PULKIT KHANDELWAL

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EDUCATION

PhD in Bioengineering, University of Pennsylvania, Philadelphia 2019-25
Committee: Paul A. Yushkevich (advisor), David A. Wolk, Jianbo Shi, Bruce Fischl, Lea T. Grinberg
Certificate in: Social, Cognitive and Affective Neuroscience
MSc. in Computer Science, McGill University, Montréal 2016-19
Thesis supervisors: Kaleem Siddiqi, Louis Collins
BTech. in Electronics and Communication Engineering, VIT University, Vellore 2012-16

RESEARCH INTERESTS

neuroimaging, neurodegenerative diseases, postmortem imaging, deep learning, computational anatomy

INDUSTRY AND ACADEMIC RESEARCH EXPERIENCE

Postdoctoral Fellow, Department of Radiology, University of Pennsylvania (Philadelphia, PA) May 2025 - Present
Research Intern, Google (Mountain View, CA) Sept 2022 - April 2023
Applied Scientist Intern, Amazon (Palo Alto, CA) May 2022 - Aug 2022
Computer Vision Intern, Imagia Cybernetics (Montréal, Canada) May 2018 - Aug 2018
Machine Learning Intern, Planet Labs (San Francisco, CA) Aug 2017 - Dec 2017
PhD candidate, Penn Image Computing and Science Laboratory (Philadelphia, PA) Aug 2019 - May 2025
MSc student, Shape Analysis Group, McGill University (Montréal, Canada) Oct 2016 - Aug 2019
Summer intern, Centre for Advanced Imaging, University of Queensland (Brisbane, Australia) Dec 2015 - Feb 2016
Summer intern, University of Saskatchewan (Saskatchewan, Canada) June 2015 - Aug 2015

JOURNAL AND REFEREED CONFERENCE PROCEEDINGS

- **Pulkit Khandelwal** et al., VIOLET: A framework for combined Volumetric Image registration via Optimization and Learning for Efficient image Translation. SASHIMI Workshop, MICCAI 2025
- **Pulkit Khandelwal** et al., Automated deep learning segmentation of high-resolution 7 tesla postmortem MRI for quantitative analysis of structure-pathology correlations in neurodegenerative diseases. Imaging Neuroscience, May 2024
- **Pulkit Khandelwal** et al., Surface-based parcellation and vertex-wise analysis of ultra high-resolution ex vivo 7 tesla MRI in neurodegenerative diseases. MLCN Workshop, MICCAI 2024
- **Pulkit Khandelwal**, and Paul A. Yushkevich. Domain Generalizer: A Few-shot Meta Learning Framework for Domain Generalization in Medical Imaging. DART Workshop, MICCAI 2020
- **Pulkit Khandelwal**, D. Louis Collins, Kaleem Siddiqi. Spine and Individual Vertebrae Segmentation in Computed Tomography Images using Geometric Flows and Shape Priors. Frontiers in Computer Science 2021
- Zimmerman, Carrie E.***, **Pulkit Khandelwal***** et al. Automatic Segmentation of Bone Selective MR Images for Visualization and Craniometry of the Cranial Vault. Academic Radiology (2021). [*** co-first authors]
- Villavisanis D.F.***, **Khandelwal P.***, et al. Developing a Craniofacial Soft Tissue Anthropomorphic Database with Magnetic Resonance Imaging and Unbiased Diffeomorphic Registration. Plastic and Reconstructive Surgery 2023.
- Michael Tran Duong***, Sandhitsu R. Das***, **Pulkit Khandelwal***** et al. Image-to-Image Translation Between Tau Pathology and Neuronal Metabolism PET in Alzheimer Disease with Multi-domain Contrastive Learning. Machine Learning in Clinical Neuroimaging, MICCAI 2023. [*** co-first authors, Best paper award]
- Ahmed H. Aly, **Pulkit Khandelwal**, et al. Fully Automated 3D Segmentation and Diffeomorphic Medial Modeling of the Left Ventricle Mitral Valve Complex in Ischemic Mitral Regurgitation, Medical Image Analysis (MedIA) 2022
- Long Xie, Laura E.M. Wisse, Jiancong Wang, Sadhana Ravikumar, **Pulkit Khandelwal**, et al. Deep Label Fusion: A Generalizable Hybrid Multi-Atlas and Deep Convolutional Neural Network for Medical Image Segmentation, MedIA 2023
- Sadaghiani S, Trotman W, Lim SA, Chung E, Ittyerah R, Ravikumar S, **Khandelwal P.**, et al. Associations of phosphorylated tau pathology with whole-hemisphere ex vivo morphometry in 7 tesla MRI. Alzheimer's and Dementia 2022
- Ravikumar S, Itttyerah R, Lim S, Xie L, Das S, **Khandelwal P.**, et al. Improved Segmentation of Deep Sulci in Cortical Gray Matter Using a Deep Learning Framework Incorporating Laplace's Equation. IPMI 2023
- Mark E., Christopher, Mingfang, Stephen R., **Pulkit Khandelwal**. Benchmarking Human Performance in Semiautomated Image Segmentation. Interacting with Computers Oxford University 2020

