Tyler Jay Yang

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EDUCATION AND HONORS

Carnegie Mellon University, School of Computer Science Pittsburgh, PA Expected May 2027
Bachelor of Science, Computer Science, **GPA: 4.0** | Dean's List
Honors: 2x American Invitational Mathematics Examination (AIME), National Merit Scholarship Recipient

Relevant Coursework: Linear Algebra, Vector Calculus, Probability & Statistics, Data Structures & Algorithms, Discrete Math, Theoretical CS, Computer Systems, Deep Learning, Computational Biology, Quantum Computation

EXPERIENCE

Computational Chemistry Research Assistant February 2025 – Present
Mechanical and Artificial Intelligence Lab, Carnegie Mellon University

- Wrote transformer encoder and decoder from scratch in *PyTorch* for solubility estimation and retrosynthetic prediction from SMILES strings
- Integrated named-entity recognition and natural language processing tools for text mining of chemistry literature
- Developed synthetic data generation pipeline to generate **>100,000 images** to pretrain deep learning models for reaction diagram parsing

Machine Learning Intern December 2022 – August 2023
Hillman Cancer Center, University of Pittsburgh Medical Center

- Created *ImageJ Java scripts* to preprocess fluorescence microscopy images to train *MATLAB* image segmentation algorithm to isolate thousands of asymmetrically dividing T cell clusters
- Achieved **90% accuracy**, outperformed Sartorius commercial software

PUBLICATIONS

Shiqi Xu, **Tyler J. Yang**, Suhong Xu, Yi-Nan Gong. *Plasma membrane repair empowers the necrotic survivors as innate immune modulators.* Seminars in Cell & Developmental Biology, Volume 156, (2024)
doi.org/10.1016/j.semcdb.2023.08.001

PROJECTS

Mitigating Algorithmic Bias in Skin Cancer Detection

- Implemented per-epoch adaptive resampling in *Keras* to implement a debiasing variational autoencoder, achieving a **31% accuracy improvement** in cancer detection over traditional CNNs
- Automated hyperparameter search across 6 model architectures using *Sklearn* and *Comet*
- Processed and labeled **>10,000 images** using *Tensorflow* and Pandas, leveraging *HDF5* utilities to enable handling of big data with optimized memory usage and faster I/O operations

Quantum Algorithm Virtual Machine

- Modeled probabilistic and quantum algorithms, simulating pbit and qubit state manipulations in C, upgraded simulation to **support 100x more qubits** using randomized Monte Carlo algorithms
- Designed libraries for qubit operations and string parsing, ensuring correctness with programming contracts and optimizing memory management using *Valgrind*

Sequence Analysis Toolkit

- Developed pathfinding and optimization algorithms for genome assembly and sequence alignment
- Built Hidden Markov Models using *NumPy* and implemented the Viterbi algorithm for genome reconstruction
- Performed Principal Component Analysis (PCA) in R with *ggplot* to classify SARS-CoV-2 variants

ACTIVITIES

Board Member, Carnegie Mellon Computational Biology Undergraduate Society January 2025 – Present
FLIQ Hackathon Planning Team, IDQuantique Innovation Track, Quantum Coalition April 2025 – May 2025
Quantum Coalition Delegate, Carnegie Mellon Quantum Computing Club August 2024 – Present
Futsal Club October 2024 – Present
Lab Supervisor, University of Memphis Satellite Campus August 2022 – May 2023

SKILLS

Languages: Python, C, C++, JavaScript, Java, Julia, R, MATLAB
Machine Learning and Big Data: Tensorflow/Keras, PyTorch, Sklearn, Pandas, NumPy, Matplotlib, Flask, SQL
Other: Git, GitHub, LaTeX, BASH scripting, Blender, Arduino, SolidWorks CAD, 3-D Printing, SLURM