





Hyemin Gu

Machine Learning Researcher

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SUMMARY

A Machine Learning Researcher and a current PhD student in Mathematics, specializing in Partial Differential Equation (physics model) based Machine Learning. Adept at developing and maintaining program modules and accessing high-performance computing platforms.

EXPERIENCE

GRADUATE RESEARCH ASSISTANT | UNIVERSITY OF MASSACHUSETTS - AMHERST

Jan 2022 – Current | Amherst, MA

- Developed a particle transportation algorithm and implemented the algorithm as a generative model.
- Improved the base model by autoencoders and proved a sufficient condition for the convergence of the improved model.

GRADUATE TEACHING ASSISTANT | UNIVERSITY OF MASSACHUSETTS - AMHERST

Feb 2021 – Dec 2021 | Amherst, MA

- TA for M545 (Linear Algebra for Applied Math), M235 (Linear Algebra), M532H (Nonlinear Dynamics & Chaos with Applications).
- Hosted discussion sessions, delivered mini-courses for Python ODE solving tutorials, and graded weekly assignments.

POST-MASTER'S RESEARCHER | EWHA WOMANS UNIVERSITY SEOUL HOSPITAL

Jul 2020 – Dec 2020 | Seoul, Korea

- Constructed a pipeline for gene expression data analysis using R and created a documentation.
- Trained medical school graduate students to conduct statistical analysis using R.

GRADUATE RESEARCH ASSISTANT | EWHA WOMANS UNIVERSITY

Mar 2018 – Feb 2020 | Seoul, Korea

- Trained CNN to estimate a physical state variable from 2D flow velocity fields.

PROJECTS

GENERATIVE PARTICLES ALGORITHM | PYTHON

2022

- Developed a particle transportation algorithm through gradient flows associated with regularized f -divergences.
- A generative model alternative to GANs for low training data regimes.
- Proposed a mathematical interpretation of applying spectral normalization on neural network discriminators as a particle transportation speed regularization.

PUBLICATIONS

Hyemin Gu, Panagiota Birmpa, Yannis Pantazis, Luc Rey-Bellet, and Markos A. Katsoulakis. Lipschitz regularized gradient flows and latent generative particles, 2022 (Preprint)

SKILLS

COMPUTING

Programming languages:
Python • Matlab • R

High-performance computing:
Google cloud platform •
MGHPCC

Documentation:
L^AT_EX • Jupyter notebook

SOFT SKILLS

Coordination seminars

EDUCATION

UNIVERSITY OF MASSACHUSETTS - AMHERST

DOCTOR'S IN MATHEMATICS
Sep 2020 - Present | Amherst, MA
Specialization: Mathematical modeling
Advisor: Markos Katsoulakis
GPA: 3.85 / 4.0

EWHA WOMANS UNIVERSITY

MASTER'S IN MATHEMATICS
Mar 2018 - Feb 2020 | Seoul, Korea
Specialization: Numerical Analysis
Advisor: June-Yub Lee
GPA: 4.15 / 4.3, 30 credits

EWHA WOMANS UNIVERSITY

BACHELOR'S IN MATHEMATICS
Mar 2014 - Feb 2018 | Seoul, Korea
Major: Mathematics •
Computational Science
Minor: Statistics
GPA: 3.74 / 4.3, 136 credits