Jethro Au

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Research Interest

Advancing the intersection of clinical AI/ML foundational models and computational drug discovery algorithms to enable biomedical discovery and clinical translation. Current work centers on multimodal large language models and protein folding algorithms for clinical applications, with emphasis on grounding, interpretability, and explainable AI, with applications in clinical LLMs, proteomics, and drug discovery.

Education

Harvard University — MSc. Health Data Science (Aug 2025 – Dec 2027)
Area of Focus: Clinical LLMs, ML for Healthcare, Computational Biology, Protein LLMs

Hong Kong University of Science and Technology (HKUST) — MSc. Big Data Technology (Sept 2023 – Jun 2025)
GPA: 4.0/4.3 | TPG Fellowship | HKUST School of Engineering (CS & Math)
Courses: Research in AlphaFold, LLM, Parallel Programming, Social Computing (Graph Networks), CV

Northwestern University — B.S. Industrial Engineering (2018)
McCormick School of Engineering (IE) , Certificate in Managerial Analytics - Kellogg School of Management
Courses: Stats & Machine Learning, Optimization Algorithms, Accelerated Physical Chemistry, Calculus, Data Management

Relevant Research & Work

Independent Research on AlphaFold for Cyclic Peptide Design - HKUST (Jul 2024 - Jul 2025)
- Under supervision of Prof. Nevin Zhang and Dr. Tao Wang (inventor of HIV antiretroviral drug Rukobia), researched use of AlphaFold for de-novo design of cyclic peptides for Hepatitis-C and HIV.
- Developed candidate cyclic peptide compounds using a backpropagation-based generative design method that improved binder precision at HIV CD4-binding sites.
- Optimized AlphaFold2 AfCycDesign, improving peptide design accuracy validated against molecular simulation benchmarks.
- Guided peptide design by syntheszing literature on generative architectures (RFDiffusion, AlphaFold2/3)

AI/ML Engineer (Summer) — Apricot AI, Hong Kong (Jun 2025 – Aug 2025)
- Fine-tuned local clinical model via teacher–student distillation, improving clinical diagnosis, reasoning, and treatment recommendations from doctor–patient transcripts (deployed to production) for chinese medicine
- GPRO preference alignment using two methods : (1) naive reward function on exam questions, (2) Curriculum learning using RL with AI feedback (RLAIF), based on Google Deepmind's ICML 2024 work.
- Developed a clinical implementation of auto-prompt optimization agent w/ Langchain by embedding TCM theoretical context and patient-safety guardrail, based on Microsoft's EMNLP 2023 work.
- Implemented advanced prompt engineering : few-shot, CoT, CoVe, back-translation, self-refine, RAG
- Curated SFT datasets and designed reward functions for curriculum learning in collaboration with practitioners

XAI - Detecting and Reducing Hallucinations in Factual Question Answering w/ Recursion
Hong Kong University of Science and Technology (Feb 2025 - May 2025)
- Designed multi-turn recursive framework to detect & reduce hallucinations in LLM factual QA w/ LLaMA-7B.
- Developed a sensitivity-tuned hint prefix method to calibrate LLM without requiring an external oracle. Tested and evaluated the effectiveness on TriviaQA dataset, achieving an improved reduction in hallucination rate

Graph NNs: Exploring Cross-domain task generalization of graphs with language embeddings
Hong Kong University of Science and Technology (Mar 2025 - May 2025)
- Explored scaling and generalizing cross-domain tasks amongst graph datasets using language embeddings and Mixture-of-Feature models, which are inspired from the MoE architecture.
- Evaluated model performance of word2vec, E5-Small-v2, GraphAlign on classification tasks from OGB graph datasets.

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Relevant Research & Work (Continued)

DNA K-mer Parallel Programming: CUDA, Pthreads, MPI — HKUST

- Parallelized algorithms for k-mer mining of DNA sequences with CUDA, Pthreads, and MPI across both CPU and GPU clusters. Evaluated wall-clock performance optimizations across different algorithms.

Stroke Prediction with Machine Learning — HKUST

- Benchmarked performance of fine tuned algorithms w/ grid & bayesian search, comparing effect of synthetic data vs non-synthetic data on: Naive Bayes, Support Vector Machines and Deep Neural Networks (DNNs).

Publications & Awards

- Co-Author in "Financial Considerations in Primary Healthcare after COVID-19", *Springer Nature*
- TPG Fellowship for MSc. Big Data Technology
- Co-Founder of Northwestern Blockchain Group
- Northwestern Dean's List

Professional Work

R&D Coordinator / Head of Business Development — C-POLAR Asia, Hong Kong (Jun 2023 – Jun 2025)

- Digital infectious disease prevention: Researching IoT + ML infectious disease monitoring project for hospitals w/ Dr. Anthony Law (HK PolyU) and industry partners. Researched methods for spatial and temporal analysis for low-cost multi-array IAQ & occupancy sensingfor real-time aerosolized microorganism risk-scoring.
- Collaborated with universities & hospital laboratories on non-drug based methods to combat antibiotic-resistant organisms w/ cationic polymers that selectively disrupt protein membranes and envelopes.

Project Lead – COVID-19 RT-PCR Screening — Prenetics, Hong Kong (Jun 2021 – May 2023)

- Led RT-PCR diagnostic tests for inbound travellers during COVID-19, a high-profile project implementing decentralized point-of-care screening as part of HK's COVID-19 health policy.
- Built ML/CV/NLP pipelines to improve reporting accuracy on 2M+ results using ETL pipelines on AWS.
- Developed in collaboration with the Department of Health gold operational standards for RT-PCR testing

Other Projects

Training Multi-Modal Generative Models with LLMs — HKUST

- Researched and finetuned text-to-audio generation models for multimodal audio generation w/ LoRa adaptors

Random Forest Parallelization with PySpark — HKUST

- Optimized the Random Forest algorithm using parallel computing in Spark on Microsoft Azure to measure how to improve training time of random forest through the divide and conquer approach. Analyzed computational overhead, proposing enhancements for dynamic partitioning and resource allocation.

Community & Leadership

- Directed Forces at Work Charity Photobook Exhibition, raising HKD $100K for Médecins Sans Frontières
- Winner, ACS Hackathon (2018): proposed haptic feedback gloves for visually impaired; awarded HKD $25K

Skills

- Programming: C++, Python , R , MATLAB, AMPL
- ML: tensorflow, pytorch, HuggingFace, JAX, Unsloth, opencv, LangChain, pandas, numpy
- Database: SQL, Spark, Hadoop
- Performance Optimization: CUDA, MPI, Pthreads
- Biomedical computation: AlphaFold, ColabFold, ColabDesign, PyMol, PyRosetta
- Languages: Native in English, Mandarin, Cantonese | Beginner in German
- Hobbies: Golf, Disc Jockey, Pleasure Vessel Operator Certificate Grade 2 (PVOC2)