PULKIT KHANDELWAL

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EDUCATION

PhD in Biomedical Image Analysis, University of Pennsylvania, Philadelphia   Expected 2025
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

- network neuroscience, medical image analysis, neuroimaging
- computational anatomy, computer vision, deep learning

INDUSTRY AND ACADEMIC RESEARCH EXPERIENCE

Research Intern, Google   (Mountain View, CA) Sept 2022 - present
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 - present
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**, 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
- **Pulkit Khandelwal** et al., Automated deep learning segmentation of high-resolution 7 Tesla ex vivo MRI for quantitative analysis of structure-pathology correlations in neurodegenerative diseases. [Under review]
- 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. [In press]
- 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. [Accepted at 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? [Under review]
- 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 [In preparation]

PEER-REVIEWED ABSTRACTS

- **Pulkit Khandelwal**, et al. Deep learning pipeline for cortical gray matter segmentation and thickness analysis in Ultra High Resolution T2w 7 Tesla Ex vivo MRI across neurodegenerative diseases reveals associations with underlying neuropathology. Alzheimer's Association International Conference (AAIC) 2022
- **Pulkit Khandelwal**, et al. Deep Learning for Ultra High Resolution T2-weighted 7 Tesla Ex vivo Magnetic Resonance Imaging Reveals Differential Subcortical Atrophy across Neurodegenerative Diseases. Alzheimer's Association International Conference (AAIC) 2022
- Mohammad Taghvaei, Philip Cook, **Pulkit Khandelwal**, et al. Mechanisms of Cognitive Decline due to White Matter Lesions in Cognitively Intact Older Adults. Alzheimer's Association International Conference (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. Alzheimer's Association International Conference (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
- **P. Khandelwal**, M. Barth, S. Bollmann. Performance evaluation for automated segmentation of Hippocampus Subfields: Preliminary Results using FreeSurfer and ASHS. European Society for Magnetic Resonance in Medicine and Biology (ESMRMB), Vienna, Austria, September 2016 [Lightning Talk Poster]

REVIEWER DUTIES

- Medical Image Analysis
- IEEE Transactions on Biomedical Engineering
- Medical Image Computing and Computer Assisted Intervention Society (MICCAI) 2020, 2021, 2022
- Medical Imaging with Deep Learning (MIDL) 2022
- Domain Adaptation and Representation Transfer (DART) Workshop at MICCAI 2021 (Program committee)
- Medical Imaging meets NeurIPS 2021 (Program committee)
- NeurIPS workshop on Machine Learning and the Physical Sciences 2021
- Organization of Human Brain Mapping (OHBM) 2020, 2021
- International Journal of Computer Assisted Radiology and Surgery
- Journal of Applied Clinical Medical Physics

TEACHING

- 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**
- Tutorials and presentations at the PICSL weekly meeting at UPenn on topics related to medical image analysis [2019-present]

TALKS

- Guest lecturer for graduate course on Biomedical Image Analysis, UPenn [Dec 2022] **Recordings: Day 1** and **Day 2**
- 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]
- Lightning talk for Product Engineering team, Planet Labs, San Francisco [2017]
- Centre for Advanced Imaging, University of Queensland [2016]

MENTORSHIP

- Elyse Migdal: undergraduate student, UPenn
- Grace Choi: undergraduate student, UPenn
- Emily Kopp: undergraduate student, UPenn
- Bridget Loja: undergraduate student, UPenn
- Eusha Hasan: undergraduate student, UPenn
- Jiacheng Li: undergraduate student, UPenn
- Amanda Denning: research assistant, UPenn
- Eunice Chung: research assistant, UPenn
- Jacob Platin: Masters student, UPenn
- Xueying Lyu: PhD student, UPenn

AWARDS

- School of Engineering and Applied Science, Graduate Fellowship ($\sim$\$75,000 per year) [Aug 2019-present]
- NSERC CREATE-MIA, Graduate Fellowship (\$41,000) [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**
- 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**

EXTRA-CURRICULAR INTERESTS

Book-binding, rare books and manuscripts, independent movies, classical music, literature and poetry, coffee nerd