

Nathan Riley Summers LaPierre

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CURRENT POSITION	<i>Postdoctoral Research Fellow</i> Department of Medical Oncology Dana-Farber Cancer Institute and Harvard Medical School Lab of Alexander Gusev	Mar. 2025 - Present
OTHER RECENT POSITIONS	<i>Postdoctoral Scholar and Fellow</i> Department of Human Genetics University of Chicago Labs of Xin He and Matthew Stephens	Aug. 2022 - Mar. 2025
EDUCATION	PhD in Computer Science, June 2022 University of California, Los Angeles M.S. in Computer Science, March 2019 – 3.74 GPA University of California, Los Angeles B.S. in Applied Computer Science, December 2015 – 3.86 GPA (<i>magna cum laude</i>) George Mason University	
PUBLICATIONS	For all research software, please see: https://github.com/nlapier2/ P. B. Chen, R. Chen, N. LaPierre , et al, “Complementation testing identifies genes mediating effects at quantitative trait loci underlying fear-related behavior,” <i>Cell Genomics</i> , vol. 4, no. 5, pp. 100545, May 2024. PubMed PMID: 38697120. M. Alser, ..., N. LaPierre , ..., “Packaging and containerization of computational methods,” <i>Nature Protocols</i> , vo. 19, no. 9, pp. 2529-2539, Apr. 2024. PubMed PMID: 38565959. N. LaPierre and Harold Pimentel, “Accounting for Isoform Expression in eQTL Mapping Substantially Increases Power,” <i>PLOS Computational Biology</i> , vol. 20, no. 2, pp. e1011857, Feb. 2024. PubMed PMID: 38346082. PubMed Central PMCID: PMC10890775. A. Khan, J. Bagley, N. LaPierre , et al, “Genetic pathways regulating the longitudinal acquisition of cocaine self-administration in inbred and recombinant inbred mice,” <i>Cell Reports</i> , vol. 42, no. 8, pp. 112856, Aug. 2023. PubMed PMID: 37481717; PubMed Central PMCID: PMC10530068. N. LaPierre *, B. Fu*, S. Turnbull, E. Eskin, and S. Sankararaman, “Leveraging family data to design Mendelian Randomization that is provably robust to population stratification,” <i>Genome Research</i> , vol. 33, pp. 1032-1041, July 2023. PubMed PMID: 37197991; PubMed Central PMCID: PMC10538495. B. Fuqua, ... N. LaPierre , ..., “The Genetic Architecture of Dietary Iron Overload and Associated Pathology in Mice,” <i>bioRxiv</i> , June 2023.	

J. Karlin, L. Gai, **N. LaPierre**, et al, “Ensemble neural network model for detecting thyroid eye disease using external photographs,” *British Journal of Ophthalmology*, Sep. 2022. PubMed PMID: 36126104.

F. Meyer, ... **N. LaPierre**, ..., “Critical Assessment of Metagenome Interpretation-the second round of challenges,” *Nature Methods*, vol. 19, pp. 429440, Apr. 2022. PubMed PMID: 35396482; PubMed Central PMCID: PMC9007738.

C. Cinelli, **N. LaPierre**, B. L. Hill, S. Sankararaman, and E Eskin, ”Robust Mendelian randomization in the presence of residual population stratification, batch effects and horizontal pleiotropy,” *Nature Communications*, vol. 13, no 1., pp. 1093, Mar. 2022. PubMed PMID: 35232963; PubMed Central PMCID: PMC8888767.

N. LaPierre*, K. Taraszka*, H. Huang, R. He, F. Hormozdiari, and E. Eskin, “Identifying Causal Variants by Fine Mapping Across Multiple Studies,” *PLOS Genetics*, vol. 17, no. 9, pp. e1009733, Sept. 2021. PubMed PMID: 34543273; PubMed Central PMCID: PMC8491908.

J. Bloom et al (many authors), “Massively scaled-up testing for SARS-CoV-2 RNA via next-generation sequencing of pooled and barcoded nasal and saliva samples,” *Nature Biomedical Engineering*, vol. 5, no. 7, pp. 657-665, July 2021. PubMed PMID: 34211145.

N. LaPierre, M. Alser, E. Eskin, D. Koslicki*, and S. Mangul*, “Metalign: Efficient alignment-based metagenomic profiling via containment min hash,” *Genome Biology*, vol. 21, pp. e242, Sep. 2020. PubMed PMID: 32912225; PubMed Central PMCID: PMC7488264.

