Alvin Heng

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INTERESTS

Deep generative models, unsupervised learning, self-supervised learning, gradient flows, representation learning.

EDUCATION

National University of Singapore 2021 - Present
Ph.D in Computer Science

University of Toronto 2020 - 2021
M.Sc in Physics

Nanyang Technological University, Singapore 2016 - 2020
B.Sc in Physics

EXPERIENCE

National University of Singapore Aug 2021 - Present
Graduate Researcher with Harold Soh

Conducting research in the field of deep generative modeling as a PhD thesis topic. Topics explored thus far are broadly in the areas of gradient flows, diffusion models, variational inference, neural ODEs and time-series prediction.

University of Toronto Sep 2020 - Aug 2021
Graduate Researcher with Nathan Wiebe

Worked remotely to investigate how deep learning techniques can be used to improve particle resamplers for Sequential Monte Carlo, with applications to quantum algorithms.

SpeQtral Jun 2020 - Aug 2020
Software Development Intern

Developed an open-source API that distributes quantum keys according to the ETSI standard, and ensured compatibility with commercial encryptors from a partner cybersecurity company.

Nanyang Technological University, Singapore Jun 2017 - May 2020
Undergraduate Researcher with Pinaki Sengupta

Ran Quantum Monte Carlo simulations to study the physics of quantum materials. Published in Physical Review B.

Kavli Institute for Theoretical Physics, UCSB Jun 2019 - Dec 2019
Visiting Researcher with Anna Keselman, Leon Balents

Collaborated with experimental physicists to run numerical simulations on a quantum material with exotic spin excitations. Published in Physical Review Letters.

Institute of High Performance Computing, A*STAR May 2018 - Aug 2018
Research Intern with Ling Feng

Analyzed the statistical properties of the Bitcoin and Lightning cryptocurrency networks and ran simulated transactions to investigate the problem of Lightning channel imbalances. Published in ICPADS 2018.

SCHOLARSHIPS & AWARDS

NUS-SoC Graduate Tutorship-PhD Scheme — 2021 - Present
Singapore National Academy of Science Award — 2020
CNYSP Research Award (Gold) — 2020
CN Yang Scholars Program — 2016-2020
Nanyang Scholarship — 2016-2020
NTU SPMS Dean's List — 2016/17, 2017/18, 2019/20

PUBLICATIONS

Preprints

[5] **Generative Modeling with Flow-Guided Density Ratio Learning**
A. Heng, A. F. Ansari, H. Soh
Preprint, 2023.

[4] **Neural Continuous-Discrete State Space Models for Irregularly-Sampled Time Series**
A. F. Ansari, **A. Heng**, A. Lim, H. Soh
Preprint, 2023.

Journal Papers

[3] **Three-Magnon Bound State in the Quasi-One-Dimensional Antiferromagnet α-$NaMnO_2$**
R. L. Dally, **A. Heng**, A. Keselman, M. M. Bordelon, M. B. Stone, L. Balents, S. D. Wilson
Physical Review Letters, 2020.

[2] **Pair Hopping in Systems of Strongly Interacting Hard-Core Bosons**
A. Heng, W. Guo, A. W. Sandvik, P. Sengupta
Physical Review B, 2019.

Conference Papers

[1] **Optimal Fee Structure for Efficient Lightning Networks**
A. Heng, L. Feng, S. Cheong, R. Goh
International Conference on Parallel and Distributed Systems (ICPADS), 2018.

TEACHING

CS1010: Programming Methodology, National University of Singapore — Fall 2021, 2022
Teaching Assistant with Prof. Ooi Wei Tsang

CS2030S: Programming Methodology II, National University of Singapore — Spring 2022
Teaching Assistant with Prof. Ooi Wei Tsang

SKILLS

Programming Languages: Python, C, Java; *familiar with* C++, Fortran
Deep Learning Frameworks: Pytorch
Typesetting: LaTeX