Krishna Choudhary

Google Scholar LinkedIn Website

Education

University of California, Davis, USA 2014-19
Ph.D., Biomedical Engineering with Designated Emphasis in Biotechnology
Dissertation: Statistical methods & software for comparative analysis of RNA structurome profiling data
Advisor: Sharon Aviran

Indian Institute of Technology, Delhi, India 2008-13
B. Tech & M. Tech (Dual Degree Program)
Biochemical Engineering & Biotechnology (Major)
Nano Science & Engineering (Minor)

Research Experience

Postdoctoral Scholar, University of California, San Francisco, USA 2021-
Advisors: Michael McManus and Shalin Mehta
Developing computational methods and conducting CRISPR screens to quantify genetic interactions that drive cancer

Bioinformatician II, Gladstone Institute of Data Science & Biotechnology, USA 2020-21
Supervisor: Alexander R. Pico, Director, Bioinformatics Core
Delivered computational solutions for analysis of a large variety of deep-sequencing data sets in projects related to diverse biomedical research problems

Biostatistician I, Gladstone Institute of Data Science & Biotechnology, USA 2019
Supervisor: Eva Wang, Director, Bioinformatics Core
Delivered computational solutions for analysis of a large variety of deep-sequencing data sets in projects related to diverse biomedical research problems

Publications

Post-Ph.D. 2019-

20. Krup, A. L., ... five authors ..., **Choudhary, K.**, ... four authors ..., Bruneau. B., A Mesp1-dependent developmental breakpoint in transcriptional and epigenomic specification of early cardiac precursors. *Development*, dev.201229, 2023.
19. Zhu, L., **Choudhary, K.**, ... sixteen authors ..., Bruneau, B. G., Steinmetz, L., Krogan, N. J., Pollard, K. S., Srivastava, D., Transcription factor GATA4 regulates cell type-specific splicing through direct interaction with RNA in human induced pluripotent stem cell-derived cardiac progenitors. *Circulation*, 146, 770-787, 2022.
18. Gonzalez-Teran, B., ... five authors ..., **Choudhary, K.**, ... fifteen authors ..., Conklin, B. R., Black, B. L., Bruneau, B. G., Krogan, N. J., Pollard, K. S., Srivastava, D., Transcription factor protein interactomes reveal genetic determinants in heart disease. *Cell*, 185, 1-21, 2022.
17. Abouleisa, R. R. E., ... ten authors ..., **Choudhary, K.**, ... eleven authors ..., Srivastava, D., Bolli, R., Mohamed, T. M. A., Transient cell cycle induction in cardiomyocytes to treat ischemic heart failure. *Circulation*, 145(17), 1339-1355, 2022.
16. **Choudhary, K.**[#], Pico, A. R.[#], Introducing R as a smart version of calculators enables beginners to explore it on their own. *F1000Research*, 10(859), 2021. ([#]co-corresponding author)
15. **Choudhary, K.**, ... two authors ..., Bader, G. D., Pico, A. R., Morris, J. H., scNetViz: from single cells to networks using Cytoscape. *F1000Research*, 10(448), 2021.
14. Taubes, A., ... eleven authors ..., **Choudhary, K.**, ... eleven authors ..., Sirota, M., Huang, Y., Experimental and real-world evidence supporting the computational repurposing of bumetanide for APOE4-related Alzheimer's disease. *Nature Aging*, 1, 932–947, 2021.

PUBLICATIONS [CONTINUED]

13. Gulbranson, D., ... seven authors ..., **Choudhary, K.**, Thomas, R., Mucke, L., Phenotypic differences between the Alzheimer's disease-related hAPP-J20 model and heterozygous Zbtb20 knockout mice. *eNeuro*, 8(3), 2021.

12. **Choudhary, K.**[#], Narang, A.[#], Urn models for stochastic gene expression yield intuitive insights into the probability distributions of single-cell mRNA and protein counts. *Physical Biology*, 17(6), 066001, 2020. ([#]co-corresponding author)

11. Garcia, P. D., ... two authors ..., **Choudhary, K.**, ... three authors ..., Zakian, V. A., Stability and nuclear localization of yeast telomerase depend on protein components of RNase P/MRP. *Nature Communications*, 11(1), 1-19, 2020. [recommended by *Faculty Opinions*]

10. **Choudhary, K.**[#], Narang, A.[#], Analytical expressions and physics for single-cell mRNA distributions of the *lac* operon of *E. coli*. *Biophysical Journal*, 117(3), 572-586, 2019. ([#]co-corresponding author)

Ph.D. 2014-19

9. **Choudhary, K.**, Lai, Y. H., Tran, E., Aviran, S., dStruct: identifying differentially reactive regions from RNA structurome profiling data. *Genome Biology*, 20(1), 40, 2019. [open-source Bioconductor package]

8. Lai, Y. H., **Choudhary, K.**, Cloutier, S. C., Xing, Z., Aviran, S., Tran, E., Genome-wide discovery of DEAD-Box RNA helicase targets reveals RNA structural remodeling in transcription termination. *Genetics*, 212(1), 153-174, 2019.

