Chris Francis

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Education

University of California San Diego — **GPA: 4/4**
MS in Computer Science **(can start from January 2024)** — *Sep 2022 - Dec 2023*

Indian Institute of Technology Gandhinagar — **GPA: 9.77/10**
BTech in Computer Science and Engineering (Transcript, 3 Gold Medals, 2 Silver Medals) — *Jul 2018 - Jul 2022*

Technical Skills

Languages: Python, C, C++, Go, SQL, JavaScript, HTML, CSS, Dart, LaTeX, Bash
Tools: PyTorch, TensorFlow, AWS, OpenCV, Numpy, Jira, Git, Linux, Tableau, Flask, Node.js, React, MongoDB, Flutter

Experience

Graduate Student Researcher, Qualcomm Institute, UC San Diego — ***July - September 2023***
- Experimented with sequential deep learning models for generating music, using **PyTorch** and **OpenAI Jukebox**.
- Continuing the project to extract '**information rate**' from the models to be used in a **reinforcement learning** algorithm that can enable near real-time improvisation of musical pieces.

Research Intern, Caltech — ***May - July 2021***
- Developed machine learning models with **TensorFlow** to identify the species present in low-biomass metagenomic samples and achieved a **classification accuracy of around 81%**.

Research Intern, Indian Institute of Science (IISc), Bangalore — ***May - June 2020***
- Worked on data visualization and parameters for a data-driven partial differential equation based model of COVID-19 infections using **Python, Numpy, Pandas and Plotly**.
- Developed a webpage to display the results of the model using **JavaScript, HTML, and CSS**. The webpage included time-series plots using FusionCharts.js and choropleth maps using Leaflet.js.

Application Developer, InsIIT: An all-in-one app for IIT Gandhinagar students — ***May - June 2020***
- Developed the InsIIT App, using **Flutter**, under Students' Summer Online Projects (SSOP) 2020 at IIT Gandhinagar.
- Implemented the campus map feature using the **Google Maps and Sheets APIs** which enables users to search for, read about, and get directions to their desired location.

Projects

Solving Math Word Problems Using Language Models and Contrastive Loss — ***April - June 2023***
- Built PyTorch models with contrastive loss and semantic encoder models including **BERT**, **DistilBERT**, **Electra** and **RoBERTa** on the MathQA dataset (GitHub repository, report). Proposed a similarity measure NeuralSim and achieved accuracies of 74.6% and 76.7% on two tasks, an improvement by 0.4% and 0.5%.

Surfstore: A fault-tolerant, scalable, and distributed file storage application — ***February - March 2023***
- Developed a networked file storage application (based on Dropbox) in **Go** that lets users sync files to and from the cloud.
- Implemented the **RAFT protocol** to make it fault-tolerant and **consistent hashing** to make it scalable (GitHub repository).

SpiroMask: Measuring Lung Function Using Consumer-Grade Masks — ***August 2021 - April 2022***
- Developed a system for estimating lung-health parameters by employing machine learning and audio sensors fitted in consumer-grade N95 and cloth masks with an **error rate less than 5%**.
- Research paper accepted in **ACM Transactions on Computing for Healthcare** (doi).

Adaptive Candidate Assessment for Subjective Tests — ***August - November 2021***
- Developed a system for adaptive candidate assessment for subjective tests using natural language processing and machine learning with **PyTorch** (GitHub repository) and developed a demo web application using **Flask**.

Acad Search: A search engine to find professors in computer science — ***January - May 2021***
- Developed a search engine using **Python** and **Flask** that can cater to the needs of students looking for professors to approach for projects, internships, or jobs (GitHub repository).

Cross-Modal Learning for Fashion Image-Text Retrieval — ***January - May 2021***
- Implemented **cross-modal machine learning** methods like Siamese Networks, Correlational Networks, and Deep Cross-Modal Projection Learning in **PyTorch** for image-text retrieval in the fashion clothing domain (GitHub repository).

Relevant Coursework

Machine Learning, Natural Language Processing, Introduction to Data Science, Probability and Random Processes, Modeling and Simulation of Complex Systems, Probabilistic Reasoning and Decision Making, Convex Optimization, Web Mining and Recommender Systems, Search and Optimization, Introduction to Robotics, Databases, Computer Networks, Networked Systems, Operating Systems, Compilers, Computer Organization and Architecture, Theory of Computation