N. LaPierre, R. Egan, W. Wang, and Z. Wang, “De novo Nanopore read quality improvement using deep learning,” *BMC Bioinformatics*, vol. 20, no. 1, pp. e552, Dec. 2019. PubMed PMID: 31694525; PubMed Central PMCID: PMC6833143.

N. LaPierre, C. Ju, G. Zhou, and W. Wang, “MetaPheno: A Critical Evaluation of Deep Learning and Machine Learning in Metagenome-Based Disease Prediction,” *Methods*, vol. 166, pp. 74-82, Aug. 2019. PubMed PMID: 30885720; PubMed Central PMCID: PMC6708502.

N. LaPierre*, S. Mangul*, M. Alser, I. Mandric, N.C. Wu, D. Koslicki, and E. Eskin, “MiCoP: Microbial Community Profiling method capable of detecting low abundance viral and fungal organisms in metagenomic samples,” *BMC Genomics*, vol. 20, no. 5, pp. e423, June 2019. PubMed PMID: 31167634; PubMed Central PMCID: PMC6551237.

M. A. Rahman, **N. LaPierre**, H. Rangwala, and D. Barbara, “Metagenome sequence clustering with hash-based canopies,” *Journal of bioinformatics and computational biology*, vol. 15, no. 6, pp.1740006, Oct. 2017. PubMed PMID: 29113561.

M. A. Rahman, **N. LaPierre**, and H. Rangwala, “Phenotype Prediction from Metagenomic Data Using Clustering and Assembly with Multiple Instance Learning (CAMIL),” *IEEE/ACM transactions on computational biology and bioinformatics*, Oct. 2017. PubMed PMID: 28981422.

N. LaPierre, M. A. Rahman, and H. Rangwala, “CAMIL: Clustering and Assembly with Multiple Instance Learning for Phenotype Prediction,” in *IEEE Interna-*

tional Conference on Bioinformatics and Biomedicine, Shenzhen, China, 2016.

N. LaPierre and H. Rangwala, “Predicting Clinical Phenotype using OTU-based Metagenome Representation,” in *IEEE International Conference on Data Mining Workshop on Biological Data Mining and its Applications in Healthcare*, Atlantic City, New Jersey, 2015, pp. 156-163.

(* Authors contributed equally)

CONFERENCE TALKS

“Pleiotropy-robust methods for high-dimensional multivariable Mendelian randomization,” in *STATGEN 2024: Conference on Statistics in Genomics and Genetics*, May 2024.

“Leveraging family data to design Mendelian Randomization that is provably robust to population stratification,” in *International Conference on Research in Computational Molecular Biology (RECOMB)*, Apr. 2023.

“Metalign: Efficient alignment-based metagenomic profiling via containment min hash,” in *Intelligent Systems for Molecular Biology (ISMB) HitSeq*, virtual, July 2020.

“Identifying Causal Variants by Fine Mapping Across Multiple Studies” in *International Conference on Research in Computational Molecular Biology (RECOMB)*, virtual, June 2020.

“Metalign: Efficient alignment-based metagenomic profiling via containment min hash,” in *RECOMB-Seq*, virtual, June 2020.

“CAMIL: Clustering and Assembly with Multiple Instance Learning for Phenotype Prediction” in *IEEE International Conference on Bioinformatics and Biomedicine*, December 2016.

“Predicting Clinical Phenotype using OTU-based Metagenome Representation” in *IEEE International Conference on Data Mining workshop on Biological Data Mining and its Applications in Healthcare*, November 2015.

CONFERENCE POSTERS

“Accounting for Isoform Expression in eQTL Mapping,” in *CSHL Genome Informatics*, virtual, Nov. 2021.

“Identifying Causal Variants by Fine Mapping Across Multiple Studies” in *American Society for Human Genetics Annual Meeting*, October 2019.

“MiniScrub: de novo long read scrubbing using approximate alignment and deep learning” in *Amazon Web Services - UCLA Computational Medicine Symposium*, February 2019.

“MiniScrub: de novo long read scrubbing using approximate alignment and deep learning” in *American Society for Human Genetics Annual Meeting*, October 2018.

“MiCoP: Microbial Community Profiling method capable of detecting low abundance viral and fungal organisms in metagenomic samples” in *American Society for Human Genetics Annual Meeting*, October 2017.

