Aarthi Venkat, Ph.D.

Last update: January 29, 2026

CONTACT INFORMATION

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EDUCATION

Yale University
Ph.D. in Computational Biology & Bioinformatics — May 2024
M.S. in Computational Biology & Bioinformatics — Dec 2021

The University of California, San Diego
B.S. in Bioengineering: Bioinformatics — Jun 2019

RESEARCH EXPERIENCE

Postdoctoral Associate — Sept 2024-Present
Broad Institute of MIT & Harvard & Harvard Medical School, Drs. Nir Hacohen & Marinka Zitnik

- Translating molecular and cellular biological insights into personalized patient interventions using geometric machine learning

Computational Biology & Bioinformatics Ph.D. Student — Aug 2019-Jul 2024
Yale University, Dr. Smita Krishnaswamy

- Developed geometric representation learning methods to characterize cellular and molecular behavior in diverse, co-led collaborations

Applied Science Research Intern — Sept 2021-Dec 2021
Google Brain, Drs. Lucy Colwell & Farhad Hormozdiari

- Performed ML-guided biological sequence design with Google Genomics, UCSF
- Achieved top performance for CRISPR RNA guide efficacy and expression prediction

Bioinformatics Research Assistant — Oct 2016-Sept 2019
La Jolla Institute for Immunology, Dr. Ferhat Ay

- Characterized 3D structure of malaria-related parasite genomes from Hi-C sequencing
- Corrected *Toxoplasma gondii* misassembly with Hi-C and long-read sequencing

Computational Biology Research Assistant — Sept 2018-Aug 2019
Institute for Genomic Medicine, Dr. Theresa Gaasterland

- Performed bioinformatic analysis of primary congenital glaucoma exomes

Genome Informatics Intern — Jun 2018-Sept 2018
Regeneron Pharmaceuticals, Regeneron Genetics Center

- Integrated loss-of-function variant and target annotation for over 500,000 exomes
- One of 7 selected out of 250+ interns to present at company-wide annual event

Data Analytics Intern — Jun 2017-Sept 2017
Auris Health, Research & Development

- Built cloud-based pipeline to facilitate high-performance analysis of endoscopic robot

PUBLICATIONS

*§ Denote equal contribution.
Links to full publications available on my website: `https://aarthivenkat.github.io`

[1] C Garcia*, **A Venkat***, DC McQuaid* ... S Krishnaswamy§, MD Muzumdar§. *Beta cell-derived cholecystokinin drives obesity-associated pancreatic adenocarcinoma development.* Accepted In Principle at Nature Communications (2026).

[2] **A Venkat***, S Youlten*, BP San Juan* ... S Krishnaswamy§, CL Chaffer§. *AAnet resolves a continuum of spatially-localized cell states to unveil tumor complexity.* Cancer Discovery (2025).

[3] **A Venkat**, S Leone, S Youlten, E Fagerberg, J Attanasio, NS Joshi, S Krishnaswamy. *Mapping the gene space at single-cell resolution with gene signal pattern analysis.* Nature Computational Science (2024).

[4] **A Venkat***, J Chew*, F Cardoso Rodriguez, CJ Tape, M Perlmutter§, S Krishnaswamy§. *Directed scattering for knowledge graph-based cellular signaling analysis.* ICASSP (2024).

[5] **A Venkat***, M Carlino*, B Lawton* ... S Krishnaswamy§, D Krause§. *Single-cell analysis reveals transcriptional dynamics in primary parathyroid tissue.* Genome Research (2024).

[6] **A Venkat**, D Bhaskar, S Krishnaswamy. *Multiscale geometric and topological analyses for characterizing and predicting immune responses from single-cell data.* Cell Trends in Immunology (2023).

[7] D Bhaskar*, DS Magruder*, M Morales, E De Brouwer, **A Venkat**, F Wenkel, J Noonan, G Wolf, N Ivanova, S Krishnaswamy. *Inferring dynamic regulatory interaction graphs from time series data with perturbations.* LoG Conference (2023).

[8] S Leone, A Tong, G Huguet, **A Venkat**, G Wolf, S Krishnaswamy. *Graph Fourier MMD for Signals on Graphs.* SampTA (2023).

