Ryan Melzer

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Work Experience

Sandia National Laboratories | Albuquerque, NM (Remote)

Machine Learning Engineer (Member of Technical Staff, DOE Q clearance)   01/2021 - 10/2022

Machine Learning Engineering Graduate Intern   05/2019 - 01/2021

- Developed deep neural network (DNN) models, neural architecture search (NAS) techniques, and training/inference techniques for synthetic aperture radar automatic target recognition (SAR ATR). Achieved state-of-the-art accuracy and robust domain adaptation between synthetic and real radar imagery under strict compute/power constraints. Enhanced model transparency and trust by integrating explainability algorithms. Deployed trained models to 8-bit EdgeTPU devices for inference. Co-authored two leading publications as first author detailing these techniques.
- Built a comprehensive Python library of DNN models, NAS methods, explainability algorithms, data augmentation routines, training/inference pipelines, and quantization and edge deployment routines for SAR ATR and SAR pose estimation using PyTorch, Tensorflow, ONNX, and OpenCV. This became a foundational resource for internal SAR ATR research.
- Led the development of a high-fidelity, GPU-bound hypersonic vehicle simulation in CUDA C++. Implemented control systems, dynamics models, CUDA C++ performance optimizations, and machine learning capabilities, co-authored a related publication, and transitioned the application to JAX, streamlining development while preserving performance.
- Implemented reinforcement learning (RL) algorithms in a multi-agent RL Python library, establishing a new standard for internal RL research and facilitating widespread adoption of this library across teams.

The University of Arizona | Tucson, AZ

Graduate Research Assistant   08/2018 - 01/2021

- Designed and implemented an unsupervised learning algorithm in C++ for real-time outlier detection in streaming astronomical data from the Large-aperture Synoptic Survey Telescope (LSST).
- Implemented and trained deep reinforcement learning algorithms for hypersonic aircraft control.
- Built a file system for macOS from scratch with over 13k lines of C and C++.
- T.A. for Software Development in C++, Theory of Computation, Data Structures & Algorithms, Intro. to Computer Science.

Optiver | Chicago, IL

Software Engineer I   06/2017 - 04/2018

Software Engineering Intern   05/2016 - 08/2016

- Spearheaded the development and launch of a real-time, post-trade analysis tool in C# to evaluate the behavior of a novel automated trading strategy, enabling the deployment of the strategy at scale while guaranteeing safe behavior.
- Implemented and deployed a high-frequency trading application in C++ on a new exchange, and expanded a Python testing framework to cover the new application and the exchange, significantly boosting daily trading volume for the team.
- Identified, implemented, and deployed a novel microsecond-timescale trading strategy in C. This strategy was able to identify and execute a class of easily profitable trades that the team was not exploiting.
- Implemented, tested, and deployed a safety mechanism in C across the auto-trading system to enforce continuously changing price limits on fast automated trades, ensuring critical compliance and safety guarantees.
- Created a C# server to simulate and relay option pricing forecasts, informing trading applications with key market insights.
- Developed and deployed a C# server for real-time monitoring of throughput bottlenecks in the data collection system work queues, enabling precise identification and optimization of slow system components.

Rincon Research Corporation | Tucson, AZ

Software Engineering Intern   05/2015 - 09/2015

- Developed a distributed geolocation algorithm in Python and C for drone clusters, enabling networked triangulation and target localization. Built the compute and sensor platform for a prototype drone.

Skills

Python, C++, C, PyTorch, Unix, Bash, CUDA, Computer Vision, Deep Learning, Neural Networks, Machine Learning, C#, Java

Education

The University of Arizona | Tucson AZ

- **M.S. Computer Science** (focus: Machine Learning, 4.0 GPA)   2018 - 2020
- **B.S. Computer Science** (4.0 major GPA)   2013 - 2017
- **B.S. Mathematics**   2013 - 2017