ISAAC LIAO

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EDUCATION

Massachusetts Institute of Technology GPA: 5.0/5.0 *Sep 2019 - Present*
BS expected in June 2023, Double major in Computer Science and Physics
Earl Haig Secondary School *Sep 2015 - Jun 2019*
Ontario Secondary School Diploma (OSSD)

RELEVANT COURSEWORK

Graduate Information Theory, Graduate Bayesian Modeling and Inference, Graduate Statistical Learning Theory, Computer Vision, Quantum Physics III. Built superfluid simulator using split-step method on Gross-Pitaevskii equation, with visualizations used to teach MIT Classical Mechanics II class.

RESEARCH EXPERIENCE

Meta Learned Optimization for Machine Learning
MIT Advanced Undergraduate Research Opportunities Program (Advisor: Marin Soljačić)
Ideation, refinement, theoretical analysis, and empirical testing of optimization algorithms nested within each other. Drafting, polishing, and submission of paper and rebuttals for ICLR and ICML.

Few Shot Learned Image Compression
Final project in computer vision class
Ideation, refinement, theoretical analysis, and empirical testing of neural image compression techniques. Use of information theory to develop channel codes for compression resembling the forward passes of VAEs and BNNs. Reinvented reparameterization gradients, hierarchical depth, and KL annealing schedules in the process, without prior knowledge of variational inference.

PUBLICATIONS

Liao, I., Dangovski, R. R., Foerster, J. N., and Soljačić, M. Learning to optimize quasi-newton methods. *arXiv preprint arXiv:2210.06171, 2022.*

Introduces a novel machine learning optimizer which blends learn to optimize (L2O) meta-learning techniques with quasi-Newton optimization methods using sparse neural networks. Theoretical results regarding convex and nonconvex stochastic convergence and sparse neural network expressiveness, with experimental support.

AWARDS AND HONORS

International Physics Olympiad: *Silver Medal* *Tel Aviv, Israel, July 2019*
International Physics Olympiad: *Honorable Mention* *Lisbon, Portugal, July 2018*
MIT Battlecode Competition: Champion, solo *Cambridge, MA, Jan 2022*
MIT Battlecode Competition: 7th place, solo *Cambridge, MA, Jan 2021*
MIT Battlecode Competition: Champion of Newbie division, solo *Cambridge, MA, Jan 2020*

EXTRACURRICULARS

Game AI Programming, poker, piano, ice skating