

# Ellen Ma

[ellenma@g.harvard.edu](mailto:ellenma@g.harvard.edu) | [ellenma.vercel.app](https://ellenma.vercel.app) |   

## EDUCATION

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**Harvard University** *M.S. Data Science*

Sept. 2024 – Jun. 2026

- Thesis: “Reinforcement Learning and Tool Use for AI Agents”
- Advisor: Kianté Brantley

**University of Chicago** *B.S. Mathematics, B.A. Economics*

Sept. 2020 – Jan. 2024

- Dean’s List, Katen scholar

## WORK EXPERIENCE

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**Kempner Institute at Harvard University**

Jun. 2025 – Present

*ML Research Intern*

- Implemented meta-MDP enabling LLMs to act or call tools for planning without mutating state; prototyped in FrozenLake and extending to coding tasks using ReTool
- Configured multi-node Ray for OpenRLHF and VeRL to run asynchronous training and created custom multiturn environment wrappers to integrate Gym into OpenRLHF
- Stabilized tool-use training via GRPO/PPO ablations on KL and reward shaping; mitigated reward hacking while preserving tool use
- Built end-to-end FrozenLake pipeline: BFS map generator for solvable training data and evaluation harness that parses prompts to Gym environments, executes LLM actions, and returns reward and end state

**Garcia Lab at UChicago Medicine**

Jan. 2021 – Dec. 2023

*Research Assistant*

- Built signal processing and ML pipeline (RandomForest, PCA, UMAP, FFT) to analyze ventilatory reflexes and detect changes in preBötzing complex activity (brainstem respiratory control center)
- Findings revealed physiological adaptations that may explain variance in overdose susceptibility

**1104Health**

May 2022 – Sept. 2022

*Data Science Intern*

- Applied NLP techniques including Named Entity Recognition, relation extraction, and negation detection on medical terminology and healthcare data to distinguish inclusion/exclusion criteria in clinical trials
- Presented literature reviews and visualized data to highlight inefficiencies in clinical trial matching and demand for product to partners and investors (e.g. Johns Hopkins Medicine)

## PROJECTS

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**Predicting election winners with NLP methods**

- Used sentiment analysis (VADER), word embeddings (GloVE) and machine learning models (RandomForest, XGBoost) to predict presidential winners with NYT headline data

**Emissions-optimized meal planning**

- Formulated robust optimization problem minimizing emissions while meeting nutritional constraints
- Used polyhedral and ellipsoidal constraint sets to account for variability in ingredient-level carbon emission data

## SKILLS

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- **Programming:** Python, R, PyTorch, Git, GCP, Docker, Slurm, sklearn, NumPy, pandas
- **ML/AI:** reinforcement learning, supervised fine-tuning, distributed training, Ray, Slurm, OpenRLHF, VeRL
- **Coursework:** differential equations, probability theory, Markov chains & Brownian motion, machine learning