SOHAM GADGIL

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R E S E A R C H   I N T E R E S T S

Explainable AI, Generative Modeling, AI for Healthcare, Multi-modal foundation models

E D U C A T I O N

UNIVERSITY OF WASHINGTON   **Seattle, WA**
- Ph.D. in Computer Science and Engineering   Sept. 2022 - Present

STANFORD   **Stanford, CA**
- M.S. in Computer Science GPA: **4.056**   *Graduated: June 2021*
- Coursework: Deep Learning, Natural Language Processing, Computer Vision

GEORGIA INSTITUTE OF TECHNOLOGY   **Atlanta, GA**
- B.S. in Computer Engineering, Minor in CS GPA: **4.0 (Faculty Honors)**   *Graduated: May 2019*
- Selected in the China Summer Program (CSP) for study abroad in Summer 2016

P U B L I C A T I O N S

[P] Ensembling Sparse Autoencoders [Paper]
Soham Gadgil*, Chris Lin*, Su-In Lee
Under Review

[J] Transparency of medical artificial intelligence systems
Chanwoo Kim*, Soham Gadgil*, Su-In Lee
Nature Reviews Bioengineering 2025 (Accepted in principle)

[C] Transformer-based Time-Series Biomarker Discovery for COPD Diagnosis [Paper]
Soham Gadgil, Joshua Galanter, Mohammadreza Negahdar
NeurIPS 2024 Workshop on Time Series in the Age of Large Models

[C] Data Alignment for Zero-Shot Concept Generation in Dermatology AI [Paper]
Soham Gadgil*, Mahtab Bigverdi*
ICLR 2024 Workshop on Navigating and Addressing Data Problems for Foundation Model

[C] Discovering mechanisms underlying medical AI prediction of protected attributes [Paper]
Soham Gadgil*, Alex J. DeGrave*, Roxana Daneshjou, Su-In Lee
CVPR 2024 Workshop on Data Curation and Augmentation in Medical Imaging

[C] Estimating Conditional Mutual Information for Dynamic Feature Selection [Paper] [Code]
Soham Gadgil*, Ian Covert*, Su-In Lee
ICLR 2024

[J] Transparent medical image AI via an image-text foundation model grounded in medical literature [Paper] [Code]
Chanwoo Kim, Soham Gadgil, Alex J. DeGrave, Zhou Ran Cai, Roxana Daneshjou, Su-In Lee
Nature Medicine 2024

[C] Combining Expert Annotations with DNN-generated Saliency Maps for X-ray Segmentation [Paper] [Code]
Soham Gadgil*, Mark Endo*, Emily Wen*, Andrew Y. Ng, Pranav Rajpurkar
MIDL 2021

[C] Spatio-Temporal Graph Convolution for Functional MRI Analysis [Paper] [Code]
Soham Gadgil, Qingyu Zhao, Adolf Pfefferbaum, Edith V. Sullivan, Ehsan Adeli, Kilina M. Pohl
MICCAI 2020

[C] Solving The Lunar Lander Problem under Uncertainty using Reinforcement Learning [Paper] [Code]
Soham Gadgil, Yunfeng Xin, Chengzhe Xu
IEEE SoutheastCon 2020

*: equal contribution   [J]: journal, [C]: conference, [P]: preprint

W O R K   E X P E R I E N C E

Genentech – *Research Intern*   **June 2024 – Sep 2024**
- Utilized raw spirogram data to assess prognostic value for predicting exacerbations in COPD patients
- Developed a deep learning technique using a patch-based BERT-style transformer to extract features from volumetric blows and achieved SoTA across three clinical endpoints (*NeurIPS 2024 TSALM workshop*)

Microsoft – *Data Engineer*   **Jul 2021 – August 2022**
- Worked on a small, fast-paced team to provide automation tooling for Windows experience
- Served ~**1500** customers with a RESTful smart service to spin up secure cloud VMs for OS development
- Saved over **300** hours of developer time spent on setting up machines, access policies, and repo cloning

Microsoft – *Software Engineering Intern*   **June 2020 – Sep 2020**
- Worked in the Windows Toolkits team on an Azure hosted web portal to automate backporting bug fixes

