Dhruv Patravali

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Education

University of California San Diego Sept 2022 – June 2026

B.S. Computer Science spec. Bioinformatics (GPA 3.743)

- Provost Honors (6x)
- Founder and Co-President of Executive Lecture Series Club
- Member of CSE Society and Undergraduate Bioinformatics Club

Professional Experience

Goldrath Lab / La Jolla, CA

Undergraduate Bioinformatics Researcher (February 2025 - Present)

- Awarded 'Best Poster Award' at the 2025 La Jolla Immunology Conference
- Developed a Resolvi-based neural network architecture to predict gene perturbation specific effects for CRISPR Pooled Screening
- Developed an aggregate XGBoost machine learning model for cell type prediction using spatial transcriptomics data
- Developed a nuclear segmentation pipeline to identify and delineate cell nuclei from spatial transcriptomics data with Cellpose
- Refined the lab's processing pipeline for Xenium spatial data, and helped modify algorithms to accommodate different tissue types
- Created robust, publication-quality figures and visualizations used for internal presentations and manuscripts.
- Developed analysis scripts for processing complex, high-dimensional data and comparing spatial neighborhoods and their gene expression patterns

La Jolla Institute for Immunology / La Jolla, CA

Research Intern (June 2024 - September 2024)

- Utilized PyTorch based image reconstruction models to predict hemagglutination inhibition measurements for influenza vaccination studies. Applied machine learning techniques to enhance the labs predictive accuracy for antibody response.
- Gained proficiency in machine learning and deep learning evaluation and testing methodologies, including train-test split, cross-validation, performance evaluation metrics, and overfitting/underfitting analysis, to ensure reliable model performance.
- Developed python scripts to consolidate and analyze bulk hemagglutinin inhibition and neutralization datasets from ImmPort's database of influenza studies. This was crucial in streamlining the selection of key vaccination data for the lab.

Zealie LLC / San Diego, CA

Software Engineer Intern (July 2023 - August 2023)

- Developed REST API modules in Java using Spring Boot framework, leveraging Postman for testing and MySQL for database integration. These modules were critical in data delivery to the dashboard of Zealie's new integrated web application.
- Streamlined data retrieval and processing through optimized SQL queries and database management techniques.
- Collaborated with a team of software engineers on a large-scale software project, adhering to Scrum (Agile) methodology for effective project management and updates.

DIVRT / San Diego, CA

Tech Intern (August 2021 - August 2022)

- Assembled and built hardware for raspberry pi based IOT gate control boxes for parking garages.
- Created assembly manuals for future hardware assembly employees to use as reference.
- Developed basic raspberry pi skills.

Projects

Climate Model (Deep Learning): Link

Team Developer (Fall 2024)

- Developed a 3D U-Net convolutional neural network to predict global temperature and precipitation patterns based on worldwide spatiotemporal data for various climate indicator variables.
- Focused on optimizing model performance across different local loss metrics as well as a hidden Kaggle performance score through testing different model architectures, regularization techniques, and parameter tuning
- Wrote a detailed NeurIPS-style project analysis report to explain model architecture, analyze the strengths and weaknesses of different model iterations, and explain and interpret results.

Stock Market Prediction (Machine Learning): Link

Team Developer (Fall 2024)

- Developed a machine learning pipeline to predict stock market closing prices, using Polynomial Regression, Lasso & Ridge Regression, and Support Vector Regression.
- Focused on data preprocessing, hyperparameter optimization, and error/loss analysis to enhance model accuracy and efficiency
- Wrote a detailed project analysis to evaluate strengths and weaknesses, justify decision-making processes, and present insights from results analysis, effectively communicating the project's methodology and outcomes.

Developer Journal: Link

Backend Developer (Spring 2024)

- Designed and developed a progressive web application using JavaScript, HTML, and CSS to help software developers efficiently manage tasks, timelines, and notes.
- Implemented Agile methodology throughout the development process and built key features such as an integrated calendar, a priority-based task list, and a markdown journal, all within a user-friendly interface.
- Implemented automated end-to-end and unit testing using GitHub Actions to ensure the comprehensive functionality and reliability of the application.

Skills

- Programming Languages: Python, Java, C++, C, JavaScript, HTML, CSS, ARM Assembly
- Applied Skills: Git/GitHub Practices (incl. GitHub Actions Testing), End-to-end Testing, Unit Testing, Spring Boot Framework, Rest API Development, Database Management, Machine Learning and Deep Learning Models, Python ML Packages (PyTorch, Scikit-Learn), Computational Biology Packages (Cellpose, scVI, resolVI, CellCharter, CoNGA), Unix/Linux
- Soft Skills: Analytical problem solver, self-motivated learner, effective communicator, adaptable, time-efficient
- Other interests: Musical instruments (drums and piano), sports (soccer and volleyball), culinary science