Last Updated: March 27, 2025

Pranav Kulkarni

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EDUCATION

Starting Aug 2025	**Ph.D. in Computer Science** University of Maryland, College Park	• Advised by Heng Huang.
Aug 2018 – May 2022	**B.S. in Computer Science** **B.S. in Mathematics** University of Maryland, College Park	• Received two B.S. diplomas for completing double degree requirements.

PROFESSIONAL EXPERIENCE

Apr 2024 – Present	**Bioinformatics Software Engineer I** University of Maryland Institute for Health Computing (UM-IHC), North Bethesda, MD Institute for Genome Sciences, University of Maryland School of Medicine, Baltimore, MD	• Building an interdisciplinary, cross-institutional medical imaging AI research group to foster extramural partnerships. • Developing web-based informatics tool for biomedical data analysis and visualization.
Aug 2022 – Apr 2024	**Bioinformatics Software Engineer I** University of Maryland Medical Intelligent Imaging (UM2ii) Center, University of Maryland School of Medicine, Baltimore, MD	• Advised by Vishwa Parekh and Paul Yi. • Developed novel techniques for medical image analysis in federated learning, data curation, and adversarial bias attacks.
Aug 2021 – Dec 2021	**Undergraduate Student Researcher** Department of Computer Science, University of Maryland, College Park, MD	• Capstone Research in Machine Learning advised by Tom Goldstein. • Explored adversarial attacks on Grover, a language model for detecting AI-generated fake news, using fast gradient sign method.
Jan 2021 – May 2022	**Head Teaching Assistant** Department of Computer Science, University of Maryland, College Park, MD	• Mentored by Anwar Mamat. • Restructured course materials for a hybrid classroom during COVID-19 and managed TAs. • Held weekly recitations, exam reviews, and one-on-one office hours for students.
Sep 2019 – Mar 2020	**MATLAB Tutor** Department of Mathematics, University of Maryland, College Park, MD	• Provided one-on-one tutoring to students in MATLAB programming, tailored to their course and proficiency.
Aug 2018 – Dec 2019	**Undergraduate Student Researcher** The First-Year Innovation and Research Experience (FIRE), University of Maryland, College Park, MD	• Advised by Müge Karagöz. • Explored unsupervised probabilistic models to reconstruct path of particles splitting into their constituents.

RESEARCH INTERESTS

My research is primarily focused on the intersection of machine learning, computer vision, and medical imaging, with the goal of improving healthcare outcomes. My current research interests include: (1) **Multi-modal models** that integrate imaging, clinical, and multi-omics data to enable opportunistic screening for early-stage disease detection. (2) **Federated learning** techniques to leverage distributed, heterogeneous data in a privacy-preserving way and reduce the burden of medical image annotation. (3) **Trustworthy and explainable AI** to adapt to distribution shifts over time (e.g., through continual learning) and mitigate algorithmic bias. Beyond my primary research interests, I have ongoing collaborations with clinicians in translational research to bring cutting-edge AI research from bench to bedside.

JOURNAL PUBLICATIONS AND CONFERENCE PROCEEDINGS

I have (first/co-) authored 7-(1/6) journal publications, 7-(3/4) conference papers, and 22-(7/15) conference abstracts and short papers. My work has been featured in top conferences (e.g., CVPR, MIDL, and ML4H) and journals (e.g., Radiology).

