

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

Advisor: Dr. Ben Langmead

National Taiwan University (NTU), *M.S. in Electronics Engineering* 09/2016 – 06/2019

Lab for Data Processing Systems. Advisor: Dr. Yi-Chang Lu

- 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 Bio-medical 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 Biomechanical Engineering, NTU

07/2020 – 08/2020

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