Prannav Shankar

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Education

Duke University Durham, NC

Biomedical Engineering (B.S.E) and Computer Science (B.S) *August 2022 – May 2026*

- GPA: 3.828 (Dean's List with Distinction)
- Relevant Coursework: Linear Algebra, Multivariable Calculus, Differential Equations, Data Structures, Algorithms, Databases, Computer Architecture, Machine Learning, Generative AI for Protein Design, Data Science

Experience

Full-Stack SWE Intern Jun. 2025 – Present

MITRE *McLean, VA*

- Reworked Flask Blueprint endpoints to integrate the Keycloak API for user management, replacing SQLAlchemy with API calls featuring built-in cascade deletions and fail-safes against manually inserted corrupt data
- Developed and refactored Flask endpoints for user-assignment and modal dialogs, enabling AJAX-driven add/remove workflows, JSON data fetch, and dynamic rendering of colored group tags without full-page reloads
- Optimized modal performance by consolidating data fetches, parallelizing API calls for 3× faster load times, and using targeted jQuery DOM insertions to cut follow-up loads from 10 seconds to instant
- Built a dynamic AJAX-driven selector component with jQuery change listeners to filter lists based on user input and persist state in Flask session, fetching relevant information from Keycloak based on selection
- Migrated data tracking from Keycloak to PostgreSQL via SQLAlchemy and Alembic migrations, removing obsolete tables and adding attributes for cascade deletes
- Delivered client-facing demo and deployed updates across 30+ compute cores, supporting thousands of users; Wrote migration script to aid in deployment and preserve data in phased out Postgres tables

Machine Learning Engineer Sep. 2023 – Feb. 2025

Duke University (MIT CSAIL and Princeton) *Durham, NC*

- Integrated GASTON into GLACIER to generate directed acyclic graphs (DAGs) from spatial omics data
- Reduced KNN model creation runtime from $O(N^2)$ to $O(N)$; implemented accuracy evaluation across k-values
- Built command-line functionality in Velorama for DAG creation from high-dimensional datasets
- Developed tools to extract and summarize key analysis results from completed DAG runs

Projects

SAGEdiff | *PyTorch, Python, AlphaFold, UniProt, MMseqs2* Jan. 2025 – May 2025

- Built a discrete denoising diffusion transformer for species-conditioned protein sequence generation
- Used class-token conditioning and residue-level tokenization to capture species-specific constraints
- Trained models on curated UniProt datasets using masked cross-entropy loss and one-cycle LR scheduling
- Benchmarked against EvoDiff using Shannon Entropy, pLDDT, pTM, Edit Distance, and Jaccard Similarity
- Achieved higher sequence diversity and species clustering while maintaining comparable structural fidelity

GLACIER | *Python, Jupyter Notebooks* Jan. 2024 – Feb. 2025

- Built ML tools to extract features from spatial transcriptomics data and construct DAGs using Velorama
- Accelerated training using gradient clipping and learning rate scheduling
- Created tools for splicing ADATA and comparing results across runs for testing and evaluation
- Built functionality for analyzing ligand-receptor and gene–transcription factor interactions
- Research paper accepted to RECOMB-SEQ 2025

Perspectify | *Python, Django, HTML/CSS* Aug. 2023 – Sep. 2023

- Built full-stack web app using Django with frontend in HTML/CSS
- Used BeautifulSoup4 to scrape article text and passed content to OpenAI API for summarization
- Used OpenAI API to generate summaries and Google API to retrieve related articles
- Provided users with up to 10 diverse article links per topic for broader perspectives

Skills

Languages: Python, Java, C, SQL, JavaScript, HTML, CSS
Frameworks and Libraries: Flask, Django, SQLAlchemy, PyTorch, TensorFlow, Keras, Scikit-learn, AJAX, jQuery
Tools and Technologies: Git, Pandas, Numpy, Jupyter, SQLite, PostgreSQL