- Developed a RESTful web API using .NET Core 3.1 with a Model-View-Controller (MVC) design pattern
- Automated web-app deployments using custom CI/CD pipelines and improved team productivity by **15%**

Microsoft – *Program Manager Intern*   **May 2019 – Aug 2019**
- Worked on the Windows Updates team to analyse telemetry data in the order of petabytes
- Designed and implemented quantifiable metrics to optimize release decisions for newer Windows builds
- New system reduced token utilization in compute resources by **10%**

Goldman Sachs – *Technology Analyst Intern*   **June 2018 – Aug 2018**
- Developed a backend application in Java to merge legal entities with metadata in over **100** tables
- Established a stream to collect, validate, and process data events by making REST compliant API calls

RESEARCH EXPERIENCE

Lee Lab of AI for bioMedical Sciences (AIMS) at UW – *Research Assistant*   **Sept 2022 - Present**
Advised by Dr. Su-In Lee
- Explainable AI
  - Developing ML methods to understand and interpret the complex behavior of large language models
  - Leveraging sparse-autoencoders and post-training techniques to learn sparse, monosemantic concepts from dense embeddings
- AI in Dermatology (In collaboration with Dr. Roxana Daneshjou from Stanford)
  - Developing unsupervised concept discovery techniques using sparse autoencoders for foundation models
  - Developed an image-text foundation model (MONET) to enhance the transparency of AI systems in medical imaging *(Nature Medicine 2024)*
  - MONET performs competitively with supervised methods for concept annotation tasks
  - Used counterfactual generative models to analyse AI-specific signals enabling classifiers to detect protected attributes with high performance *(CVPR 2024 DCAMI Workshop)*
- Dynamic Feature Selection for Emergency Medicine (In collaboration with Dr. Nathan White from UW Medicine)
  - Formulated DIME, a novel information-theoretic approach to estimate conditional mutual information
  - Network learns which features to collect for each patient for efficient and cost-effective diagnosis, enabling per-sample budgets and non-uniform feature costs *(ICLR 2024)*

Stanford Computational Neuroscience Lab (CNS^{LAB}) – *Research Assistant*   **Sept 2019 – March 2020**
Advised by Dr. Kilian Pohl
- Used deep learning techniques to perform sex classification from functional-MRI scans
- Formulated the non-stationary nature of functional connectivity within the context of spatio-temporal graphs
- The model beat previous approaches with an accuracy of **83.7%**, accepted into MICCAI 2020

Stanford Machine Learning Group (AI for Healthcare) – *Research Assistant*   **Sep 2020 – June 2021**
Advised by Dr. Andrew Ng and Dr. Pranav Rajpurkar
- Developed CheXseg, a semi-supervised method for multi-pathology segmentation
- CheXseg leverages expert annotations and saliency maps generated by image classification models
- Compared to weak supervision, CheXseg reduces the mIoU gap with radiologists by **71.6%**

TEACHING

School of Computer Science and Engineering at University of Washington   **Jan 2021 – June 2021**
- Introduction to AI (CSE 473): TA for undergraduate course with ~150 students

School of Computer Science at Stanford   **Jan 2021 – June 2021**
- Trustworthy ML (CS 329T): TA for a new course being offered for the first time with ~50 students

School of Mathematics and ECE at Georgia Tech   **Aug 2017 – May 2019**
- Math 1554 - Linear Algebra: Taught two 50-minute recitations each week (Aug 2017 – Dec 2017)
- ECE 3056 - Computer Architecture, Concurrency, and Energy in Computation (Jan 2018 – Dec 2018)
- ECE 2035 - Programming for hardware and software systems (Jan 2017 – May 2017)

HONORS & AWARDS

- Best paper runner-up award at CVPR 2024 DCAMI Workshop
- Accepted into the ORS (Opportunity Research Scholars) program for undergraduate research at Georgia Tech
- Recipient of the Electrical and Computer Engineering (ECE) Senior award for highest academic average
- Part of the team that developed and first offered the Trustworthy Machine Learning (CS 329T) course at Stanford

SKILLS

- **Languages:** Python, Java, C++, C#, MATLAB, T-SQL, PL/SQL, HTML, CSS, JavaScript
- **Frameworks:** PyTorch, NumPy, Pandas, Scikit-Learn, Hugging Face, Tensorflow
- **Workload Manager:** Slurm