Ryan David Melzer

|| Tucson, AZ || rdmelzer@email.arizona.edu || (520) 551-8039 || rdmelzer.github.io || linkedin.com/in/ryan-david-melzer ||

Employment

Sandia National Laboratories. Albuquerque, NM (Remote)

Machine Learning Engineer 2021 - Present

Machine Learning Engineering Intern 2019 - 2021

- Leading and conducting research and development of novel neural network methods for automatic target recognition.
- Implementing controllers, dynamics models, and machine learning capabilities in CUDA C++ for a rapid trajectory evaluation tool.
- Contributing features and algorithm implementations to a currently unreleased multi-agent reinforcement learning Python library.
- Implemented a suite of deep neural network models for automatic target recognition and pose estimation in synthetic aperture radar imagery to run on autonomous aircraft, several of which exceeded state-of-the-art accuracy.
- Implemented explainability algorithms for these models and discovered that many of them make classification decisions based on unexpected features.
- Developed deep neural network models and neural architecture search techniques for achieving accurate domain adaptation between synthetically generated and real radar imagery.
- Skills used: Python, PyTorch, C++, CUDA GPU programming, Unix, Computer Vision, Deep Learning, Machine Learning, Deep Reinforcement Learning.

The University of Arizona Department of Computer Science. Tucson, AZ

Research Assistant (Machine Learning) 2018 - 2021

- Implemented and successfully trained deep reinforcement learning algorithms for control of a hypersonic aircraft.
- Developed and implemented an unsupervised learning algorithm for real-time outlier detection in streaming astronomical data from a large, high throughput telescope.
- Teaching assistant for Software Development in C++, Theory of Computation, Data Structures and Algorithms, and Introduction to Computer Science.
- Skills used: Python, PyTorch, Unix, Machine Learning, Deep Reinforcement Learning, C++.

Optiver. Chicago, IL

Software Engineer I 2017 - 2018

Software Engineering Intern 2016

- Built and launched a real-time post-trade analysis tool to analyze the behavior of a new automated trading strategy. This tool allowed the company to test and deploy the strategy at scale safely.
- Implemented and deployed an ultra-fast high-frequency trading application on an unsupported exchange. Extended an in-house end-to-end testing framework to cover both the new application and the exchange.
- Discovered a use-case for a new microsecond time-scale trading strategy through examining packets sent over an exchanges' UDP broadcast. Implemented, tested, and deployed this strategy in an existing trading application.
- Implemented, tested, and deployed a safety mechanism across the entire trading system to prevent automated trades outside of algorithmically predetermined price limits.
- Built a server to simulate changes in option prices using forecasted market fluctuations and changes in pricing model parameters. This server computed large matrix operations in parallel for thousands of options and broadcasted the results on a UDP network.
- Developed and deployed server that collected real-time monitoring statistics of work queues in the data collection system. The server was able to easily identify bottlenecks across each component of the system in real-time.
- Skills used: C, C++, C#, Unix, Python, Java.

Rincon Research Corporation. Tucson, AZ

Software Engineering Intern 2015

- Developed and deployed an onboard geolocation algorithm to be used with autonomous drone clusters.
- Skills used: C++, Python, Unix.

Education

The University of Arizona, Tucson AZ

- **M.S. Computer Science** (emphasis in Machine Learning), December 2020 (4.0/4.0 GPA)
- **B.S. Computer Science**, May 2017 (4.0/4.0 major GPA)
- **B.S. Mathematics**, May 2017

Research Publications

- **Melzer R.**, Severa W., Plagge M., and Vineyard C. - "Exploring Characteristics of Neural Network Architecture Computation for Enabling SAR ATR". *SPIE Defense + Commercial Sensing*, 2021
- Gandhi M., Schlossman R., Williams K. A., **Melzer R.**, Parish J. - "CUDA for Rapid Controller Robustness Evaluation: A Tutorial". *IEEE International Conference on Decision and Control (CDC)*, 2021