Ryan Marr

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Education

University of Southern California	Los Angeles, CA
Masters in Computer Science - AI focus	*August 2023 – Present*
University of Minnesota	Minneapolis, MN
Bachelors in Computer Science	*August 2018 – May 2021*

Skills Summary

- **Languages:** Python, C/C++, Java, SQL, MATLAB, OCaml, Javascript, Unix scripting
- **Tools:** Pytorch, Jax, AWS, Docker, GIT, Postgres, Django, Pandas, Numpy, React, CUDA
- **Knowledge:** Machine Learning, Deep Learning, Full Stack

Software Engineering Experience

USC Alzheimer's Therapeutic Research Institute — San Diego, CA
ML Engineer and Backend Engineer — *September 2021 – October 2023*

- **Overview:** ATRI advances Alzheimer's research by building comprehensive biomarker datasets and driving innovation in clinical trials to combat disease.
- **Imaging Pipeline:** Built an imaging pipeline to transfer DICOM scans between MRI/PET sites and Mayo Clinic. Improvements are useful for clinical trials requiring scans to be anonymous and error-free.
- **U-Net Pipeline:** Designed pipeline and a U-net to generate image segmented scans.
- **Defacing Algorithm:** Implemented a defacing algorithm to anonymize medical scans. Previously, medical scans could be matched to participant photos with about 80% accuracy. Defacing scans led to a match rate around 2%.
- **Study Website:** Devised a report page to track pipeline status, monitoring total uploads and site error rates.
- **Clinical Trial Management:** Communicated with sites to check on scan uploads when errors arose in the process.

ML Research Experience

USC Institute for Creative Technologies — Los Angeles, CA
Research Assistant — *September 2023 – May 2025*

- **Overview:** Conducted research at the Human Adaptive Teaming Systems lab at USC. Projects involved computational approaches to determine optimal placements of military units in simulated training exercises.
- **AFlowNet in Military Training:** Leveraged AFlowNet energy-based modeling to compare against an RL baseline. Achieved performance within a 5% margin of the RL baseline while generating approximately 50x more action sequences within a similar performance margin.
- **Informed Initialized RL Networks:** Developed a technique to integrate expert military instruction with algorithmic strategy. Enabled discovery of optimal strategies in 30% of the compute time compared to baseline algorithms.
- **Resource Allocation Multi Objective Environment:** Created an environment for multi-objective RL algorithms. This environment was used to test algorithms' capacity to manage many conflicting objectives in a complex management scenario.

Princeton University — Princeton, NJ
Research Assistant — *May 2023 – September 2023*

- **Overview:** Project title: Generative Modeling For Inverse Crystalline Materials Design. Constructed a GFlowNet to algorithmically sample crystals according to desired properties. This work was published in ICLR 2025.
- **GFlowNet DAG:** Developed the Directed Acyclic Graph to iteratively sample atoms to join each crystal. Neural networks assign probabilities to adjacent nodes to maximize rewards.
- **Reverse Sampler:** Researched a method to optimize generation of valuable crystal designs by computationally decomposing high-reward crystals, leading to a 7% increase in variance of valuable crystal designs.
- **Crystal Visualization:** Visualized final crystal structures, facilitating result comprehension and effective communication of findings.

Projects

- **Duct**
  - **Overview:** Duct is a developer framework that harnesses the strengths of human and machine code writing to create APIs. Users formally specify pre- and post-conditions for their API and an LLM completes it and verifies its correctness. This LLM is fine-tuned with reinforcement learning to prove the API's correctness. Duct allows APIs to be written correctly and quickly while keeping users in the loop.

  Leaf
  - **Overview:** Leaf is an open source pip package for distributed training. It enables users to register their compute resources across different devices and servers and train models without needing to think about the complexities of distributed computing. Compared to similar solutions, Leaf is easy to use and requires minimal changes to existing training code.

- **Atticus Martin** — Remote
  Cofounder and ML Engineer — *December 2021 – April 2023*
  - **Overview:** Atticus Martin supports innovation in Fintech by delivering cutting-edge ML solutions to enhance performance and decision-making for established trading platforms.
  - **Algorithm Testing Site:** Developed an internal site to oversee research and development capable of deploying models on AWS and reporting returns. Models can also be saved and analyzed in AWS.
  - **Time Series AutoEncoder:** Built a time series autoencoder to extract important data from multidimensional stock data. These changes led to an 8% improvement in returns from a baseline in low trade frequency scenarios.