- Taghvaei, Mohammad ; Cook, Phillip; Sadaghiani, Shokufeh; Shakibajahromi, Banafsheh; Tackett, William; Dolui, Sudipto; De, Debarun; Brown, Christopher; **Khandelwal, Pulkit**. et al. Young versus Older Subject Diffusion MRI Data for Virtual White Matter Lesion Tractography? Human Brain Mapping 2023
- Mohammad Taghvaei, Dawn J. Mechanic-Hamilton, Shokufeh Sadaghiani, Banafsheh Shakibajahromi, Sudipto Dolui, Sandhitsu Das, Christopher Brown, William Tackett, **Pulkit Khandelwal** et al. Impact of white matter hyperintensities on structural connectivity and cognition in cognitively intact ADNI subjects. Neurobiology of Aging 2023
- Amanda E. Denning Li, ..., **Pulkit Khandelwal** et al., Association of quantitative histopathology measurements with antemortem medial temporal lobe cortical thickness in the Alzheimer's Disease continuum, Acta Neuropathologica 2024
- Mohammad Taghvaei, ..., **Pulkit Khandelwal** et al., Regional Cerebral Blood Flow Reflects Effects of Neurodegeneration and Microvascular Integrity Across the Alzheimer's Continuum. Neurobiology of Aging 2024.
- Chinmayee Athalye, Alejandra Bahena, **Pulkit Khandelwal** et al., Operationalizing Postmortem Pathology-MRI Association Studies in ADRD with MRI-guided Histology Sampling. Acta Neuropathologica Communications 2025
- Yue Li, Long Xie, **Pulkit Khandelwal** et al., Automatic segmentation of medial temporal lobe subregions in multi-scanner, multi-modality MRI of variable quality. Hippocampus 2025

PEER-REVIEWED ABSTRACTS

- **Pulkit Khandelwal**, et al. High-resolution postmortem 7 tesla MRI yields localized atrophy measures that are more sensitive to tau pathology and neuronal loss in Alzheimer's disease than corresponding measures on antemortem 3 tesla MRI. Alzheimer's Association International Conference (AAIC) 2025
- **Pulkit Khandelwal**, et al. Segmentation and registration of within-subject 7 tesla ex vivo and 3 tesla in situ MRI to increase sensitivity of imaging biomarkers. AAIC 2025
- Yue Li, **Pulkit Khandelwal**, et al. Segmentation of medial temporal lobe subregions in a nearly isotropic space using T2-weighted MRI with anisotropic resolution. AAIC 2025
- Zahra Khodakarami, **Pulkit Khandelwal**, et al. Assessing white matter hyperintensities on matched antemortem and postmortem MRI. AAIC 2025
- **Pulkit Khandelwal**, et al. High-resolution 7 tesla postmortem MRI for quantitative analysis of structure-pathology correlations in neurodegenerative diseases. AAIC 2024
- Chinmayee Athalye, **Pulkit Khandelwal**, et al. Operationalizing postmortem pathology-MRI association studies in ADRD with MRI-guided histology sampling: does closer proximity lead to stronger associations? AAIC 2024
- Paul A Yushkevich, ..., **Pulkit Khandelwal**, et al. Insights into LATE from postmortem imaging AAIC 2024
- Long Xie, ..., **Pulkit Khandelwal**, et al. Spatial Pattern of Medial Temporal Lobe Cross-Sectional and Longitudinal Structural Change in Cognitively Normal Individuals AAIC 2024
- Xueying Lyu, **Pulkit Khandelwal**, et al. tau-neurodegeneration mismatch from inter-modality image translation using deep learning. AAIC 2024
- **Pulkit Khandelwal**, et al. Deep learning pipeline for cortical GM segmentation and thickness analysis in Ultra High Resolution T2w 7T Ex vivo MRI across neurodegenerative diseases reveals associations with underlying neuropathology. AAIC 2022
- **Pulkit Khandelwal**, et al. Deep Learning for Ultra High Resolution T2-weighted 7 Tesla Ex vivo MRI Reveals Differential Subcortical Atrophy across Neurodegenerative Diseases. AAIC 2022
- Shakibajahromi, Banafsheh, Sudipto Dolui, Christopher Brown, William Tackett, **Pulkit Khandelwal**, et al. Periventricular White Matter Fractional Anisotropy as a Biomarker of Cerebral Small Vessel Disease P11-6.007, 2023.
- Mohammad Taghvaei, Philip Cook, **Pulkit Khandelwal**, et al. Mechanisms of Cognitive Decline due to White Matter Lesions in Cognitively Intact Older Adults. AAIC 2022
- Sadaghiani, S., Dolui, S., **Khandelwal, P.**, et al. Associations between cortical microinfarcts, hippocampal atrophy, and cerebral small vessel disease. AAIC 2022
- **Pulkit Khandelwal**, et al. Gray Matter Segmentation in Ultra High Resolution 7 Tesla ex vivo T2w MRI of Human Brain Hemispheres. Organization for human brain mapping (OHBM) 2022
- **Pulkit Khandelwal**, et al. Image to image translation for cortical segmentation in 7 Tesla T2w ex vivo human brain MRI. Organization for human brain mapping (OHBM) 2022
- **Pulkit Khandelwal**, et al. Longitudinal Network Connectivity Measurements in Medial Temporal Lobe Subregions Discriminate Preclinical Alzheimer's Disease Patients from Amyloid-β Negative Controls. AAIC 2020
- Villavisanis Dillan, **Pulkit Khandelwal**, et al. Craniofacial Soft Tissue Anthropomorphic Database: MRI-Based Diffeomorphic Algorithmic Approach. The International Society of Craniofacial Surgery 2021
- Zachary D. Zapatero, **Pulkit Khandelwal**, et al. Generation of a Craniofacial Soft Tissue Anthropomorphic Database: Pilot Study. Plastic Surgery The Meeting 2021

