Roy Friedman

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Education

Ph.D. Candidate for Computer Science

Hebrew University of Jerusalem

Under the supervision of Prof. Yair Weiss

Since 2021

M.Sc. in Computer Science

2018-2021

Thesis subject: posterior sampling for image restoration

B.Sc. in Computer Science and Physics

2014-2018

Publications, Talks and Posters

2022 **HIGlow: Conditional Normalizing Flows for High-Fidelity HI Map Modeling**, Friedman & Hassan, Machine Learning and the Physical Sciences Workshop, Conference on Neural Information Processing Systems

2022 **Minisymposium Presentation: Posterior Sampling for Image Restoration**, SIAM Conference on Imaging Science

2021 **Posterior Sampling for Image Restoration using Explicit Patch Priors**, Friedman & Weiss, preprint DOI: arXiv:2104.09895

2020 **A Unified Linear Viscoelastic Model of the Cell Nucleus Defines the Mechanical Contributions of Lamins and Chromatin**, Wintner, Hirsch-Attas, Schlossberg, Brofman, Friedman, Kupervaser, Kitsberg, Buxboim, Advanced Science 7 (8), 1901222

2019 **ICSI Based Mechanical Analysis for Evaluation of Development Potention of Human Oocytes**, Friedman, Wintner, Kitsberg, Ben-Meir Buxboim, Israeli Medical and Biological Engineering Society, poster presentation

Research Experience

Yair Weiss' lab for Computer Vision

Graduate Student

Since 2018

- **M.Sc. research topic:** using fully probabilistic approaches for image restoration in order to provably and efficiently sample restorations from an analytically defined posterior distribution
- Research into unsupervised probabilistically grounded approaches for latent generative models
- Implementation and research into sampling algorithms, such as Langevin dynamics, for generating samples from complex models such as Bayesian neural networks
- Helping with research into risk factors of Alzheimer's disease through the use of survival analysis and modelling, particularly with regards to improving the quality of the predicted hazard function

Flatiron Machine Learning X Science Summer School

Flatiron Institute

Visiting Intern

Summer 2022

- Participation in the first MLxScience summer school hosted by the Flatiron institute, including cross-discipline project work
- Development of deep generative models on simulated neutral hydrogen maps of the early universe in order to model the effects of cosmological parameters

Center for Interdisciplinary Data Science Research — *Hebrew University*
Data Science Advisor — *2019-2022*

- Time series analysis and clustering of satellite imaging for research into the causes for forest death in Israel, together with the Faculty of Agriculture
- Developing automatic cell area measurement tools for medical research regarding cancer treatment, with the Faculty of Medicine

Amnon Buxboim's lab for Mechanobiology
Research Assistant — *2015 - 2018*

- **Main research topic:** development of a viscoelastic model of the cytoplasm of embryos from videos of IVF using ICSI, in order to predict which embryos are more likely to have a successful implantation
- Designing GUIs for biological data analysis of both images and videos of cells
- Developing models describing dynamics in viscoelastic materials

Teaching and Outreach

***Bayesian Machine Learning* course** — *Hebrew University*
Teaching Assistant — *Since 2020*

- Creating the syllabus and material for a new, advanced machine learning course
- Implementing visualization tools for advanced machine learning material to aid teaching

Panel on the Computer Science and Physics program — *Hebrew University*
Panelist — *2021, 2022*
A panel meant to help guide B.Sc. students in the CS and Physics program in the Hebrew University

***Artificial Intelligence* course** — *Hebrew University*
Teaching Assistant — *Spring Semester 2022*

Student Machine Learning seminar — *Hebrew University*
Organizer — *Fall Semester 2021*

***Object Oriented Programming* course** — *Hebrew University*
Teaching Assistant — *2018 - 2020*

Honors and Awards

2021 **Dean's List for Excellence as a Teaching Assistant**, for work in HUJI's Bayesian Machine Learning course

2019 **Intel's AI Hackathon for Social Good**, 1st place

2010 **Weizmann Institute's International Safe Cracking Tournament**, 9th place out of teams formed by students from all around the world

Skills

Programming Languages Python, MATLAB, Java, C, C++

Languages English (native), Hebrew (native)

Algorithmic

- Development of advanced algorithms for image processing
- Practical applications of Bayesian machine learning and graphical models
- Analysis of large amounts of data for various research projects
- Proficient in linear algebra and matrix calculus