Kelly Cochran

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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
- 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., 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., Ruzycki, 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. Algorithm. 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)   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)   July 2021
  - Selected for 20-minute "Long Talk" + Poster

Machine Learning in Computational Biology (MLCB) [Video]   Dec 2019

  - Co-located with NeurIPS; 1 of 10 oral presentations chosen from 118 submissions

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

- Led weekly discussion sections and office hours, wrote exam problems, contributed to course textbook, 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"

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

Inclusion in AI, Stanford University   Fall 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

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

Peer Review   2020 - Current
  - Machine Learning In Computational Biology (MLCB), 2020 - 2023
  - Intelligent Systems for Molecular Biology (ISMB), 2023
  - IEEE/ACM Transactions on Computational Biology and Bioinformatics, 2023
  - Bioinformatics, 2023
  - Asian Conference in Machine Learning (ACML), 2023
  - Springer Machine Learning, 2023

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 different 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   Structure & Organization of Biomolecules*
Machine Learning (cs229)*   Experimental Molecular Biology (Lab)
The Modern Algorithmic Toolkit*   Cell & Developmental Biology
Mining Massive Datasets*   Systems Biology
(*) denotes Stanford courses