Matthew W. Repasky Jr.

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EDUCATION

Ph.D. in Machine Learning Aug 2021 – Present
H. Milton Stewart School of Industrial & Systems Engineering, Georgia Institute of Technology

B.S. in Physics Aug 2017 – May 2021
School of Physics, Georgia Institute of Technology
Concentration in Astrophysics | Graduated with Highest Honor | GPA: 3.95/4.00

PUBLICATIONS & WORKING PAPERS

Workshop Papers

1. Information recovery via matrix completion for piezoresponse force microscopy data
   Kerisha Williams, Henry Yuchi, Kevin Ligonde, **Matthew Repasky**, Yao Xie, Nazanin Bassiri-Gharb
   AI for Accelerated Materials Design Workshop, Thirty-sixth Conference on Neural Information Processing Systems (NeurIPS), 2022.

Journal Articles (Submitted)

1. Neural Stein critics with staged L^2-regularization
   Matthew Repasky, Xiuyuan Cheng, Yao Xie
   IEEE Transactions on Information Theory, 2022. (Submitted)

Working Papers

1. Classification and detection of power grid faults via low-rank tensor modeling.
   Matthew Repasky, Yichen Zhang, Feng Qiu, Yao Xie
2. Marked temporal point processes for corrosion modeling and survival analysis.
   Matthew Repasky, Henry Yuchi, Yao Xie

WORK EXPERIENCE

Technical Research Aide May 2022 – July 2022
Argonne National Laboratory
Advisor: Dr. Feng Qiu

- Applied low-rank tensor models to sensor measurements of the power grid that represent types of fault event
- Used online classification techniques in conjunction with these models to identify and localize power grid faults in real-time

RESEARCH EXPERIENCE

Data-Driven Corrosion Modelling to Reduce the Environmental Impact of National Assets July 2020 – Present
Conducted under the supervision of *Dr. Yao Xie* at Georgia Tech H. Milton Stewart School of Industrial & Systems Engineering

- Developing a model to predict the degradation of aircraft paint coatings using a marked, temporal Hawkes process

- Applying physical insights for feature selection to produce ARIMA and LSTM models
- Collaborating with a Strategic Environmental Research and Development Program (SERDP) team, including experts at Luna Innovations, Southwest Research Institute, Boeing, and the Department of Defense

Reinforcement Learning for Fair Police Dispatch and Patrol March 2021 – Present

Conducted under the supervision of *Dr. Yao Xie* and *Dr. He Wang* at Georgia Tech H. Milton Stewart School of Industrial & Systems Engineering

- Using deep reinforcement learning techniques to analyze fairness in efficient police patrol to develop an equitable patrol and dispatch policy
- Building simulations to determine basic optimal patrol patterns in addition to realistic representations of the city of Atlanta
- Consulting with the Atlanta Police Department to determine data focus and direction

Denoising and Physically Characterizing Switching Spectroscopy Piezoresponse Force Microscopy Data June 2021 – Present

Conducted under the supervision of *Dr. Yao Xie* at Georgia Tech H. Milton Stewart School of Industrial & Systems Engineering

- Exploiting correlations across space and applied excitation to denoise SS-PFM data
- Comparing data-driven hysteresis curve fitting to materials science-based approaches
- Coordinating with a mechanical and materials science engineering research group at Georgia Tech to obtain physical intuition about the data structure

Neural Stein Critics with Staged L^2 Regularization Nov 2021 – Nov 2022

Conducted under the supervision of *Dr. Yao Xie* at Georgia Tech H. Milton Stewart School of Industrial & Systems Engineering and *Dr. Xiuyuan Cheng* at Duke University Department of Mathematics

- Creating a new training scheme for neural Stein discrepancy critic functions bound to the space of square integrable functions
- Outlining a strategy for the staging throughout training of the regularization weight that bounds functions to L^2

SKILLS

Programming: Proficient in Python, C, Java; Familiar with MATLAB, R, C++
Tools: Pytorch, Tensorflow, Amazon Web Services, Google Cloud Platform, Microsoft Azure, Spark, Linux, Jupyter Notebooks, Git, SQL
Concepts: Deep Learning, Reinforcement Learning, Convolutional Neural Networks, Recurrent Neural Networks, Spatial-Temporal Modelling, Gaussian Processes, Low-Rank Approximation

HONORS & AWARDS

President's Undergraduate Reserach Award (PURA) Spring '21
Faculty Honors Spring '18, '20, & '21, Fall '19 & '20
Dean's List Fall '17 & '18

TEACHING

Graduate Teaching Assistant/Tutor at Georgia Tech Fall '21 – Spring '22
ISYE 2027: Probability with Applications
ISYE 4031: Regression and Forecasting