Eric J. Pabón Cancel

Resume

Contact Information

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Education & Academic Background

Ph.D. in Mathematics | Advisor: Prof. Aaron Yip — Expected June 2029
Purdue University, West Lafayette, Indiana

M.S. in Mathematics — Expected May 2026
Purdue University, West Lafayette, Indiana

B.S. in Pure Mathematics, Minor in Applied Math (*Magna Cum Laude*) — December 2022
University of Puerto Rico, Mayagüez Campus (UPRM), Mayagüez, Puerto Rico

Skills and Other Information
Programming & Computation: Python, Julia, C++, SageMath, MATLAB | Formatting & Tools: HTML, LaTeX, Git
Math & AI/ML: NumPy, SciPy, PyTorch, TensorFlow, JAX, Flux, CUDA | Spoken Languages: English and Spanish

Research Experience

Research Intern in Dynamical Systems and Machine Learning — May 2025–August 2025
URA-Sandia Graduate Student Summer Fellowship & Oak Ridge Institute of Science and Education
Computational & Information Sciences Foundation, Sandia National Laboratories, California Campus
Supervised by: Dr. Moe Khalil & Dr. Rileigh Bandy, Sandia National Laboratories
Data-Driven Closure Models

- Studied machine learning surrogate models, and learned and applied data assimilation for closure models with JAX.
- Conducted a parametric study of the optimization step for 100 noisy samples of an SIQR epidemic model.
- Determined a minimum ensemble size of 500 ensembles for optimal Ensemble Kalman filter-based data assimilation.

Research Intern in Machine Learning — May 2023–August 2023
MIT Lincoln Laboratory Summer Research Program (GEM Fellowship Employer Sponsor)
Group 39, Division 3, MIT Lincoln Laboratory, Massachusetts Institute of Technology
Supervised by: Dr. Sam Polk & Dr. Mabel Ramírez, MIT Lincoln Laboratory
Unsupervised Behavior Inference from Human Action Sequences (UNBIAS)

- Developed mathematical algorithms for autoencoders with LSTM architecture, using the Flux library.
- Identified the autoencoder that minimized the loss function by using PCA and clustering techniques.
- Used K-medoids to obtain an optimal silhouette score of 0.875, and IF-1 score of 0.839.

Papers and Articles (The asterisk symbol (*) denotes alphabetical order authorship)

[1] S. Polk, E.J. Pabon-Cancel, R. Paleja, K. Chestnut-Chang, R. Jensen and M. Ramírez. Unsupervised Network-Based Behavior Inference from Human Action Sequences (UNBIAS). *2024 IEEE Conference on Games (CoG) 2024, pp. 1-8*.

[2] *D. Chen, P.E. Harris, J. Carlos Martinez Mori, E.J. Pabon-Cancel and G. Sargent. Permutation-Invariant Parking Assortments. *Enumerative Combinatorics and Applications*, **4:1**, 1-25 (2024). #S2R4.

[3] *I. Byrne, N. Dodson, R. Lynch, E.J. Pabon-Cancel and F. Piñero-González. Improving the Minimum Distance Bound of Trace Goppa Codes. *Designs, Codes and Cryptography*. **91**, 2649–2663 (2023).

Projects

Projects in Optimal Transport and Neural Networks — January 2025–May 2025
Purdue University, West Lafayette, Indiana
MA59500OT: Computational Optimal Transport and Deep Generative Models
Instructor: Prof. Rongjie Lai, Purdue University
Normalizing Flow Optimal Transport Implementation on the MNIST Dataset

- Developed a normalizing flow neural network that learned the optimal transport path of a Gaussian-distributed MNIST image to the target MNIST number distribution.
- Generated recognizable digit images upon training completion.

WGAN and Monge Map Implementation on the MNIST Dataset

- Constructed a Wasserstein Generative Adversarial Network with Gradient Penalty (WGAN-GP) and Monge Map Network and applied it to the MNIST dataset.
- Successfully generated realistic-looking sample numbers at the end of training and compared with real samples.