**** Co-first author. # Corresponding author***

Peer-Reviewed Journal Publications

1. Kavandi, H., **Kulkarni, P.**, Garin, S. P., Bachina, P., Parekh, V. S., & Yi, P. H.[#] (2024). Radiomics-Based Prediction of Demographics on Chest Radiographs: Looking Beyond Deep Learning for Risk of Bias. *American Journal of Roentgenology*, 224(2), e2431963. doi: 10.2214/AJR.24.31963 — Paper
2. Kamel, P.[#], Khalid, M., Steger, R., Kanhere, A., **Kulkarni, P.**, Parekh, V. S., Yi, P. H., Bodanapally, U., & Gandhi, D. (2024). Dual Energy CT for Deep Learning-Based Segmentation and Volumetric Estimation of Early Ischemic Infarcts. *Journal of Imaging Informatics in Medicine*. doi: 10.1007/s10278-024-01294-5 — Online First • Paper
3. Chatterjee, D.*, Kanhere, A.*, Doo, F. X., Zhao, J., Chan, A., Welsh, A., **Kulkarni, P.**, Trang, A., Parekh, V. S., & Yi, P. H.[#] (2024) Children Are Not Small Adults: Addressing Limited Generalizability of an Adult Deep Learning Organ Segmentation Model to the Pediatric Population. *Journal of Imaging Informatics in Medicine*. doi: 10.1007/s10278-024-01273-w — Online First • Paper • Code
4. Kamel, P.[#], Kanhere, A., **Kulkarni, P.**, Kahlid, M., Steger, R., Bodanapally, U., Gandhi, D., Parekh, V. S., & Yi, P. H. (2024). Optimizing Acute Stroke Segmentation on MRI using Deep Learning: Self-configuring Neural Networks Provide High Performance using only DWI Sequences. *Journal of Imaging Informatics in Medicine*. doi: 10.1007/s10278-024-00994-2 — Online First • Paper
5. **Kulkarni, P.**, Kanhere, A., Siegel, E., Yi, P. H., & Parekh, V. S.[#] (2024). ISLE: An Intelligent Streaming Framework for High-Throughput AI Inference in Medical Imaging. *Journal of Imaging Informatics in Medicine*, 37(6), 3250-3263. doi: 10.1007/s10278-024-01173-z — Paper • Code
6. Doo, F. X.[#], **Kulkarni, P.**, Siegel, E., Toland, M., Yi, P. H., Carlos, R. C., & Parekh, V. S. (2024). Economic and environmental costs of cloud for medical imaging and radiology artificial intelligence. *Journal of the American College of Radiology*, 21(2), 248-256. doi: 10.1016/j.jacr.2023.11.011 — Paper
7. Bachina, P., Garin, S. P., **Kulkarni, P.**, Kanhere, A., Sulam, J., Parekh, V. S., & Yi, P. H.[#] (2023). Coarse Race and Ethnicity Labels Mask Granular Underdiagnosis Disparities in Deep Learning Models for Chest Radiograph Diagnosis. *Radiology*, 309(2), e231693. doi: 10.1148/radiol.231693 — Paper • Code

Peer-Reviewed Conference Proceedings

1. **Kulkarni, P.**, Kanhere, A., Siegel, E., Yi, P. H., & Parekh, V. S.[#] (2025). Towards Resource-Efficient Streaming of Large-Scale Medical Image Datasets for Deep Learning. *Medical Imaging with Deep Learning (MIDL)*. — Paper • Code
2. Shah, N., **Kulkarni, P.**, Doo, F. X., Li, A., Jacobs, M. A., & Parekh, V. S.[#] (2025). Federated Class-Heterogeneous Report Labeling with Surgical Aggregation. *Medical Imaging with Deep Learning (MIDL)*. — Paper • Code
3. Doo, F. X., Shah, N., **Kulkarni, P.**, Parekh, V. S., & Huang, H.[#] (2025). Negotiative Alignment: An interactive approach to human-AI co-adaptation. *ICLR Workshop on Bidirectional Human-AI Alignment*. — Tiny Paper
4. **Kulkarni, P.**, Kanhere, A., Yi, P. H., & Parekh, V. S.[#] (2024). From Isolation to Collaboration: Federated Class-Heterogeneous Learning for Chest X-Ray Classification. *AHLI Machine Learning for Health Symposium (ML4H)* (pp. 623-635). — Paper • Code
5. Chan, S., **Kulkarni, P.**, Yi, P. H., & Parekh, V. S.[#] (2024). Expanding the Horizon: Enabling Hybrid Quantum Transfer Learning for Long-Tailed Chest X-Ray Classification. *IEEE International Conference on Quantum Computing and Engineering (QCE)* (pp. 572-582). doi: 10.1109/QCE60285.2024.00073 — **Spotlight Talk** • Paper • Code
6. **Kulkarni, P.**, Chan, A., Navarathna, N., Chan, S., Yi, P. H., & Parekh, V. S.[#] (2024). Hidden in Plain Sight: Undetectable Adversarial Bias Attacks on Vulnerable Patient Populations. *Medical Imaging with Deep Learning (MIDL)* (pp. 793-821). — **Spotlight Talk** • Paper • Code
   - Acknowledged as the second **Most Reproducible Paper**
7. Kanhere, A., **Kulkarni, P.**, Yi, P. H., & Parekh, V. S.[#] (2024). Privacy-Preserving Collaboration for Multi-Organ Segmentation via Federated Learning from Sites with Partial Labels. *CVPR Workshop on Data Curation and Augmentation in Medical Imaging (CVPR DCA-in-MI)* (pp. 2380-2387). doi: 10.1109/CVPRW63382.2024.00244 — Paper • Code
   - Received the **Best Poster Award**

