode Extractors   Phys. Rev. Research 2022 • *In Review*
   J. Berman, S. Golkar, S. Farashahi, D. Lipshutz, D.B. Chklovskii.

Bridging the Gap: Point Clouds for Merging Neurons in Connectomics   MIDL 2022 • *Accepted*
   J. Berman, J. Wu, D.B. Chklovskii.   [arxiv]

Nonlinear Model Reduction via Pretrained Neural Galerkin Schemes   2023 • *In Preparation*
   J. Berman, B. Peherstorfer

SKILLS

Machine learning, numerical analysis, deep learning, nonlinear model reduction, diffusion models

Python, Jax, Pytorch, Tensorflow, NumPy, Matlab, Chebfun, SLURM, Javascript