Reece Shuttleworth

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Education

- **Massachusetts Institute of Technology** — Cambridge, MA
  Master of Engineering, Computer Science & Cognitive Science — Feb 2024 – May 2025
  - Trying to understand how and why deep neural nets work.
- **Massachusetts Institute of Technology** — Cambridge, MA
  Bachelor of Science, Computer Science & Cognitive Science — Sep 2021 – Dec 2023
  - Coursework: Algorithms I & II, Machine Learning, Deep Learning, Linear Algebra, Programming, Neural Computation, Probability & Random Variables, Computational Cogsci, AI Ethics, Game Theory
  - GPA: 4.9/5.0

Experience

- **Cleanlab** — San Francisco, CA
  Incoming Machine Learning Engineering Intern — Jan 2024 – Feb 2024
  - Working on the data-centric side of ML and its impact on LLM & transformer performance.
- **Numenta** — Redwood City, CA
  Software/Machine Learning Engineering Intern — May 2023 – Aug 2023
  - Led research and implementation of novel parameter efficient fine-tuning methods for Large Language Models to meet strict customer and hardware constraints while maintaining high performance.
  - Wrote code to support efficient sparse neural networks, including finding bugs in previously written and widely distributed third party code. Resulted in improved speed and memory usage.
  - Rigorously reviewed transformer literature to ensure alignment with SOTA methods and best practices.
- **MIT Computer Science and AI Laboratory** — Cambridge, MA
  Research Scientist — Dec 2021 – May 2023
  - **LLMs & Planning (NeurIPS FMDM '22)**: Studied the planning capabilities of LLMs. Established a benchmark and designed a codebase with which to test and improve the planning performance of LLMs. Wrote high performance code with strict testing and formatting standards. Published peer-reviewed paper.
  - **Problem Solving with ML (PNAS '22)**: Designed a state-of-the-art math question answering system using LLMs, embeddings, and KNN. Optimized results with prompt engineering and clustering techniques. Wrote code that significantly reduced manual labor costs. Published peer-reviewed paper.

Selected Work

- **Sparsity in Transformers** (*github.com/reeceshuttle/958*)
  - Measured the sparsity of weights and attention scores across several SOTA LLMs.
  - Initial findings indicate transformers are very sparse. Final conclusions TBD.
- **Bias in BERT Models** (*github.com/reeceshuttle/63950*)
  - Examined bias in BERT models and used finetuning with a novel loss function to try to reduce bias.
- **MIT Pokerbots** (*github.com/reeceshuttle/poker-bot*)
  - Placed in the top 10% of entries in 2023 MIT Pokerbots competition and awarded a cash prize.
  - Approach used a combination of game theory, simulations, and learned heuristics.
- **Gabor filter-constrained CNNs** (*github.com/samacqua/gabor-constrained-nns*)
  - Trained unique Convolutional Neural Networks by seeking inspiration from the human brain.
- **PyTorch, but in NumPy** (*github.com/reeceshuttle/numpytorch*)
  - Implemented basic PyTorch functionality from scratch using only NumPy arrays. Neural networks converge and perform well on non-trivial problems.

Technical Skills

- **Languages**: Python, JavaScript, C, C++, HTML/CSS, Julia, LaTeX, PDDL, RISC-V
- **Tools**: PyTorch, TensorFlow, Git, Docker, Adobe XD, WandB, OpenAI API, PyTorch Lightning
- **Concepts**: Transformer/LLM architecture, GPU training, Hyperparameter tuning

Activities & Interests

- **Varsity Cross Country and Track & Field:** NCAA DIII National Champions, Academic All-Conference
- **Interests**: AI, neuroscience, reading, hiking, aviation, space flight, history