Emma Qin

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Education

Massachusetts Institute of Technology 2019.09 - 2024.06

Bachelor of Science in Mathematics (18), MEng in Computation and Cognition (6-9)

- **GPA:** 5.0/5.0
- **Relevant Coursework:**
  6 | Algorithms (6.046, 6.852, 6.854), Machine Learning (6.036), Inference and Information (6.437),
  9 | Emergent Computation (9.530), Computational Cognitive Science (9.660),
  18 | Stochastic Processes (18.615), Probability Theory (18.675)

Work Experience

小红书 (Redbook), Shanghai **AIGC Algorithm Intern** 2023.07 - 2023.09

Optimize language processing for the Redbook AIGC project, spanning style recommendation, NLP analysis, image-text tagging, and LLM model research.

- **Style Recommendation:** Implemented a model to select suitable image models for user prompts, trained with user preferences, adjusting data augmentation and loss function to keep the diversity of recommendations.
- **NLP Analysis:** Developed a comprehensive toolset for user data analysis.
- **Image-Text Tagging:** Explored optimal training methods for image-text tagging models such as BLIP2 and miniGPT4.
- **LLM Model Research:** Investigated multi-directive fine-tuning approaches for translation models.

Tiamat AI Art, Shanghai **Research Engineer Intern** 2022.07 - 2022.08

Engaged in exploratory work in the field of image generation and contributed to the development of a mobile application.

- **Image Generation Research:** Read and presented papers on diffusion models and few-shot learning techniques.
- **Mobile App Development:** Implemented the frontend for a mobile application, enabling continuous feedback collection.

Yuanlan Private Equity Funds **Quantitative Analysis Intern** 2021.04 - 2021.07

Analyzed crypto-currency trading, incorporating machine learning techniques for decision-making.

- **Training Models:** Built and trained neural networks, including LSTM and self-attention models, optimizing the loss and network structure to yield returns slightly below transaction fees.
- **Backtesting:** Developed a machine learning model backtesting framework for systematic performance evaluation.

Bytedance, Beijing **AIOps Development Intern** 2020.06 - 2020.12

Developed intelligent operations services, including time series anomaly detection and idle machine detection.

- **Time Series Anomaly Detection:** Implemented time series anomaly detection using Autoencoder and LSTM models.
- **Idle Machine Classification:** Created an idle machine detection module with graph propagation algorithms, improving resource utilization.
- **Machine Learning Platform:** Contributed to the development of the machine learning platform, implementing data analysis / preprocessing and autoencoder modules.

Research Experience

Connectomics Group **UROP Project on Mice Connectomics** 2023.01 - present

Conducted research on the connectomics of the visual cortex of mice, through the MICrONS dataset.

- **Structural Analysis:** Analyzed MICrONS data to characterize mouse neural network features, including connectivity distance and density distributions. Discovered high randomness and increased information density at visual area boundaries.
- **Activity Prediction:** Trained graph neural networks to predict neuron activity, providing insights into the impact of density on regional functionality.

CSAIL - Computer Architecture Group **UROP Project on Graph Mining** 2022.06 - present

Explored optimization techniques for automated graph mining algorithms and the application of machine learning in graph mining.

- **Automated Graph Pattern Mining:** Proposed a combinatorial-based optimization method for automating complex symmetric patterns in graph patterns. Successfully reduced storage space usage, lowering storage costs by approximately 2/3 in cases of large symmetric patterns.
- **Approximate Graph Pattern Counting:** Investigated the use of graph neural networks for graph pattern counting, achieving an error rate of approximately 1% in large graphs.

Awards and Accomplishments

European Girls Math Olympiad (EGMO) 2019.04

- Participated as a member of the U.S. team, 1st place team, 2nd place individual.

Math Olympiad Program (MOP) 2018.06

- MOP qualification (2018)
- USAMO qualification (2016, 2018, 2019)

Skills & Interests

Programming	**proficient:** Python, Java; **some experience:** C, HTML/js/CSS
ML Frameworks	**proficient:** PyTorch; **some experience:** Tensorflow
Interests	design, education, cognitive development, mental health