Book Chapters

1. Parekh, V. S.[#], **Kulkarni, P.**, Kanhere, A., & Jacobs, M. A. (2025). Expanding the Federated Horizon: Cross-Domain Techniques for Collective Intelligence. *Federated Learning for Medical Imaging* (pp. 57-68). The MICCAI Society Book Series. doi: 10.1016/B978-0-44-323641-9.00014-5 — Chapter

Review Articles

1. Yi, P. H.[#], Bachina, P., Bharti, B., Garin, S. P., Kanhere, A., **Kulkarni, P.**, Li, D., Parekh, V. S., Santomartino, S. M., Moy, L., & Sulam, J. (2025). Pitfalls and Best Practices in Evaluation of Algorithmic Biases in Radiology. *Radiology*. In Press

Preprints

1. **Kulkarni, P.**, Kanhere, A., Yi, P. H., & Parekh, V. S. (2023). Text2Cohort: Facilitating Intuitive Access to Biomedical Data with Natural Language Cohort Discovery. *arXiv preprint arXiv:2305.07637*.
2. **Kulkarni, P.**, Kanhere, A., Yi, P. H., & Parekh, V. S. (2023). Optimizing Federated Learning for Medical Image Classification on Distributed Non-IID Datasets with Partial Labels. *arXiv preprint arXiv:2303.06180*.
3. Ji, Z., **Kulkarni, P.**, Neskovic, M., Nolan, K., & Xu, Y. (2022). Exploring Semantic Perturbations on Grover. arXiv preprint arXiv:2302.00509.

INVENTIONS, PATENTS, AND COPYRIGHTS

1. Parekh, V. S., **Kulkarni, P.**, Kanhere, A., Yi, P. H., & Siegel, E. Systems and Methods for High-Throughput Analysis for Graphical Data. International Patent Application No. WO/2024/233969 – Published November 14, 2024.

