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

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
Concepts: Deep Learning, Reinforcement Learning, Convolutional Neural Networks, Recurrent Neural Networks, Spatial-Temporal Modelling, Gaussian Processes, Low-Rank Approximation

PUBLICATIONS

Refereed Conference Proceedings (Submitted)

1. Denoising Piezoresponse Force Microscopy Data Using Bayesian Low-Rank Matrix Completion
   Henry Shaowu Yuchi, **Matthew Repasky**, Gardy Kevin Ligonde, Nazanin Bassiri-Gharb, Yao Xie
   Submitted to 2022 IEEE International Conference on Acoustics, Speech and Signal Processing.

RECENT PROJECTS

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 for prediction and change detection of 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

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

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 Q-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

Radiation Hydrodynamics Simulations of the First Stellar Clusters in the Universe January 2020 – April 2021

Conducted under the supervision of Dr. John Wise at Georgia Tech School of Physics (Center for Relativistic Astrophysics)

- Used Enzo cosmological simulation software to capture the conditions necessary to produce supermassive stars in early-universe halos
- Managed data and analysis tools using high performance computing resources at Georgia Tech and the Texas Advanced Computing Center

RESEARCH EXPERIENCE

Research Assistant Jan 2020 – Present

Georgia Tech H. Milton Stewart School of Industrial & Systems Engineering

Advisor: Dr. Yao Xie

- Worked with large datasets to develop statistical models that predict degree of and detect changes in corrosion in coated materials
- Collaborated with the Atlanta Police Department to develop a policy for fair and efficient policing
- Applied noise-reduction techniques to piezoresponse force microscopy data

Undergraduate Research Assistant Aug 2019 – April 2021

Georgia Tech School of Physics

Advisor: Dr. John Wise

- Simulated radiative feedback in primordial protostellar systems while considering ultraviolet backgrounds and radiative transport
- Operated on high performance computing clusters
- Visualized and analyzed simulation data with Python

Research Student Aug 2019 – Dec 2019

Georgia Tech School of Physics

Gravitational Wave Vertically Integrated Project

- Produced gravitational wave-inducing phenomenon in simulations of neutron stars
- Presented weekly progress to the larger team while producing visualizations of the simulated data

Undergraduate Research Assistant May 2019 – Aug 2019

Youngstown State University Department of Physics, Astronomy, Geology, and Environmental Science

Advisor: Dr. John Feldmeier

- Studied light saturation in astronomical images
- Identified the brighter-fatter effect in a particular dataset, used astropython and DS9 astronomy software to measure these effects
- Used SQL to probe large astronomical databases

Undergraduate Research Assistant Sept 2017 – Sept 2018

Georgia Tech School of Physics

Advisor: Dr. Peter Yunker

- Analyzed the coffee ring effect in living matter such as yeast and Vibrio harveyi
- Created biofilm simulations in Python representing microbe lattices

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 at Georgia Tech Fall '21
ISYE 2027: Probability with Applications