

MAO-JAN LIN
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RESEARCH INTERESTS AND SKILLS

- **Research Interests:** Computational Genomics, Immunogenomics, Pangenomics, Reference Bias, Sequence Alignment, Variant Calling
- **Programming Language:** Python, C++, R, MATLAB, Verilog
- **Toolkits:** Git, Latex, Bash, Snakemake

EDUCATION

Johns Hopkins University (JHU), Ph.D. Student in Computer Science	08/2021 – present
<i>Advisor: Dr. Ben Langmead</i>	
National Taiwan University (NTU), M.S. in Electronics Engineering	09/2016 – 06/2019
<i>Lab for Data Processing Systems. Advisor: Dr. Yi-Chang Lu</i>	
• Thesis: "A Parallel Design of Dynamic Programming Sequence Aligner with Affine Gap Traceback"	
NTU, B.S. in Electrical Engineering	09/2012 – 06/2016

PUBLICATIONS

1. Mao-Jan Lin, Ben Langmead, Yana Safonova, “**IGLoo enables comprehensive analysis and assembly of immunoglobulin heavy-chain loci in lymphoblastoid cell lines using PacBio high-fidelity reads**,” in *Cell Reports Methods* (2025)
2. Mao-Jan Lin, Sheila Iyer, Nae-Chyun Chen, Ben Langmead, “**Measuring, visualizing and diagnosing reference bias with biastools**,” in *Genome Biology* 25.1: 101. (2024)
3. *Mao-Jan Lin, *Yu-Chun Lin, *Nae-Chyun Chen, Allen Chilun Luo, Sheng-Kai Lai, Chia-Lang Hsu, Jacob Shujui Hsu, Chien-Yu Chen, Wei-Shiung Yang, Pei-Lung Chen, “**Profiling Genes Encoding the Adaptive Immune Receptor Repertoire with gAIRR Suite**,” in *Frontiers in Immunology*: 4425 (2022), * co-first authorship
4. Yu-Cheng Li, Mao-Jan Lin, Xiao-Xuan Huang, Chien-Yu Chen, and Yi-Chang Lu, “**Comprehensive Study of Keywords for Sequence-Based Automatic Annotation of Protein Functions**,” in *IEEE Bioinformatics and BioEngineering (BIBE)* (2020)
5. Ming-Hung Chen, Mao-Jan Lin, Yu-Cheng Li, and Yi-Chang Lu, “**Banded Pair-HMM Algorithm for DNA Variant Calling and Its Hardware Accelerator Design**,” in *IEEE Bioinformatics and BioEngineering (BIBE)* (2019)
6. Mao-Jan Lin, Yu-Cheng Li, and Yi-Chang Lu, “**Hardware Accelerator Design for Dynamic-Programming-Based Protein Sequence Alignment with Affine Gap Tracebacks**,” in *IEEE Biomedical Circuits and Systems Conference (BioCAS)* (2019)
7. Mao-Jan Lin, Chih-Yu Chang, Yu-Cheng Li, Nae-Chyun Chen, and Yi-Chang Lu, “**A Hybrid Flow for Multiple Sequence Alignment with a BLASTn Based Pairwise Alignment Processor**,” in *IEEE International Symposium on Circuits and Systems (ISCAS)* (2018)

ACADEMIC EXPERIENCE

Langmead Lab, JHU

08/2021 – present

Profiling human Immunoglobulin (IG) gene loci (collaborated with Dr. Yana Safonova)

- Analyzed the IG somatic recombinations of Human PanGenome Project (HPRC) samples, and improved their personal assemblies. [1]

Characterizing reference bias in sequence alignment

- Built an analysis framework to categorize and measure reference biases, where reads with non-reference alleles fail to align correctly on reference genome [2].

Lab of Dr. Pei-Lung Chen, Department of Medical Genetics, NTU Hospital 07/2020 – 07/2021

Profiling genes encoding adaptive immune receptor repertoire (AIRR)

- Developed a genotyping pipeline for AIRR with probe-based target sequencing technology [3].
- Built an AIRR gene annotation pipeline for personal assemblies and reference genome [3].

Lab for Data Processing Systems, NTU 09/2015 – 06/2019

Computational biology algorithms and their hardware accelerator design

- Investigated the reliability of protein function annotation with homology-based transfer prediction [4].
- Designed a fast heuristic algorithm for variant calling [5] and a memory-efficient algorithm for Smith-Waterman alignment [6], implementing both on ASICs.
- Built a CPU-ASIC hybrid flow for BLASTn-based multiple sequence alignment [7].

INDUSTRY EXPERIENCE

Roche, Summer Intern, Computational Biology Molecular Lab Applications 06/2024 – 08/2024

- Developed and benchmarked a structural variant calling pipeline to enhance recall and precision on the Sequencing by expansion (SBX) platform.

Apple, Product Design Intern, Input Device Team 01/2018 – 07/2018

- Developed circuit solutions and prototype software to a new MacBook keyboard design.

Himax, Summer Intern, Video Image Processing Team 07/2017 – 08/2017

- Developed compression algorithms for 3D depth sensing solutions.

TEACHING EXPERIENCE

Teaching Assistant, Department of Computer Science, JHU 01/2025 – 05/2025

Sketching and Indexing (EN.601.446/646) by Dr. Ben Langmead

Teaching Assistant, Department of Computer Science, JHU 08/2022 – 12/2022

Introduction to Computational Immunogenomics (EN.601.451) by Dr. Yana Safonova

Host of the Lab Programming Workshop, Lab of Dr. Pei-Lung Chen 09/2020 – 11/2020

Python training for clinical data processing

Teaching Assistant, Department of Biomedical Engineering, NTU 07/2020 – 08/2020

Bioinformatics Algorithms (BME5938) by Dr. Chien-Yu Chen