“Developing a Computational Pipeline for Metagenomic State Classification with Feature Engineering” in Volgenau School of Engineering Undergraduate Research Celebration, April 2015

- Won Outstanding Undergraduate Research Project Award for poster

FUNDING AND AWARDS

Fellowships and Merit-Based Scholarships

- *NIH T32 HL007605 - Research Training in Respiratory Biology*, July 2023-2024, University of Chicago
- *ModELing and uNdersTanding human behaviOR (MENTOR) NSF Training Grant*, 2018-19 academic year at UCLA
- *NIH T32 Doctoral Training Fellowship*, 2016-18 academic years at UCLA
- *Bersoff Endowed Scholarship*, Outstanding Academic Achievement, Awarded twice in 2015 and 2014
- *SWIFT Scholarship*, Outstanding Academic Achievement, Awarded in 2015

Selected Honors

- *Honorable Mention in NSF Graduate Research Fellowship*, 2015-16
- *Outstanding Undergraduate Student Award*, given to overall best undergraduate student in Computer Science at George Mason University, May 2016
- *Outstanding Academic Achievement Award*, given for outstanding performance in Computer Science, May 2016
- *Outstanding Undergraduate Research Project* for presentation of my research project at Volgenau School of Engineering Undergraduate Research Symposium, April 2015
- *Outstanding Undergraduate Teaching Assistant* for two semesters of excellence as a teaching assistant, April 2015
- *Dean’s List* every semester

Technical Competitions

- *Top 5 at VTHacks*, a software development competition at Virginia Tech with over 45 teams, April 2014
- *2nd Place in the Technical Innovation Challenge*, a week-long competition at George Mason University to design a viable software product, jointly refereed by Computer Science and Business Departments, October 2014

TEACHING EXPERIENCE

Graduate Teaching Assistant Spring 2020
CS/BIOINFO 122/222 - Algorithms in Bioinformatics, Computer Science Department, UCLA

Graduate Teaching Assistant Winter 2020
CS/BIOINFO 124/224 - Machine Learning in Genomics, Computer Science Department, UCLA

Undergraduate Teaching Assistant Fall 2014 - Spring 2015
CS 306 - Computer Law and Ethics, Computer Science Department, George Mason University

- Received Outstanding Undergraduate Teaching Assistant Award
- Assisted students with legal research, writing, and oral communication
- Responsible for grading student assignments worth 25% of their grade; one of the only Undergraduate Teaching Assistants entrusted with this responsibility

VOLUNTEERING, ORGANIZATIONS, AND LEADERSHIP *Diversity, Equity, and Inclusion Committee – University of Chicago Departments of Human Genetics and Genetics, Genomics, & Systems Biology* 2023 - present

- Participated in monthly discussions to plan and organize events and resources promoting DEI initiatives for the HG and GGSB departments
- Currently revising a yearly survey to be sent out to survey the DEI “climate” in these departments

Student-Run Computing and Technology (SRCT) 2013 - 2016

- Student organization at George Mason University that works on software projects and competitions to benefit the university and broader local community
- Secretary and Member of Executive Board, Fall 2015 Semester

Executive Curriculum Planner and Mentor, Community Programming Initiative
George Mason University Honors College and SRCT 2014 - 2015

- Volunteer effort to teach basic programming to local 5th-8th grade students
- Planned and developed parts of the curriculum for the sessions, such as designing games and hints to help the students create them
- Mentored the elementary and middle school students during the sessions

COMPUTATIONAL SKILLS *Languages / Scripting:* Fluent in Python, R, Bash; past experience with C(++) and Java

Deep Learning Frameworks: PyTorch, Keras

Other Technologies: Git, Docker, LaTeX

Bioinformatics experience: Mendelian randomization; GWAS & statistical fine mapping; alignment; assembly; metagenomics; common software such as Plink, Bedtools, Samtools, Bcftools, etc; SGE and Slurm grid/cluster computing systems

Machine Learning Algorithms: Deep Learning, Linear & Logistic Regression, SVMs, Random Forests, etc

Operating Systems: Linux, Windows, macOS

INTERNSHIPS

Graduate Student Researcher Summer 2017

DOE Joint Genome Institute / Lawrence Berkeley National Lab

- Developed a method that uses a Convolutional Neural Network (Deep learning method) to improve Oxford Nanopore long read quality *de novo*
- Method improves both read accuracy and downstream *de novo* assembly
- Helped pioneer use of deep learning within the lab

Security Engineering Intern

Summers 2013-2015

Sony Corporation of America

- Wrote secure and scalable software and worked with Big Data in order to help analyze, detect, and prevent attacks on Sony's networks
- Used Python, Javascript (Node, Express, Meteor), MongoDB, X/HTML, CSS
- Developed a workplace communications system using Meteor.js; solo project
- Assisted in the development of a web application based on a searchable database system using Node.js, Express.js, and MongoDB
- Assisted in the development of a network forensics system; wrote backend python scripts and XML web layouts