7. Watters, K. E., **Choudhary, K.**, Aviran, S., Lucks, J. B., Perry, K. L., Thompson, J. R., Probing of RNA structures in a positive sense RNA virus reveals selection pressures for structural elements. *Nucleic Acids Research*, 46(5), 2573-2584, 2018.

6. **Choudhary, K.***, Deng, F.*, Aviran, S., Comparative and integrative analysis of RNA structural profiling data: current practices and emerging questions. *Quantitative Biology*, 5(1), 3-24, 2017. (*co-first author)

5. **Choudhary, K.**, Ruan, L., Deng, F., Shih, N., Aviran, S., SEQualyzer: interactive tool for quality control and exploratory analysis of high-throughput RNA structural profiling data. *Bioinformatics*, 33(3), 441-443, 2016.

4. **Choudhary, K.**, ... four authors ..., Aviran, S., Metrics for rapid quality control in RNA structure probing experiments. *Bioinformatics*, 32(23), 3575-3583, 2016.

Undergraduate/Masters -2014

3. **Choudhary, K.**, Oehler, S., Narang, A., Protein distribution from a stochastic model of *lac* operon with DNA looping: analytical expressions and comparison with experiments. *PLoS ONE*, 9(7), e102580, 2014.

2. Grover, A.*, Pande, A.*, **Choudhary, K.***, Gupta, K.*, Sundar, D., Re-programming DNA-binding specificity in zinc finger proteins for targeting unique address in a genome. *Systems and Synthetic Biology*, 4(4), 323-329, 2010. (*co-first author)

PREPRINTS

1. **Choudhary, K.**[#], Addition formulas for the ${}_pF_p$ and ${}_{p+1}F_p$ generalized hypergeometric functions with arbitrary parameters and their Kummer- and Euler-type transformations. ([#]corresponding author) [*arXiv*]

Teaching Experience [graduate]

Guest Instructor, UC Davis 2022
Topic: Single-cell RNA-seq Data Analysis
Course: Statistical Genomics (BIM254)
IOR: Sharon Aviran
∼10 students in class; positive feedback from IOR; not rated by students

Content Developer & Lead Instructor, Gladstone Data Science Training Program 2019-21
Topics: Single-Cell RNA-seq Analysis; Bulk RNA-seq Analysis; Data Analysis & Visualization
Workshops attended by Gladstone/UCSF graduate students, postdoctoral scholars, and faculty
∼100 hours of instruction, cumulative attendance ∼1000, mean student rating 4.54/5

Guest Discussion Lead, UC San Francisco 2020
Topic: Dimensionality Reduction
Course: Statistical Methods in Bioinformatics (BMI206)
IOR: Katherine Pollard
∼20 students in class; positive feedback from IOR; not rated by students

Guest Instructor & Teaching Assistant, UC Davis 2015-16
Course: Genomic Big Data Analysis (BIM289C)
IOR: Sharon Aviran
∼20 students in class; positive feedback from IOR; not rated by students

Teaching Assistant, IIT Delhi 2012-13
Courses: Advanced Biochemical Engineering (BEL850); Microbial Engineering (BEL713)
IOR: Atul Narang
∼20-30 students in class; positive feedback from IOR; not rated by students

Teaching Experience [undergrad]

Teaching Assistant, UC Davis 2018
Course: Probability & Statistics (BIM105)
IOR: David Rocke
∼70 students in class; mean student rating: 4.0/5

President & Tutor, *Students Tutoring Students* club, UC Davis 2015-17
Tutored ∼10 students in lower-division chemistry and mathematics courses for free
Recruited multiple volunteer tutors and connected them with students
Majority of our students identified with minoritized groups
Faculty advisor: Andreas Toupadakis

Teaching Experience [broader community]

Instructor/Instruction team member, UCSF AI4All Program 2021-22
Lectured on supervised learning & led group discussion with diverse 9^{th}-12^{th} graders
Program Director: Marina Sirota