- **Pulkit Khandelwal**, C. E. Zimmerman, et al. Automated Segmentation of the Human Cranial Vault with Bone-Selective MRI as an alternative to radiative CT for Craniofacial Imaging. European Society for Magnetic Resonance in Medicine and Biology (ESMRMB) 2020 [Lightning Talk Poster]
- Carrie E Zimmerman, **Pulkit Khandelwal**, et al. Bone-Selective MRI As a Nonradiative Alternative to CT for Cranial Vault Imaging: Concordance and Implementation of an Automated Segmentation Pipeline for Timely Image Processing. Plastic Surgery the Meeting 2020
- **Pulkit Khandelwal**, Carrie E. Zimmerman, et al. Automated Segmentation of Human Skull to plan Craniofacial Surgery using dual-Radiofrequency dual-Echo, 3D Ultrashort Echo Time MRI sequence. International Society of Magnetic Resonance in Medicine (ISMRM), Paris, France 2020

REVIEWER DUTIES

- Medical Image Analysis
- IEEE Transactions on Biomedical Engineering
- IEEE Transactions on Medical Engineering
- Computer Vision and Pattern Recognition (CVPR) 2025
- European Conference on Computer Vision (ECCV) 2024
- Medical Image Computing and Computer Assisted Intervention Society (MICCAI) 2020, 2021, 2022, 2023, 2024
- Medical Imaging with Deep Learning (MIDL) 2022
- Domain Adaptation and Representation Transfer (DART) Workshop at MICCAI 2021 (Program committee)
- CVPR workshop on Data Curation and Augmentation in Medical Imaging 2024
- Medical Imaging meets NeurIPS 2021 (Program committee)
- NeurIPS workshop on Machine Learning and the Physical Sciences 2021, 2023
- Organization of Human Brain Mapping (OHBM) 2020, 2021, 2024
- International Journal of Computer Assisted Radiology and Surgery
- Journal of Applied Clinical Medical Physics
- International Conference on Information Processing in Computer-Assisted Interventions (IPCAI) 2024
- International Symposium on Biomedical Imaging (ISBI) 2024, 2025
- Area Chair, ICML Workshop AI4Science 2024
- Associate Editor, Frontiers in Neuroscience

TEACHING

- Guest lecturer: Research Practicum in Cognitive Neuroscience [COGS 1770]
- Guest lecturer: graduate course on Biomedical Image Analysis (BE/CIS 5370), UPenn [2022, 2023, 2024] **Recordings**
- Teaching assistant at the University of Pennsylvania:
  - Machine Learning [CIS 520]: Fall 2019
  - Biomedical Image Analysis [CIS/BE 537]: Fall 2020, Fall 2021
  - Machine Learning [PHY 359]: Spring 2021
- Teaching assistant at McGill University:
  - Introduction to Computer Vision [COMP 558]: Fall 2018
  - Practical Machine Learning [YCBS 258]: Summer 2019
  - Introduction to Software Systems [COMP 206]: Fall 2016, Winter 2017, Winter 2018 and Winter 2019
  - Introduction to Computer Systems [COMP 273]: Winter 2019
- Certificate in Teaching and Learning at the University of Pennsylvania **Link**