PRESENTATIONS, ABSTRACTS, AND NON-ARCHIVAL PAPERS

**** Presenting author***

1. Shams, S.*, Maldarelli, M., Kshetry, P., **Kulkarni, P.**, Mahurkar, A., Ennett, C., Maron, B. A., & Zeder, K. (2025). Extraction of right heart catheterization data from an electronic health record by large language modeling is highly accurate with implications for pulmonary hypertension research. *European Respiratory Society Congress*.
2. **Kulkarni, P.***, Kanhere, A., Kukreja, H., Zhang, V., Yi, P. H., & Parekh, V. S. (2024). Improving Multi-Center Generalizability of GAN-Based Fat Suppression using Federated Learning. *Medical Imaging with Deep Learning*. Short Paper
3. **Kulkarni, P.***, Kanhere, A., Savani, D., Chan, A., Chatterjee, D., Yi, P. H., & Parekh, V. S. (2024). Anytime, Anywhere, Anyone: Investigating the Feasibility of Segment Anything Model for Crowd-Sourcing Medical Image Annotations. *Medical Imaging with Deep Learning*. Short Paper
4. Zhao, J.*, Kanhere, A., **Kulkarni, P.**, Chatterjee, D., Parekh, V. S., & Yi, P. H. (2024). Using Deep Learning to Predict Knee Osteoarthritis. *University of Maryland Undergraduate Research Day*.
5. Kamel, P.*, Khalid, M., Steger, R., Kanhere, A., **Kulkarni, P.**, Parekh, V. S., Yi, P. H, Bodanapally, U., & Gandhi, D. (2024). Is Dual-Energy CT Better for Deep Learning-Based Detection and Segmentation of Early Ischemic Infarcts on CT? *American Society of Neuroradiology Annual Meeting*.
6. Kamel, P.*, Kanhere, A., **Kulkarni, P.**, Khalid, M., Steger, R., Bodanapally, U., Gandhi, D., Parekh, V. S., & Yi, P. H. (2024). Assessing the Generalizability of Acute Stroke Segmentation using a Self-Configuring Neural Network Trained on Public Data. *American Society of Neuroradiology Annual Meeting*. **Spotlight Talk**
7. Kamel, P.*, Khalid, M., Steger, R., Kanhere, A., **Kulkarni, P.**, Parekh, V. S., Yi, P. H., Bodanapally, U., & Gandhi, D. (2024). Cross-Modality Stroke Segmentation using Deep Convolutional Neural Networks for Detection of Acute Ischemic Infarcts on Non-Contrast Head CT. *American Society of Neuroradiology Annual Meeting*.
8. **Kulkarni, P.***, Hafey, C., Siegel, E., Yi, P. H., & Parekh, V. S. (2024). Medical Images On-Demand: Intelligent Streaming of Medical Images for High-Throughput AI Inference. *Society for Imaging Informatics in Medicine Annual Meeting*. **Spotlight Talk** Abstract
9. Chan, A.*, **Kulkarni P.**, Garin, S., Parekh, V. S., & Yi, P. H. (2024). More pixels, more bias? Comparing fairness of chest x-ray deep learning models trained with image vs. pixel-level annotations. *Society for Imaging Informatics in Medicine Annual Meeting*. **Spotlight Talk** Abstract
10. Navarathna, N.*, Chatterjee, D., Chan, A., **Kulkarni, P.**, Kanhere, A., Parekh, V. S., & Yi, P. H. (2024). From Download to ML: Challenges in Directly Using the MIDRC Dataset for Machine Learning and Enhancing its Usability. *Society for Imaging Informatics in Medicine Annual Meeting*. **Spotlight Talk** Abstract
11. Chan, S.*, **Kulkarni, P.**, Navarathna, N., Murphy, Z., Venkatesh, K., Sulam, J., Parekh, V. S., & Yi, P. H. (2024). Vision Transformers are More Robust to Real-World Medical Image Variations than Convolutional Neural Networks. *Society for Imaging Informatics in Medicine Annual Meeting*. Abstract