GED Tutor, Sacramento Public Library 2016

Other Work Experience

Bioinformatics Intern, Roche Molecular Systems, USA 2017
Developed a machine learning classifier to call somatic variants identified in liquid biopsy
The method was integrated in Roche's pipeline for data analysis

Chemical Product Developer (Entrepreneur), Saatvic CosmoCare, India 2012-14
Developed product formulations for metal polishes
Devised a low-cost manufacturing unit, marketing strategy, and managed supply line

Biopharmaceutical Production Scale-Up Intern, Biocon Limited, India 2011
Interfaced between Biocon's Mammalian Cell Culture Group and their Pilot Plant
Modeled and explained anomaly in gas transfer that was hindering scale-up of CHO cell cultures

Mentoring Experience

Graduate students

Yuhao Wang, PhD candidate, Biomedical Sciences, McManus lab, UCSF	2021-
Yongin Choi, Rotation student, Biomedical Engineering, Aviran lab, UC Davis	2018

Undergraduate students

Richard Phouasalith, Researcher, Biomedical Engineering, Aviran lab, UC Davis	2017
Kyle Van Housen, Researcher, Biomedical Engineering, Aviran lab, UC Davis	2017
Cassidy Dzoan, Researcher, Biomedical Engineering, Aviran lab, UC Davis	2017
Huan Chen, International summer intern, GREAT program, Aviran lab, UC Davis	2016
Qianyu Gao, International summer intern, GREAT program, Aviran lab, UC Davis	2015

High-school students

Chubi Yambao, E-Mentor program, Sheldon High School Biotechnology Academy, CA	2017
Jem Doan, E-Mentor program, Sheldon High School Biotechnology Academy, CA	2016
Deirdre Willgohs, Intern, Aviran lab, UC Davis	2016

Peer Reviewer

BMC Bioinformatics, PLOS ONE, The Journal of Chemical Physics, Scientific Reports, Entropy, Nature Communications, Proceedings of the Royal Society A, Biophysical Journal, Cancers, BMC Systems Biology, Nucleic Acids Research [Total: 25 articles reviewed; credits on Orcid] 2019-

Community Outreach

Application reviewer, UCSF's AI4All program targeting diverse high schoolers	2021
Invited speaker, seniors at Avenidas Village, Palo Alto, CA via *Skype a Scientist*	2021
Career counselor, Douglass Middle School, Woodland, CA	2016
Music teacher, Davis Mosaics initiative of the Davis Community Church, Davis, CA	2016

Conference Presentations

Choudhary, K., ... three authors ..., & McManus, M., epitoPeR enables scale up of high-content CRISPR screens. Poster, **Systems Approaches to Cancer Biology conference**; Woods Hole, MA, USA. [*selected for lighnting talk*] 2022

Choudhary, K., & Aviran, S., dStruct: a Bioconductor package for differential analysis of RNA structurome profiling data. Poster, **Annual Meeting of the RNA Society**; Online. 2021

Choudhary, K., & Narang, A., Urn models for stochastic gene expression. Poster, **Biophysical Society Annual Meeting**; Online. 2021

Choudhary, K., & Narang, A., Probability distributions of single-cell mRNA and protein counts derived by solving urn models for stochastic gene expression. Poster, **Biological Data Science conference of Cold Spring Harbor Laboratory**; Online. 2020

Choudhary, K., Shih, N., & Aviran, S., Noise in RNA structural profiling data and its impact on reactivities and structure prediction. Poster, **Annual Meeting of the RNA Society**; Prague, Czech Republic. 2017

Choudhary, K., ... four authors ..., & Aviran, S., Methods for rapid and scalable quality assessment of RNA structure probing data. Poster, **Biological Data Science conference of Cold Spring Harbor Laboratory**; New York, USA. 2016

Choudhary, K., ... four authors ..., & Aviran, S. Methods for rapid quality assessment of RNA structure probing data. Poster, **Computational RNA Biology conference of Wellcome Genome Campus**; Cambridge, UK. 2016

Awards & Fellowships

Postdoc Travel Grant, Helen Diller Family Comprehensive Cancer Center, UCSF	2022
Conference Award (sponsored by NSF) to attend the RNA Society annual meeting	2021
Graduate Student Travel Award, Graduate Studies, UC Davis	2017
Travel fellowship to attend RNA Society annual meeting, RNA Society	2017
Biomedical Engineering Graduate Group Travel Award, UC Davis	2016
Travel bursary, Wellcome Genome Campus, Cambridge, UK	2016
Scholarship for all-India rank 26 in GATE test, Government of India	2012-13
Summer Undergraduate Research Award, Industrial R&D Unit, IIT Delhi	2010