Sid Gupta

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Machine learning experience

BioAI Health Aug 2023 - Present
Machine Learning Engineer PyTorch · OpenCV · Pandas · NumPy Remote

- Engineer #3 at a cancer research startup for histopathology images. Designed and implemented features critical to attaining revenue & MVP. Working with everything from client, to product, to infrastructure
- **Infra:** Led the development of a unified machine learning platform from scratch; with sampling, model training, inference, evaluation, and experiment organization using tracked & versioned configuration files
- **Modeling:** Thoroughly explored unstructured and incomplete medical datasets. Iterated on 30+ machine learning models to predict cancer from histopathology images, and identify rare cancer biomarkers

PathAI Aug 2022 - Aug 2023
Machine Learning Engineer PyTorch · OpenCV · Pandas · MapReduce · NumPy Boston, MA

- Technical owner of a customer & client facing flagship AI product for cancer research (histopathology)
- **Modeling:** Engineered and tuned custom neural networks through 80+ experiments. Identified overfitting and complex failure modes using data visualization & quantitative metrics. Targeted failures through sampling new input distributions, applying augmentations, tuning loss coefficients, & active learning
- **Research:** Innovated a framework for quantifying model uncertainty using Monte Carlo dropout. Engineered a MapReduce system that generates uncertainty heatmaps 20x faster than the existing solution

University of Toronto May 2020 - Jan 2022
Machine Learning Research Assistant Tensorflow · PyTorch · OpenCV · Pandas Toronto, ON

- Published three papers in machine learning, computer vision, & medical imaging with open-source code
- **Clinical AI:** Built versatile machine learning systems for emulating clinical predictions on a new kind of rapid diagnostic test (RDT), applied for blood-typing and COVID-19. System first processes RDT images using OpenCV, then generates hand-crafted image features, and finally trains machine learning models
- **Medical imaging AI:** Implemented an interpretable CNN for heart failure prediction from cardiac MRI images, that learns and identifies key visual features indicative of heart disease.
- **Computer vision:** Developed a probabilistic algorithm for contour completion that improves edge detecton quality. Integrated this algorithm with image inpainting models, improving performance on state-of-the-art
- **Infra:** Coded ML pipelines from scratch, for data annotation, processing, experiments, & deployment

Personal projects

The Aphrodite Project (aphrodite.global) Sept 2020 - Present
Co-creator & Data Science Lead Docker · Scikit SDK · Pandas · Node · React Remote

- Co-engineered a web platform for students, where they can fill out a personality survey with 75 questions, and get matched with another student through a compatibility algorithm; **70,000+ users, 2 new marriages**
- Trained ML classifiers to predict relationship success, using data from a follow-up survey. Applied model interpretability algorithms (SHAP, boosting) to highlight what survey answers indicate relationship success
- **Leadership**: Led 4 volunteer data scientists on a variety of data science projects, including data reports, algorithm optimization, and algorithm bias evaluation

Knowtworthy (www.knowtworthy.com) Nov 2017 - Nov 2020
Co-creator JavaScript · MongoDB · Node · React Toronto, ON

- Co-founded and engineered the full-stack of a meetings productivity application from scratch, from ideation, to building web-pages & servers, testing features with 150+ users, deploying, & selling to paying customers

Engineering internships

Apple Jan 2020 - Apr 2020
Software Engineering Intern Typescript · GraphQL · SQL · Node · React Cupertino, CA

- Built a ticketing API service that reads errors from hardware devices, and assigns tasks to internal engineers. Implemented a 'ticket search' feature with GraphQL query and mutation endpoints to quickly find tickets

Intel San Jose, CA
Software Engineering Intern C++ · C · Make · Bash · FPGAs May 2019 - Dec 2019

- Built a C++ model that can track the speed of a hardware chip (number of clock cycles for completion), successfully integrated onto hardware after modifying Makefiles in a 15K+ line codebase compilation

Research papers

1. **S. Gupta**, A. Sklavounos, J. Dahmer, A. Yong,[... (6 co-authors)], A. Wheeler, A. Mariakakis
"Machine Learning to Automate the Visual Interpretation of Chemical Agglutination Tests"
ARDUOUS Workshop at IEEE PerCom 2022

2. M. Rezanejad*, **S. Gupta* (co-first author)**, [... (4 co-authors)], D.Walther
"Contour-guided Image Completion with Perceptual Grouping"
British Machine Vision 2021 Conference (BMVC 2021)

3. A. Sklavounos, J. Lamanna, D. Modi, **S. Gupta**, J. Callum, A. Mariakakis, A. Wheeler
"Digital Microfluidic Hemagglutination Assays for Blood Typing and Hematocrit Analysis"
American Association for Clinical Chemistry 2021 (AACC 2021)

Peer-reviewed abstracts

1. S. Nofallah, D. Sanghavi, **S. Gupta**, [...] et al.
"Deep learning models identify key tumor microenvironment features associated with genetic signatures of UV mutagenesis and alkylating agent treatment in melanoma"
Society for Immunotherapy of Cancer 2023 (SITC 2023)

2. C. Shen, [...], **S. Gupta (11th author)**, [...] et al
"Quantification of tumor infiltrating lymphocytes (TILs) from pathology slides reflects molecular immune phenotypes"
Society for Immunotherapy of Cancer 2023 (SITC 2023)

3. M. Rezanejad*, **S. Gupta* (co-first author)**, C. Gummaluru, R. Marten, J Wilder, D. Walther
"Object completion with stochastic completion fields predicts human behavior in recognizing degraded object drawings"
Vision Science Society 2021 (VSS 2021)

Education

University of Toronto · Computer Science Sept. 2017 – May 2022
Bachelor's of Science · 3.5 cGPA · High Distinction

Coursework – AI: Neural Networks · Probabilistic Learning · Computer Vision · Bioinformatics · NLP
Systems: Distributed Systems · Operating Systems · Computer Security · Algorithms · Databases

Teaching Assistant: Mathematics for Computer Science · Computer Science I · Computer Science II
Mentorship: Learning community peer mentor · UofT orientation volunteer · UofT-hacks volunteer

Awards: CS Research award ($5K) · Entrepreneurship Hatchery award ($10K)· CS Teaching award nomination