

Kelly Cochran

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kellycochran.github.io

EDUCATION

Stanford University

Sep 2019 - Current

Computer Science Ph.D. candidate, advised by Dr. Anshul Kundaje
Pierre & Christine Lamond Fellow, Stanford Graduate Fellowship (2019 - 2022)

Duke University

Aug 2014 - May 2018

B.S. in Computer Science (GPA: 3.8)
Minors in Statistical Science, Computational Biology & Bioinformatics
Angier B. Duke Memorial Merit Scholarship

RESEARCH EXPERIENCE

Kundaje Lab - Stanford University

Sep 2019 - Current

Ph.D Candidate, Computer Science Department

- Dissecting the regulation of gene expression and RNA processing by genomic sequence via state-of-the-art, interpretable deep learning frameworks; manuscript in prep
- Mentored several high school and undergraduate students through research projects

Mahony Lab - Pennsylvania State University

June 2018 - Aug 2019

Research Tech, Center for Eukaryotic Gene Regulation

- Trained neural networks to predict transcription factor binding events across species, diagnosed cross-species model pitfall, and proposed an effective solution
- Presented talks at MLCB 2019, ISMB 2021; 1st-author publication in *Genome Research*

Kay Lab - Duke University

Dec 2015 - May 2018

Undergraduate Researcher, Neurobiology & Ophthalmology Departments

- Analyzed PacBio deep long-read sequencing data to discover unannotated isoforms
- Sole developer of an R package for validating isoforms, characterizing transcript and gene diversity, and visualizing results

Wang Lab - University of California, Los Angeles

Summer 2017

Bruins-In-Genomics Fellowship

- Assisted development of a statistical method to detect Type II Diabetes in patients using gut microbiome RNA-seq data; won Best Poster Award

PUBLICATIONS

Cochran, K., Schreiber, J., Yin, M., Mantripragada, A., Marinov, G., Yu, H., Lis, J.T., & Kundaje, A. 2023. Dissecting the *cis*-regulatory syntax of transcription initiation with deep learning. *In prep*.

Cochran, K., Srivastava, D., Shrikumar, A., Balsubramani, A., Hardison, R.C., Kundaje, A., & Mahony, S. 2022. Domain-adaptive neural networks improve cross-species transcription factor binding prediction. *Genome Research*. [[Paper](#)] [[Code](#)]

Ray, T., **Cochran, K.**, Kozlowski, C., Wang, J., Alexander, G., Cady, M.A., Spencer, W.J., Ruzyski, P.A., Clark, B.S., Laeremans, A., He, M-X., Wang, X., Park, E., Hao, Y., Iannaccone, A., Hu, G., Fedrigo, O., Skiba, N.P., Arshavsky, V.Y., & Kay, J.N. 2020. Comprehensive identification of mRNA isoforms reveals the diversity of neural cell-surface molecules with roles in retinal development and disease. *Nature Communications*, 11(1): pp. 1-20. [[Paper](#)] [[Code](#)]

Ray, T., **Cochran, K.**, & Kay, J. 2019. The enigma of *CRB1* and *CRB1* retinopathies. In: Bowes Rickman C., Grimm C., Anderson R., Ash J., LaVail M., Hollyfield J. (eds) *Retinal Degenerative Diseases. Advances in Experimental Medicine and Biology*, vol 1185. Springer, Cham.

SOFTWARE

Choe, C., Wayment-Steele, H., **Cochran, K.**, Sharma, E., Kim, D.S., & Das, R. [authors unordered]. **RiboTree**: Software to Design Functional DNA & RNA Medicines. Patented software. Featured in [Leppek et al. 2022](#): Combinatorial optimization of mRNA structure, stability, and translation for RNA-based therapeutics. [[Access](#)]

Cochran, K. & Ray, T. **IsoPops**: Framework for analyzing output of PacBio sequencing experiments. R package. Companion to Ray *et al.* 2020. [[Documentation](#)][[Github](#)]

TALKS

Intelligent Systems For Molecular Biology (ISMB), Lyon, France

July 2023

- World's largest bioinformatics conference; 12% talk acceptance rate

Symbolic Systems Forum, Stanford, CA

January 2022

- Invited to give 1-hour research presentation to Stanford undergraduates

Intelligent Systems For Molecular Biology (ISMB), Virtual

July 2021

- Selected for 20-minute “Long Talk” + Poster

Machine Learning in Computational Biology (MLCB), Vancouver, CA

Dec 2019

- Co-located with NeurIPS; 1 of 10 talks chosen from 118 submissions - [\[Video\]](#)

Great Lakes Biology Conference (GLBio), Madison, WI

May 2019

POSTERS

Cochran, K., Yin, M., Schreiber, J., & Kundaje, A. (2023, July). *Modeling the cis-regulatory syntax of transcription initiation with ProCapNet*. Presented at ISMB, Lyon, France.

Cochran, K., Yin, M., Schreiber, J., & Kundaje, A. (2023, May). *Modeling the cis-regulatory syntax of transcription initiation with ProCapNet*. Presented at Biology of Genomes, Cold Spring Harbor Labs, NY.

