SUKANYA KRISHNA

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Education

Harvard University   **Aug. 2024 - May ?**
PhD in Engineering and Applied Sciences   *Cambridge, MA*
- First Year Faculty Advisor: Dr. Donhee Ham

University of California, San Diego (UCSD)   **Aug. 2020 - June 2024**
Bachelor of Science in Bioengineering; Double Minor in Data Science and Cognitive Science   *San Diego, CA*
- UCSD Thurgood Marshall College Provost Honors
- GPA: 3.995/4.0

Undergraduate Research Experience

Systems Biology and Systems Medicine Lab   **4/2024 - Present**
Advisor: Dr. Shankar Subramaniam   *UCSD*
- Developing an image-based methodology to stratify the heterogeneity and classify the disease state of tumors in triple-negative breast cancer (TNBC) using fluorescent microscopy images obtained from GeoMx experiments.

Robotic and Haptic Devices Lab   **5/2023 - Present**
Advisor: Dr. Tania Morimoto   *UCSD*
- Part of bioengineering senior design team that aims to develop a proof-of-concept demonstration of a novel vine biomedical robot which can be steered by local actuation of responsive material
- Evaluating and testing the attachment of heating actuators (LCEs) to different vine materials, and characterizing the performance of LCEs when activated using hydronic heating or pneumatic heating.

Particle Physics and Machine Learning Lab   **5/2021 - 2/2024**
Advisor: Dr. Javier Duarte   *UCSD*
- Experimenting with anomaly detection methods for discovering new physics in the data collected from the Large Hadron Collider. Research graph-based autoencoder and randomized neural network architectures, specifically the interaction network autoencoder and variational autoencoder
- Evaluated, against other kinds of autoencoder and variational autoencoder structures (i.e. CNN/DNN) to see which structures can be best optimized to fit in an FPGA (to meet L1 trigger requirements) that are also good at anomaly detection.
- Received IRIS-HEP Fellowship for research in 2021. Trainee Researcher in the Accelerated AI Algorithms for Data-Driven Discovery (A3D3) NSF Institute

Neurobiology of Addictive Disorders Lab   **9/2021 - 6/2022**
Advisor: Dr. Eric Zorrilla   *Scripps Research*
- Applied random forest machine learning model on dietary predictors using data from UK BioBank to determine if there is a genetic association with alcohol dependency.
- Created a program that takes in a text file containing timestamps of rats pressing a lever, sorts it into active/inactive presses, and calculates latency and bouts using Pandas and NumPy.

Publications

[1] Tsan, S., Kansal, R., Aportela, A., Diaz, D., Duarte, J., Krishna, S., ... & Pierini, M. (2021).
"Particle Graph Autoencoders and Differentiable, Learned Energy Mover's Distance." arXiv preprint
arXiv:2111.12849.

Technical Reports

[1] Krishna, S., O'Shea, N., Lu, A., Chang, S., & Fagelnour, Y. (2023).
Improving System Feedback in Soft Vine Robots via PID Control. UCSD.
[2] Butler, N., Krishna, S., Liu, J., O'Shea, N. & Park, J. (2023). A Biosensing Device for Posture Correction.
UCSD.
[3] Krishna, S. (2022). Machine Learning Approaches for Genomics Analysis. Scripps Research.

Conference and Workshop Contributions

- "Improving System Feedback in Soft Vine Robots via PID Control". 24th Annual UC Systemwide Bioengineering Symposium. June 24-25, 2024. San Diego, CA, USA.

- "Benchmarking Manifold Learning vs. VAEs for the CMS Level-1 Trigger Using the ADC 2021 Dataset". American Physical Society April Meeting 2024 on Data Analysis, AI, and ML. April 3-6, 2024. Sacramento, CA, USA.

- "Interaction Network Autoencoder in the Level-1 Trigger". Fast Machine Learning for Science Workshop 2022. October 5, 2022. Southern Methodist University, Dallas, TX, USA.

- "Particle Graph Autoencoders for L1 Anomaly Detection". 2022 Undergraduate Research Conference at UC San Diego. May 14, 2022. UC San Diego, La Jolla, CA, USA.

- "Interaction Network Autoencoder in the Level-1 Trigger". American Physical Society April Meeting 2022 on Data Analysis, AI, and ML. April 11, 2022. New York, NY, USA.

- "Particle Graph Autoencoders for Real-Time Jet Anomaly Detection". IRIS-HEP Fellow presentations. September 20, 2021. USA.

Industry Experience

Bristol Myers Squibb   **7/2023 - 9/2023**
Machine Learning Intern   *Final Internship Report*
- Employed machine learning techniques to identify key features for predicting diabetes using two distinct datasets. Investigated multiple scikit-learn classifiers, explainable AI techniques, and neural networks.
- Achieved up to 86% model accuracy for smaller Pima Indians Diabetes dataset and 75% accuracy for larger Diabetes Readmission dataset.
- Implemented Generative Adversarial Networks (GANs) to augment new patient data, enhancing the project's scope beyond feature selection

Google Summer of Code - Ontario Institute for Cancer Research   **5/2023 - 9/2023**
Software Engineer Intern   *Final Internship Report*
- Spearheaded implementation of a CI/CD pipeline using Argo CD, Argo Workflows, AWS, GitHub, and Jenkins.
- Successfully automated continuous integration deployments for 2 repositories using Git Hooks, with plans to expand to over 20 by the next release.
- Dockerized critical repositories in the release pipeline to reduce manual intervention, improve curator workflows, and enhance developer productivity.