12. Kim, J.*, **Kulkarni, P.**, Welsh, A., Garin, S., Chatterjee, D., Kanhere, A., Parekh, V. S, & Yi, P. H. (2023). Sex Bias in Pediatric Deep Learning Chest Radiograph Classifier Model. *University of Maryland Medical Student Research Day*. **Spotlight Talk**
13. Kavandi, H.*, **Kulkarni, P.**, Garin, S., Bachina, P., Parekh, V. S., & Yi, P. H. (2023). Risk of Bias in Chest X-Ray Radiomics Models: Looking Beyond Neural Networks. *Radiological Society of North America Scientific Assembly and Annual Meeting*. **Spotlight Talk**
14. Kamel, P.*, Kanhere, A., **Kulkarni, P.**, Khalid, M., Steger, R., Bodanapally, U., Gandhi, D., Parekh, V. S., & Yi, P. H. (2023). Quantifying the Technical Challenges and DICOM Metadata Variability in Stroke Machine Learning Data Curation. *Radiological Society of North America Scientific Assembly and Annual Meeting*. **Spotlight Talk**
15. **Kulkarni, P.***, Kanhere, A., Yi, P. H., & Parekh, V. S. (2023). From Isolation to Collaboration: Harmonizing Heterogeneous Medical Imaging Datasets with Partial Annotations. *Conference on Machine Intelligence in Medical Imaging*. **Spotlight Talk** Abstract
16. Bachina, P.*, Garin, S., **Kulkarni, P.**, Kanhere, A., Sulam, J., Parekh, V. S., & Yi, P. H. (2023). Coarse Race and Ethnicity Labels Mask Granular Underdiagnosis Disparities in Deep Learning Models for Chest Radiograph Diagnosis. *Conference on Machine Intelligence in Medical Imaging*. **Spotlight Talk** Abstract
17. **Kulkarni, P.***, Kanhere, A., Siegel, E., Yi, P. H., & Parekh, V. S. (2023). One Copy Is All You Need: Resource-Efficient Streaming of Medical Imaging Data at Scale. *Conference on Machine Intelligence in Medical Imaging*. Abstract
18. **Kulkarni, P.***, Kanhere, A., Yi, P. H., & Parekh, V. S. (2023). Text2Cohort: Democratizing the NCI Imaging Data Commons with Natural Language Cohort Discovery. *Conference on Machine Intelligence in Medical Imaging*.
19. Kanhere, A.*, **Kulkarni, P.**, Yi, P. H., & Parekh, V. S. (2023). SegViz: A Federated Learning Framework to Train Multi-task Segmentation Models from Partially Annotated and Distributed Datasets. *Conference on Machine Intelligence in Medical Imaging*.
20. Bachina, P.*, Garin, S., **Kulkarni, P.**, Kanhere, A., Kargilis, D., Parekh, V. S., & Yi, P. H. (2023). Not So Black and White: Confounders Mediate AI Prediction of Race on Chest X-Rays. *Machine Learning for Healthcare 2023*.
21. Kamel, P.*, Kanhere, A., **Kulkarni, P.**, Parekh, V. S., & Yi, P. H. (2023). Optimizing Acute Stroke Segmentation: Do Additional Sequences Matter for Deep Learning Algorithms? *Society for Imaging Informatics in Medicine Annual Meeting*.
22. **Kulkarni, P.***, Kanhere, A., Yi, P. H., & Parekh, V. S. (2022). From Competition to Collaboration: Making Toy Datasets on Kaggle Clinically Useful for Chest X-Ray Diagnosis Using Federated Learning. *Medical Imaging meets NeurIPS Workshop*. Short Paper

GRANTS

Active Grants

Jul 2024 – Jun 2027 **(Key Personnel, 20%)** Subcontract PI: Vishwa S. Parekh
"Enabling Intuitive Access to Biomedical Data with Natural Language Queries"
ARPA-H Biomedical Data Fabric Toolbox
Total Direct Costs: $384,140

Completed Grants

Apr 2023 – Dec 2023 **(Key Personnel)** PIs: Vishwa S. Parekh, Paul H. Yi
"Amazon Experimental Credits"
Total Direct Costs: $9,998 (AWS Credits)

Oct 2022 – Sep 2023 **(Key Personnel)** PI: Vishwa S. Parekh
"CheXViz: A collaborative learning medical imaging platform for chest x-ray diagnosis"
Total Direct Costs: $5,000 (GCP Credits)