MENTORSHIP AND OUTREACH

- RISE-MICCAI board member (journal club coordinator) [2025-present]
- Undergraduate students (UPenn): Elyse Migdal, Grace Choi, Emily Kopp, Bridget Loja, Eusha Hasan, Jiacheng Li
- Masters student (UPenn): Jacob Platin, Constanza Fuentes
- PhD student (UPenn): Xueying Lyu
- Research assistant (UPenn): Amanda Denning, Eunice Chung, Lisa Levorse
- High schools students: Nathaniel Gauthier, Ved Shenoy, Aadit Bontha, Jahmosi Joslyn
- UPenn Bioengineering Applicant-Support Program (Fall 2020, 2023): assisted to applicants from under-served or under-represented communities in the PhD admissions process
- Skype-a-Scientist at Berlin Bilingual School, Germany

TALKS

- Alzheimer's Imaging Consortium (AIC), Alzheimer's Association International Conference [July 2025]
- Martinos Center at Massachusetts General Hospital, Harvard Medical School [June 2025]
- Lightning talk at the MICCAI MLCN Workshop, Marrakesh, Morocco [October 2024]
- Oral talk at the BigBrain Workshop, Padua, Italy [September 2024]
- Featured Research Session, Alzheimer's Association International Conference [July 2024]
- 17th Annual Sridhar R. Charagundla Lecturer, Pendergrass Symposium, UPenn [June 2024]
- Penn Three Minute Thesis (Finalist), UPenn [March 2024]
- Department of Computer Science, Bucknell University, Lewisburg, PA [September 2023]
- IEEE Summer School BIO-X on Data Science and Engineering in Medicine and Biology, Chania, Greece [June 2023]
- Health AI, Google Research [April 2023]
- Bioengineering Graduate Symposium, UPenn [April 2023]
- Social, Cognitive and Affective Neuroscience Annual Retreat [March 2023]
- Center for Biomedical Image Computing and Analytics Seminar, UPenn [March 2022]
- Bioengineering Graduate Group Research Symposium, UPenn [Jan 2021]
- Pendergrass Symposium, Department of Radiology, UPenn [June 2020]
- Medical Image Computing and Computer Assisted Interventions [Oct 2020]
- The European Society for Magnetic Resonance in Medicine and Biology [2020]
- Centre for Advanced Imaging, University of Queensland [2016]

AWARDS

- Alzheimer's AAIC travel fellowship [2024, 2025]
- NeuroDataReHack, HHMI Janelia Research Campus travel award [July 2024]
- 17th Annual Sridhar R. Charagundla Lecturer, UPenn [June 2024]
- Harvey Nisenbaum Award ($500), UPenn [June 2024]
- GAPSA Individual Research Travel Grant ($800, $1200) [2024, 2025]
- Winner of the MICCAI Educational Challenge ($500) [October 2023]
- Bucknell University PUI faculty workshop travel award [September 2023]
- IEEE Summer School BIO-X on Data Science and Engineering in Medicine and Biology NSF travel award [June 2023]
- Penn Engineering Outstanding Teaching Award [May 2023]
- Outstanding Reviewer (Honorable Mention) [MICCAI 2022]
- Magna cum laude distinction at the Pendergrass Symposium, Department of Radiology, UPenn [June 2020]
- NSERC CREATE-MIA, Graduate Fellowship [2016-19]
- Mitacs Globalink Graduate Fellowship, Graduate Fellowship ($15,000) [2016-17]
- University of Queensland Summer Research Program, Internship Scholarship ($3,000) [2015]
- Mitacs Globalink Research Internship, Internship Scholarship ($7,500) [2015]

SOFTWARE

- Reinforcement Learning Jupyter Notebooks (>**1000 stars**) **GitHub Link**
- purple-mri: Penn Utilities for Registration and ParcelLation of Ex vivo MRI **GitHub Link**
- Few-shot Meta Learning Framework for Domain Generalization in Medical Imaging **GitHub Link**
- Python Interface for Open Street Maps Queries **GitHub Link** and **Blog**
- PyTorch ecosystem: Kornia **Link**
- Level-set segmentation demos and code **Link**

SKILLS

Languages	Python, C, C++, R, Bash
Tools and Packages	Matlab, Mathetmatica, git, ITK, VTK, FreeSurfer, Slicer, Paraview, Inkscape, docker
Libraries	scikit-learn, vlfeat, PIL, OpenCV, nltk, geoPandas, PyTorch, Tensorflow, Keras

RELEVANT GRADUATE COURSEWORK

Network Neuroscience, Theoretical Neuroscience, Systems Neuroscience, Advanced Image Applications, Social, Affective and Cognitive Neuroscience, Advanced Linear Algebra and Optimization, Differential Geometry, Shape Analysis, Computer Vision, Statistical Computer Vision, Advanced Medical Imaging, Deep Learning, Natural Language Processing, Reinforcement Learning, Applied Machine Learning.

MEDIA

- Podcast guest at **Abstract: The Future of Science**. Listen **here**
- Science communication: Penn Science Policy and Diplomacy Group **here**