One Medical - Amazon   **5/2023 - 8/2023**
Product Analytics Intern
- Worked with big data to develop an efficient data model on Snowflake, aggregating patient data to enhance performance and analytical capabilities.
- Designed and published Tableau dashboards, visually representing 8 crucial success metrics sourced from Snowflake and Mixpanel. Utilized a pre-aggregated data model to ensure superior performance.

Medtronic   **6/2022 - 8/2022**
Data Engineering Intern
- Reduced compute time on Digital Twin for real-time intervention (50k patients on InPen therapy dataset)
- Achieved 7.5x reduction in compute time with stable fitting (1.4% deviation in MARD), and stable parameter estimation (less than 4% parameter variation) for 10-minute step size
- Estimated 5x cost reduction in cloud resources (AWS) at scale

HindSight Technology Solutions   **6/2021 - 8/2021**
Data Science and Machine Learning Intern   *Final Internship Project*
- Learned about ML classifier systems, data processing and scraping, and few-shot learning.
- Built a website/article classifier under major topic categories that achieved 70% testing accuracy.

Technical Skills

Languages: Python, Java, MATLAB, Git, C++, HTML/CSS, JavaScript, SQL, Closure
Technologies/Frameworks: Linux, Jenkins, GitHub, Kubernetes, Docker, AWS
Software Applications: AutoCAD, SolidWorks, Tableau, JMP, Figma, SAP

Select Projects

Amazon Redesign Case Study | *Figma, HTML/CSS* 1/2023 - 3/2023
  * Conducted case to propose design ideas for Amazon mobile app to help users curb exuberant consumption and spending, and encourage budgeting and money tracking.

Fake Amazon Reviews (FARS) | *Python, Streamlit* 1/2022 - 6/2022
  * Led a team of 4 on a Data Science/ML dataset using KNN (K-Nearest Neighbors) and Bigrams with Random Forest Classification to predict whether a given Amazon review is verified or unverified.
  * Optimized the KNN classifier and achieved around 70% test accuracy for both models

Teaching

Instructional Assistant for MAE 107 (Computational Methods in Engineering) 4/2024 - 6/2024
  * Assisting professor in formulating assignments, instruction implementation, and logistics. Supporting student learning and development during office hours. Providing detailed feedback to students through assignment and assessment grading.

Instructional Assistant for COGS 118B (Introduction to Machine Learning II) 1/2024 - 3/2024
  * Assisting professor in formulating assignments, instruction implementation, and logistics. Supporting student learning and development during office hours. Providing detailed feedback to students through assignment and assessment grading.

Instructional Assistant for MAE 40 (Linear Circuits) 9/2023 - 3/2024
  * Assisting professor in formulating assignments, instruction implementation, and logistics. Providing detailed feedback to students through assignment and assessment grading.

Big BENG at UCSD Educational Content Creator 10/2022 - 6/2024
  * Actively contributed to the creation of educational support videos, posted on "The Big BENG at UCSD" YouTube channel, for UCSD's Bioengineering department. Worked on video scripting and video design as a member of the BIG BENG club, enhancing the learning experience for fellow students in the department.
  * Work on video scripting for the videos on the Sliding Filament Theory and Isometric Length Tension Relationships.

Ignite Fellow for Teach for America organization 9/2021 - 6/2023
  * Worked to accelerate learning and foster belonging with students so that they may overcome the systemic barriers to an excellent education: Created lesson plans and executed Zoom lessons to groups of third graders and seventh graders thrice weekly to build their reading fluency and proficiency as well as mathematics abilities respectively.

Tutor via Tutor Program, Jacobs School of Engineering 9/2022 - 6/2023
  * Tutored for CSE and Data Science courses which included one-on-one mentoring of students in labs and office hours.

Fellowships, Awards, and Honors

  * Outstanding Academic Achievement Award in Bioengineering at UCSD (2024)
  * IGNITE Fellowship through Teach For America (2021-2023)
  * Google Summer of Code 2023 Program Participant (17.1% Acceptance) (2023)
  * IBM Client Engineering and Technical Sales (CETS) Track Participant (2023)
  * IRIS-HEP Undergraduate Fellowship through Institute for Research and Innovation in Software for High Energy Physics (IRIS-HEP) (2021)
  * Rotary International Undergraduate Scholarship (2020)
  * Temecula Women's Club Scholarship (2020)

Leadership / Extracurriculars

IEEE UCSD Chapter 2020 − 2024
Principal Member, Events Coordinator *UCSD*
  · Attend event planning meetings with University Center Personnel, submit funding and reimbursement requests. Part of planning committee for major IEEE events including GBMs, H.A.R.D Hack, ECE Day, Reverse Career Fair, and Robofest.

IEEE EMBS UCSD Chapter 2023 − 2024
Co-Founder and Vice President (VP) of Industry Relations *UCSD*
  · Navigate industry contacts and hold events to connect UCSD's undergraduate and graduate students to industry. Coordinate industry-sponsored events and workshops.

SWE UCSD Chapter 2020 − 2024
Principal Member, Treasurer *UCSD*
  · Receive and distribute funds in accordance with financial rules and regulations of the University. Part of the planning committee for SWE events and workshops.

The Investors Club 2021 − 2024
Principal Member, Chief Administrator *UCSD*
  · Coordinate the distribution of news of The Investors Club's events, outreach, and projects. Responsible for managing The Investors Club Newsletter.