Nilin Abrahamsen

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EDUCATION

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
2015 - 2021

PhD in Mathematics
GPA: 5.0 / 5.0

UNIVERSITY OF COPENHAGEN
2009 - 2015

BS and MS in mathematics
Thesis prize: **Best MS thesis in Denmark** in the mathematical sciences (Danish Mathematical Association)

SKILLS

Programming: Python, machine learning frameworks (JAX, PyTorch), JIT-compiled Python (Numba+CUDA)
Scientific machine learning: neural network-based electron simulation for energy calculations in chemistry

EXPERIENCE

UNIVERSITY OF CALIFORNIA, BERKELEY
2021 - PRESENT

Postdoctoral researcher, The Simons Institute for the Theory of Computing

- Developed optimization methods and neural architectures for the variational Monte Carlo method in computational chemistry.
- Created method to use the same code for CPU and GPU using Numba CUDA.
- Designed a new optimization procedure for simulating a quantum control problem which allowed scaling up the problem size by 8x

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
2015 - 2021

Research assistant

- Developed a polynomial-time (non-quantum) algorithm for solving ground states of quantum systems on tree graphs, the first such algorithm outside the setting of 1-dimensional chains.
- Established the first sub-exponential (non-quantum) algorithm for ground states of exactly solvable quantum systems on 2-dimensional lattices.

LEADERSHIP AND SERVICE

- Invited speaker at the Machine Learning for Electronic Structure Theory workshop at the University of Chicago. All other 20+ speakers were principal investigators.
- Reviewer for leading scientific journals and conferences including *Innovations in Theoretical Computer Science* (ITCS), *Journal of Computational Physics* (JCP), *Siam Journal of Scientific Computing* (SISC), and *Symposium on Theory of Computing* (STOC).
- Led classroom sessions at MIT on statistics, probability, linear algebra, discrete mathematics, and more.
- Designed the exercise curriculum for a new class on probability theory at the University of Copenhagen.

EXTRACURRICULAR PROJECTS

Inventing art styles with no artistic training data
During the controversy about AI plagiarizing artists I hypothesized that generative art can be achieved without using human-made training data. I proposed to use the latent space in an auto-encoder as the artwork and leveraging the inductive bias from a digital paintbrush. As part of this project I created a differentiable brush engine as a JAX (machine learning framework) model. Preprint at arxiv.org/abs/2305.12015.

LINKS

Google Scholar: https://scholar.google.com/citations?user=wovW9DAAAAAJ&hl=en
LinkedIn: https://www.linkedin.com/in/nilin-abrahamsen-1969742a7/
GitHub: https://github.com/nilin

LANGUAGES

English, Danish, Mandarin Chinese professional working