[9] X Sun*, S Gupta*, A Tong*, M Kuchroo*, D Bhaskar*, C Liu, **A Venkat** ... CL Chaffer§, S Krishnaswamy§. *Revealing dynamic temporal trajectories and underlying regulatory networks with Cflows.* In Review.

[10] M Damo, N Hornick, **A Venkat** ... NS Joshi. *PD-1 prevents pathogenicity of effector CD8 T cells that infiltrate skin under homeostatic conditions.* Nature (2023).

[11] M Amodio, SE Youlten, **A Venkat**, BP San Juan, CL Chaffer, S Krishnaswamy. *Single-cell multi-modal GAN reveals spatial patterns in single-cell data from triple-negative breast cancer.* Cell Patterns (2022).

[12] KA Connolly, M Kuchroo, **A Venkat** ... NS Joshi. *A reservoir of stem-like CD8+ T cells in the tumor draining lymph node preserves the ongoing antitumor immune response.* Science Immunology (2021).

[13] Y Su*, **A Venkat***, Y Yadav, L Puglisi, S Fodeh. *Twitter-based analysis reveals differential COVID-19 concerns across areas with socioeconomic disparities.* CBM (2021).

[14] J Xia, **A Venkat**, ML Reese, KG Le Roch, F Ay, JP Boyle. *Third generation sequencing revises the molecular karyotype for Toxoplasma gondii and identifies emerging copy number variants in sexual recombinants.* Genome Research (2021).

[15] EM Bunnik, **A Venkat***, J Shao*, KE McGovern ... F Ay§, KG Le Roch§. *Comparative 3D Organization in Apicomplexan Parasites.* PNAS (2019).

Presentations

- *Geometric representation learning for cellular and molecular discovery*
  Invited talk, WNAR/IMS Annual Meeting (2026)
- *Relational ethics for scientific knowledge production and the limits of LLMs*
  Machine Logos: Persons, Language, and AI, Oral Presentation (2026)
- *Decoding cellular biology with geometric machine learning*
  Invited talk, University of Idaho Math & Statistics Colloquium (2026)
- *Analysis of Therapeutic Response in Hepatocellular Carcinoma with Graph-based Machine Learning Methods on Spatial Transcriptomics Data*
  ASCB Poster Presentation (2025)
- *Mapping the gene space at single-cell resolution with gene signal pattern analysis*
  LOG Poster Presentation (2025)
- *Epistemic Responsibility and Interdisciplinarity in the Age of AI for Science*
  LLMs and Digital Autonomy: From Misinformation to Context Collapse Oral Presentation (2025)
- *Dissecting cellular and molecular mechanisms of pancreatic cancer with deep learning*
  ISMB MLCSB Conference Oral Presentation (2025)
- *Dissecting cellular and molecular mechanisms of pancreatic cancer*
  Dr. Samuel M. Nabrit Conference, Brown University, Oral Presentation (2025)
- *Geometric representation learning for single-cell biology across contexts*
  Invited talk, Brown University (2025)

- *Learning cellular and molecular mechanisms of pancreatic cancer*
  Connecting the Dots Broad Institute Symposium Poster Presentation (2024)
- *Mapping the gene space at single-cell resolution with gene signal pattern analysis*
  Yale Department of Genetics Symposium Poster Presentation (2023)
- *Mapping the gene space at single-cell resolution with gene signal pattern analysis*
  Gruber Science Fellowship Symposium Poster Presentation (2023)
- *Learning directed and hyperbolic embeddings*
  Graph Signal Processing Workshop Oral Presentation (2023)
- *PHATE reveals cell state transformation in Tercen biomedical data analysis platform*
  CYTO Oral Presentation (2023)
- *Mapping the gene space at single-cell resolution with gene signal pattern analysis*
  AAI Immunology Poster Presentation (2023)
- *Elucidating mechanisms of endocrine-exocrine signaling in pancreatic cancer*
  Yale Single Cell Symposium Oral Presentation (2022)
- *Manifold-based gene density estimates reveal immune signaling in meningioma*
  ISMB MLCSB Conference Poster Presentation (2021)
- *Archetypal analysis of antigen-specific T cell responses across conditions*
  CSHL Systems Immunology Conference Poster Presentation (2021)
- *Leveraging the Power of Human Genetics through Knockout Discovery*
  Regeneron Oral Presentation & Poster (2018)

