Karthik Guruvayurappan
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EDUCATION

2019-2023 (expected)

University of California, San Diego
Bachelor of Science, Data Science
Bachelor of Science, General Biology
GPA : 3.953

Relevant Coursework: Deep Learning, Data Management, Scalable Analytics Systems, Data Visualization, Multivariate Statistics, Recommender Systems, Statistical Methods, Linear Algebra, Applied Genomic Technologies, Molecular Biology, Metabolic Biochemistry, Microbiology Laboratory, Genetics, Immunology

RESEARCH EXPERIENCE

May 2020 – Present

McVicker Lab, Salk Institute for Biological Studies
Undergraduate Researcher
Advisor: Dr. Graham McVicker

Project 1: Statistical Modeling of Enhancer-Enhancer Interactions

- Using generalized linear models to analyze enhancer-enhancer interactions, model guide efficiency, and regress cell cycle scores using previously published single-cell RNA-sequencing readout from a multiplexed CRISPRi screen

Project 2: CRISPR Guide Design

- Used differential ATAC-seq peak analysis between T-cell populations to design guides for a multiplexed single-cell CRISPRi screen
- Designed guides for a tiled CRISPRi screen targeting a topologically associated domain encompassing the Foxp3 gene locus
- Collaboration with Zheng Lab at Salk Institute

Project 3: RELICS Software

- Tested the effects of different parameters on enhancer location predictions from the RELICS (Regulatory Element Location Identification in CRISPR Screens) software

- Compared RELICS to competing methods MAUDE and MAGeCK
- Used cubic splines to model overdispersion of pooled CRISPR screen count data within CRSsim, a simulation framework for regulatory CRISPR screens
- Implemented a "slab-and-spike" approach to model the area of effect of genomic perturbations introduced by CRISPRi
- https://github.com/patfiaux/RELICS

June 2022-Present

Boutros Lab, University of California, Los Angeles
Programming Analyst, Bruins in Genomics Summer Researcher
Advisor: Dr. Paul Boutros

Project: **Exploring RNA Editing in Metastatic Prostate Cancer**

- Explored RNA editing in 99 previously published metastatic prostate cancer samples
- Performed association tests between RNA editing frequency and clinical features, genomic features, and gene expression
- https://qcb.ucla.edu/big-summer/big2022/#toggle-id-20

September 2022-Present

Halicioglu Data Science Institute, University of California, San Diego
Senior Capstone Project
Advisor: Dr. Tiffany Amariuta

Project: eQTL Analysis of the 1000 Genomes Project

PUBLICATIONS

Chen H, Fiaux P, Sen A, Luthra I, Ho A, Chen A, **Guruvayurappan K**, Lorenzini M, O'Connor C, McVicker G (2022). Deletion mapping of regulatory elements for GATA3 reveals a distal T helper 2 cell enhancer involved in allergic diseases. *biorxiv.* **[In review]**

TALKS

Guruvayurappan K*, Zhou J*, McVicker G (2022). Measuring enhancer-enhancer interactions by analysis of single-cell CRISPR perturbations. Cold Spring Harbor Laboratory Biological Data Science Meeting.

POSTER PRESENTATIONS

Guruvayurappan K, Livingstone J, Boutros PC (2022). Exploring the RNA Editing Landscape of Metastatic Prostate Cancer. UCLA BIG (Bruins in Genomics) Summer Poster Symposium.

TEACHING EXPERIENCE

Spring 2022	**Teaching Assistant**, University of California San Diego BIMM 100: Molecular Biology Led weekly discussion sections of roughly 30 students and held weekly office hours. Prepared exam review sessions, graded student homework assignments and exams, and proctored exams. Received 85% recommendation on student evaluations.
Fall 2021	**Instructional Assistant**, University of California San Diego BIBC 102: Metabolic Chemistry Led weekly discussion sections of roughly 30 students and weekly office hours. Prepared exam review sessions, graded student problem sets, and proctored midterm exams. Received 100% recommendation on student evaluations.

VOLUNTEER EXPERIENCE

2021-Present	**Volunteer Scientist**, SciChats@Salk

PROFESSIONAL MEMBERSHIPS

2022 – Present	**Data Science Student Representative**, UC San Diego
2022 – Present	**Director of Marketing and Sponsorship**, ACM AI at UC San Diego
2020 – 2022	**Sponsorship Coordinator**, ACM AI at UC San Diego
2022 – Present	**Practice Coordinator**, UC San Diego Competitive Club Tennis
2019 – Present	**Member**, UC San Diego Competitive Club Tennis

AWARDS AND HONORS

2022	**Research Excellence Award**, UC Los Angeles
2021	**Goldwater Scholarship Nominee**, UC San Diego
2019-Present	**Provost Honors**, UC San Diego
2019-Present	**Roosevelt College Honors Program**, UC San Diego
2020-2021	**HDSI Undergraduate Research Scholarship**, UC San Diego

- AlbumGAN: Generative Adversarial Network for Album Cover Artwork

2019-2020 **HDSI Undergraduate Research Scholarship**, UC San Diego

- Quantifying Tennis Player Performance using Machine Learning

SKILLS

Programming Languages:	Python, R, Java, SQL, PostgreSQL, JavaScript, HTML, CSS
Software Tools:	Git, Jupyter Notebook, JupyterLab, RStudio, Sun Grid Engine, Regular Expressions, Microsoft Azure, Docker, AWS, VSCode
Software Packages:	NumPy, Pandas, SciPy, Matplotlib, Seaborn, PyTorch, BeautifulSoup4, Dask, Spark, ggplot2, d3.js
Bioinformatics Software:	BLAST, IGV, ENCODE ATAC-seq QC and Peak Calling Pipeline (trim galore, bwa, samtools, MACS2), HOMER, Seurat, biomaRt, chrAccR, pybedtools, FastQC, STAR, DESeq2, Metascape, DiffBind, GuideScan, CellRanger, REDItools, RNAEditingIndexer
Lab Techniques:	Pipetting, Microscopy, PCR, Culturing
Languages:	English, Chinese