Jerry Lingjie Mei

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EDUCATION

Princeton University — Princeton, New Jersey
Ph.D. candidate in Computer Science — Sept. 2022 - May 2027

Massachusetts Institute of Technology — Cambridge, Massachusetts
M.Eng. in Computer Science — GPA: 4.7/5.0 — Sept. 2020 - May 2022
B.Sc. in Computer Science (6-3), and Mathematics (18) — GPA: 4.9/5.0 — Sept. 2017 - May 2020

Peking University — Beijing, China
B.Sc. candidate in Mathematics — GPA: 3.84/4.00 — Sept. 2016 - Jun. 2017

RESEARCH EXPERIENCES

FALCON (FAst Learning of novel visual CONcepts) — CoCoSci Lab, MIT CSAIL
Advised by Chuang Gan, Joshua Tenenbaum — Sept. 2019 - Now

- It is important to build machines that can learn concepts that are associated with the physical world in an incremental manner and flexibly use them.
- I proposed a novel unified framework (FALCON) that addresses fast concept learning that combines known concepts and very few data from visual images and language, and applies such concepts in donwstream tasks like question answering.
- I built a model that incorporates neural-symbolic reasoning and meta-learning to learn the novel concept.
- Under review at ICLR.

ADEPT (Approximate Derenderer, Extended Physics, and Tracking) — CoCoSci Lab, MIT CSAIL
Advised by Jiajun Wu, Joshua Tenenbaum — Sept. 2018 - Jul. 2019

- Humans have expectations about how objects will move and interact. We aim to recreate human's ability to become surprised when expectation does not match observation.
- I designed a novel object-centric model that can discriminate scenes base on whether they are physically plausible at near-human levels.
- I created a new stimulus dataset based on developmental cognitive experiments for probing the core knowledge in the intuitive physics.
- Accepted to NeurIPS, Cogsci. More at `http://physadept.csail.mit.edu/`

Generic and Efficient Convolutions in Julia on Non-traditional Numeric Types — Julia Lab, MIT CSAIL
Advised by Alan Edelman — Feb. 2018 - Jul. 2018

- I optimized Julia's convolutions on GPU with Winograd convolution and CUDAnative library. It also supports various non-traditional numeric types, like half-precision floating-point numbers and fixed-point numbers.
- Throughput is increased by a factor of 1.4 compared to existing implementations.

PUBLICATIONS

1. Mei, L., Mao, J., Wang, Z., Gan, C., & Tenenbaum, J. (2022). TFALCON: Fast Visual Concept Learning by Integrating Images, Linguistic descriptions, and Conceptual Relations. ICLR.
2. Smith, K., Mei, L., Yao, S., Wu, J., Spelke, E., Tenenbaum, J., & Ullman, T.D. (2020). The fine structure of surprise in intuitive physics: when, why, and how much? CogSci.
3. Smith, K., Mei, L., Yao, S., Wu, J., Spelke, E., Tenenbaum, J., & Ullman, T. (2019). Modeling Expectation Violation in Intuitive Physics with Coarse Probabilistic Object Representations. NeurIPS.

COURSEWORK

Computer Vision, Embodied Intelligence, Computational Sensorimotor Learning, Natural Language Processing, Statistical Learning Theory, Machine Learning, Computational Cognitive Science, Algorithm for Inference, Robotic Manipulation, High-dimensional Statistics, Numerical Methods, Nonlinear Dynamics, Network Science, Game Theory, Program Analysis.

SERVICES

- Member of **IEEE-Eta Kappa Nu** Honor Society at MIT. Duty includes organizing student-faculty dinners and tutoring.
- Teaching Assistant for Course 6.036, Intro to Machine Learning. Duty includes organizing recitation and lab sections, office hours and developing new course materials.

OTHER PROJECTS

- Sim-to-real Transfer with Residual Boostrapped DDPG

- Assessing Generalization of representations in Atari Games.
- Compositional Language Evolution from a Bayesian Standpoint.
- A Iterative Numerical Solver to Elliptic PDE via Multigrid Methods.
- Scallop: A Numerical Solution for Swimming Microorganisms in Low Reynolds Number Fluids via Complement Flows.
- Competitive SIR Model: Rumour Network Dynamics Simulation with Compartmental Models.
- A Numerical Simulation for 1-D N-body Systems with Fast Multiple Methods.

HONORS & AWARDS

- Top 25 individual at the 2017 **Putnam** Competition.
- Top 1 team at the 2017 Boston Dragon Boat Race (as PKU Alumni).
- Gold Medal at the 2016 International Mathematical Olympiad.

ACTIVITIES

- I was an Exec member of **Association of Taiwanese students** responsible for organizing *Strait to Taiwan*, a food event at Stata building.
- I am also involved in MIT Asian dance team and MIT Technique.