RELEVANT COURSEWORK AND SKILLS

Computational Coursework	Geometric Computer Vision (*Graduate-Level*), Computer Vision, Deep Learning, Machine Learning, Artificial Intelligence, Algorithms, Data Structures, Data Science, Functional Programming, Object-Oriented Programming
Mathematics Coursework	Linear Algebra, Multivariate Calculus, Advanced Calculus, Differential Equations, Partial Differential Equations, Fourier Transforms, Statistical Analysis
Technical Skills	Python, TensorFlow, PyTorch, Git, Linux, C/C++, C#, Java, MATLAB, SQL
Other Skills	Data Visualization, Data Analysis, Scientific Writing, Public Speaking

TEACHING

Organization of Programming Languages (CMSC 330)
Head Teaching Assistant
University of Maryland, College Park
Spring 2021, Fall 2021, Spring 2022

- Planned and restructured course materials for a hybrid classroom during COVID-19 and managed >50 TAs.
- Held weekly recitations, exam review sessions, and one-on-one office hours with students.

Object-Oriented Programming II (CMSC 132)
Teaching Assistant
University of Maryland, College Park
Summer 2021

- Held virtual office hours and weekly recitations due to COVID-19 and graded exams/assignments.

MATLAB Tutor
University of Maryland, College Park
Fall 2019, Spring 2020

- Provided one-on-one tutoring to students in MATLAB programming, tailored to their course and proficiency.

MENTORING

2025	**Jason Uwaeze**, Ph.D. Student	Rice University
2023 – 2024	**Andrew Chan**, Research Assistant	University of Maryland Medical Intelligent Imaging (UM2ii) Center, University of Maryland School of Medicine
2023 – 2024	**Nithya Navarathna**, Research Program Coordinator	University of Maryland Medical Intelligent Imaging (UM2ii) Center, University of Maryland School of Medicine
2023 – 2024	**Skylar Chan**, Research Assistant	University of Maryland Medical Intelligent Imaging (UM2ii) Center, University of Maryland School of Medicine
2023 – 2025	**Jake Kim**, Medical Student	University of Maryland School of Medicine
2023 – 2024	**Devina Chatterjee**, Medical Student	University of Maryland School of Medicine
2023 – 2024	**Annie Trang**, Medical Student	University of Maryland School of Medicine
2023 – 2024	**Alexander Welsh**, Medical Student	University of Maryland School of Medicine
2023	**Niket Patel**, Medical Student	Drexel University
2023	**Sam Santomartino**, Medical Student	Drexel University
2023	**Jerry Zhao**, Undergraduate Student	University of Maryland, College Park
2023	**Noam Fox**, Undergraduate Student	University of Maryland, College Park
2022 – 2023	**Daniel Kargilis**, Medical Student	Johns Hopkins University
2021 – 2022	**Aasritha Sanikommu**, Undergraduate Student *Iribe Initiative for Inclusion and Diversity in Computing (I4C)*	University of Maryland, College Park

RECOGNITION

Awards and Honors

2025 – 2026	Dean's Fellowship	Department of Computer Science, University of Maryland, College Park
2024	Best Poster Award	CVPR Workshop on DCA-in-MI
2021 – 2022	OMSE Academic Excellence Award	Office of Multi-Ethnic Student Education, University of Maryland, College Park
2019	FIRE Summer Fellowship	The First-Year Innovation and Research Experience Program, University of Maryland, College Park

2019	125 Mile E-Bike Challenge Preliminary Design Competition Award	A. James Clark School of Engineering, University of Maryland, College Park
2018 – 2022	Semester Academic Honors (Dean's List)	Department of Computer Science, University of Maryland, College Park

SERVICES AND LEADERSHIP

Leadership Activities

2019 – 2022	President	CompuTerps	Student Organization
2019	Committee Member	Student (Under)graduate Directing Organization	Student Organization

Journal and Conference Peer-Review Activities

2025	Medical Image Computing and Computer Assisted Intervention (MICCAI)
2025	AHLI Conference on Health, Inference, and Learning (CHIL) – 2 papers
2025	Medical Imaging with Deep Learning (MIDL) – 2 papers
2023	Frontiers in Medicine – 1 paper