Teaching Experience

Teaching Assistant, Computational Genomics Nov 2022, Dec 2023
Cold Springs Harbor Laboratory Workshop
- Designed and presented single-cell workshops for 20-40 PhD-level researchers

Teaching Fellow, Deep Learning Theory and Applications S 2021, S 2024
Yale University, Computer Science
- Held recitations, designed and graded homework, exams, and projects for undergraduate and graduate students

Teaching Assistant, Machine Learning for Single-cell Analysis May 2020, Jan 2021
Yale University, Department of Genetics & Yale SEAS
- Co-taught 100+ researchers across all levels in tools for single-cell analysis

Teaching Assistant, Introduction to Biomedical Data Science and Health Informatics Jun 2020
Yale Center for Medical Informatics
- Assisted in Python for biomedical data analysis for researchers across all levels

Genetics Undergraduate Tutor / Instructional Assistant F 2017, F 2018, S 2019
UC San Diego Biological Sciences
- Developed material for weekly recitation sessions, office hours, and exam preparation
- Received Excellence in Teaching Award for top performance (100% positive reviews)

Fellowships and Grants

GSA Conference Travel Fellowship Jun 2023, Mar 2024
Yale University

Yale Gruber Science Fellowship Aug 2019
Yale University
- Most prestigious award offered by Graduate School of Arts and Sciences to incoming science PhDs in recognition of outstanding accomplishments and promise

Honors and Awards

Public Communication Certificate 2023
Poorvu Center for Teaching & Learning, Yale University
- Certificate for skills developed in oral and written communication

OHER Award Finalist for Yale Research Excellence 2022
Yale School of Medicine, Office of Health Equity Research

- Received for "Twitter-based analysis reveals differential COVID-19 concerns across areas with socioeconomic disparities"

Outstanding Academic Achievement in Bioengineering 2019
The University of California, San Diego
- Highest performance in graduating class in Bioengineering: Bioinformatics

Excellence in Teaching Award 2019
The University of California, San Diego
- Highest performance evaluation for teaching assistance in Genetics

Tau Beta Pi Engineering Honors 2018, 2019
The University of California, San Diego
- Awarded to engineering students displaying high academic acheivement and personal, professional integrity

Muir College Caledonian Honors 2018, 2019
The University of California, San Diego
- Awarded to engineering students displaying high academic acheivement and personal, professional integrity

Provost Honors 2015-2019
The University of California, San Diego
- Received 12 times for high academic achievement

Academic Service

Invited Reviewer and PC Member 2023-2026
- Reviewed and co-reviewed papers for Nature, BMC Bioinformatics, Computational & Structural Biotechnology Journal, RECOMB, Yale Journal of Biology & Medicine
- PC Member (ISMB/ECCB 2026, ISMB/ECCB 2025), Subreviewer (RECOMB 2024)

Research Mentor 2023-2026
- Hannah Thomas (Nashua High School South), Sofia Lara (MIT Biological Engineering), Sam Leone (Yale Applied Mathematics)

KeyPals Volunteer 2026
- Provide mentorship and writing/computer skills for local Cambridge fifth graders

Broad Summer Research Program Selection Committee 2025
- Evaluate applicants for BSRP program for underrepresented students with a strong interest in genomics research

Foundation Models in Genomics Panel Moderator @ Broad 2024
- Lead discussion on opportunities, successes, and pitfalls of recent genomic and transcriptomic foundation models

Student Advisory Board, Poorvu Center for Teaching & Learning 2023
- Developed curriculum and policy incorporating AI literacy and DEI principles

Networking Chair, Yale Gruber Science Fellowship 2022, 2023
- Hosted networking talks, panels, and discussion to foster Gruber scientific community

Student Representative, Graduate Student Assembly 2023
- Advocated for CB&B graduate students to improve Yale healthcare literacy and policy

Reviewing Editor, Yale Journal of Biology & Medicine 2023
- Managed manuscripts for *Big Data* issue, including inviting reviewers and making editorial decisions

Social Services & Insurance Counseling, HAVEN Free Clinic 2022, 2023
- Provided healthcare guidance and resources to uninsured New Haven residents

Cancer Biology Training Program, Yale School of Medicine 2021-2023
- Completed certificate in cancer biology through additional translational coursework
- Shadowed Dr. Pamela Kunz and discussed clinical relevance of *in silico* cancer research