Cochran, K., Srivastava, D., Shrikumar, A., Balsubramani, A., Kundaje, A., & Mahony, S. (2021, July). *Domain-adaptive neural networks improve cross-species prediction of transcription factor binding*. Presented at Intelligent Systems for Molecular Biology (ISMB), virtually. [\[Video\]](#)

Cochran, K., Srivastava, D., Balsubramani, A., Kundaje, A., & Mahony, S. (2019, July). *Cross-species transcription factor binding prediction using neural networks*. Presented at the Penn State Summer Symposium in Molecular Biology, State College, PA.

Cochran, K., Ray, T., & Kay, J. (2018, April). *A bioinformatics pipeline for characterizing isoform diversity in PacBio sequencing data*. Presented at the Computer Science Undergraduate Project Showcase, Durham, NC.

Ray, T., **Cochran, K.**, & Kay, J. (2018, January). *Targeted sequencing and bioinformatics pipeline for capturing and characterizing isoform diversity*. Presented at the Duke University Research Computing Symposium, Durham, NC. **2nd Place Poster Award.**

Cochran, K., Mitchell, D., Ju, C. J.-T., & Wang, W. (2017, August). *A genome-independent and alignment-free approach for improved disease prediction using k-mer counts from metagenomic reads*. Poster presentation for Bruins-in-Genomics Summer Research Fellowship program, Los Angeles, CA. **Best Poster Award.**

TEACHING

TA, cs109: Probability for Computer Scientists, Stanford University Fall 2022 & 2023

- Head TA in Fall 2023 - managed 19 TAs + 420 students; handled nearly all course logistics, trained new TAs, led several review sessions, taught a lecture, revised exams
- In Fall 2022 - led weekly discussion sections and office hours, wrote exam problems, graded problem sets, and answered 200+ student questions online
- Student feedback: "one of the best TAs I've had", "exactly the TA I want to have"
- Other TA feedback: "seriously helped me grow as a teacher", "the GOAT"

TA, cs197: Computer Science Research, Stanford University Fall 2021

- Led the Computational Biology section, mentoring 3 groups of students through research projects, teaching best practices in the field, and advising on scientific writing
- Course targets undergraduates from under-represented backgrounds in CS research
- Student feedback: "incredibly supportive", "dedicated", "very knowledgeable"

Instructor, Unix & Python Virtual Workshops, Stanford University Fall 2020

- Co-taught a week-long virtual Intro Python workshop to 60+ biomedical researchers; student feedback: "The best online learning I've done in any setting", "You are a great teacher", "You made it so that Python was no longer overwhelming!"
- Prepared and led a 2-session Unix crash course for 1st-year Genetics Ph.D. students; feedback: "The best 'unix basics' that I've witnessed"

Section Leader, Code-In-Place, Virtual Spring 2020

- Developed lessons for and taught a 10-person discussion group in a massive (~10,000 students) international virtual offering of Stanford's cs106a Intro Python course

TA, Software Design & Implementation, Duke University Spring 2017

- Advised students in monthly code reviews, office hours, and lecture; graded projects

ACADEMIC SERVICE & LEADERSHIP

Admissions 2020 - 2022

- Evaluated 200+ applications for Stanford CS Ph.D. Admissions Committee, Winter 2021
- Volunteer for Stanford CS DEI Applicant-Support Program (early application feedback)
- Assisted with Admit Weekends in Winter 2020 - 2022 through DEI programming and as comp-bio liaison by coordinating student-admit meetups, Q & As, and social events
- Alumni interviewer for Duke Undergraduate Admissions, Winter 2021

Inclusion in AI, Stanford University

2019 - 2022

- Co-organized a bi-monthly Women in AI support group, the Humans of AI speaker series, and Queer in AI quarterly dinners, aimed at fostering more inclusive community
- Organized and supported DEI advocacy within the CS department, working with faculty and staff, the DEI Committee, and the Grad Student Advisory Council

Peer Review

2020 - Current

- Machine Learning In Computational Biology (MLCB) 2020 - 2023
- IEEE/ACM Transactions on Computational Biology and Bioinformatics, 2022
- Intelligent Systems for Molecular Biology (ISMB) 2023
- Bioinformatics, 2023
- Asian Conference in Machine Learning (ACML) 2023
- Springer Machine Learning, 2023
- Northern Lights Deep Learning (NLDL) 2023
- RECOMB 2024 (subreviewer)

OTHER SERVICE & LEADERSHIP**Assistant Band Director, St. Ignatius College Prep, CA**

Winter 2021 - Spring 2022

- Helped found the “Spirit of SI” Pep Band program from scratch
- Coached new-to-band directors on athletic band management, logistics, and culture
- Mentored students in leadership roles; developed solid musical and social foundations

Foster Volunteer, Centre County PAWS, PA & Pets-In-Need Palo Alto, CA

2018 - 2020

- Fostered 10 cats and kittens; responsible for medical care and socialization

Drum Major, Duke University Marching Band

Fall 2016 - Spring 2018

- Senior conductor, mentor, and academic tutor to 130+ band members, and a driving force behind major organizational growth, both musically and as a community
- Received the Charles Hogan Memorial Band Award for “dedication, leadership, enthusiasm, and a willingness to serve the band”

SELECTED COURSEWORK

Computational Genomics
Machine Learning (cs229)*

Experimental Molecular Biology (Lab)
Structure & Organization of Biomolecules*

The Modern Algorithmic Toolkit*
Mining Massive Datasets*
(*) denotes Stanford courses

Cell & Developmental Biology
Systems Biology