Qinyang Shou

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Education

University of Southern California, Los Angeles, CA
Ph.D., Biomedical Engineering, August 2019-September 2024(expected)
Shanghai Jiao Tong University, Shanghai, China
B.S., Biomedical Engineering, September 2015 - July 2019

Awards & Honors

2020 ISMRM Summa Cum Laude Merit Award
2023 Grodins Biomedical Engineering Research Symposium 2nd Place in Imaging Session

Research Experience

Lab of functional MRI technology (LOFT), USC

1. Accelerated Imaging and Super-resolution
   - Develop a super-resolution technique using the Slice Dithered Enhanced Resolution (SLIDER) technique for simultaneous multislice (SMS) arterial spin labeling (ASL). (2019-2021)
   - Accelerated acquisition of multi-delay ASL with time dependent CAIPI pattern with total generalized variation (TGV) based reconstruction. (2021-2023)

2. Deep learning applications in medical imaging
   - Develop a CNN based segmentation model for penumbra segmentation using ASL image for ischemic stroke patients. (2018-2020)
   - Develop a flexible deep learning framework for single and multi-delay ASL with pseudo 3D Swin Transformer. (2022-2024)
   - Adapt the transfer learning technique to apply the pretrained model to the high-resolution multi-delay ASL dataset with k-space weighted average (KWIA) based supervision. (2023-present)

3. Generative model development with diffusion model
   - Develop a diffusion model for M0 generation for existed public dataset (Alzheimer's Disease Neuroimage Initiative, ADNI). (2023-present)

4. MRI sequence development and data analysis
   - Optimized the background suppression pulse for the 3D GRASE ASL for optimized imaging of human spinal cord. (2021-2022)
   - Regional analysis of water permeability using diffusion-prepared pseudo-continuous arterial spin labeling (DP-pCASL) across a large range of age group. (2021-2023)

Internship

Subtle Medical Inc.

- Develop on a knowledge distillation-based model compression technique for accelerated deep learning-based image denoising and super-resolution (2022 Summer, poster presented at ISMRM 2023)

Journal Publications

1. Wang K, **Shou Q**, Ma SJ, Liebeskind D, Qiao XJ, Saver J, Salamon N, Kim H, Yu Y, Xie Y, Zaharchuk G. Deep learning detection of penumbral tissue on arterial spin labeling in stroke. Stroke. 2020 Feb;51(2):489-97.

2. **Shou Q**, Shao X, Wang DJ. Super-Resolution Arterial Spin Labeling Using Slice-Dithered Enhanced Resolution and Simultaneous Multi-Slice Acquisition. Frontiers in Neuroscience. 2021 Oct 29;15:737525.
3. Shao X, Guo F, **Shou Q**, Wang K, Jann L, Yan L, Toga AW, Zhang P, Wang DJJ, Laminar perfusion imaging with zoomed arterial spin labeling at 7 Tesla, Neuroimage, Volume 245, 2021
4. Wang K, Ma SJ, Shao X, Zhao C, **Shou Q**, Yan L, Wang DJ. Optimization of pseudo-continuous arterial spin labeling at 7T with parallel transmission B1 shimming. Magnetic resonance in medicine. 2022 Jan;87(1):249-62.
5. Shao X, Zhao C, **Shou Q**, St Lawrence KS, Wang DJ. Quantification of blood–brain barrier water exchange and permeability with multidelay diffusion-weighted pseudo-continuous arterial spin labeling. Magnetic Resonance in Medicine. 2023 May;89(5):1990-2004.
6. Zhao C, Shao X, **Shou Q**, Ma SJ, Gokyar S, Graf C, Stollberger R, Wang DJ. Whole-Cerebrum distortion-free three-dimensional pseudo-Continuous Arterial Spin Labeling at 7T. NeuroImage. 2023 Jun 24:120251.
7. **Shou Q**, Zhao C, Shao X, Jann K, Kim H, Helmer KG, Lu H, Wang DJ. Transformer-based deep learning denoising of single and multi-delay 3D arterial spin labeling. Magnetic resonance in medicine. 2024 Feb;91(2):803-18.
8. Shao X, **Shou Q**, Felix K, Ojogho B, Jiang X, Gold BT, Herting M, Goldwaser EL, Kochunov P, Hong E, Pappas I. Age-Related Decline in BBB Function is More Pronounced in Males than Females. bioRxiv. 2024:2024-01.
9. Shao X, Guo F, Kim J, Ress D, Zhao C, **Shou Q**, Jann K, Wang DJ. Laminar multi-contrast fMRI at 7T allows differentiation of neuronal excitation and inhibition underlying positive and negative BOLD responses. medRxiv. 2024:2024-04.

Conference Presentations

1. Poster session, Denoising single and multi-delay 3D pCASL using SWIN Transformer. ISMRM 2023
2. Poster session, Knowledge Distillation Enables Efficient Neural Network for Better Generalizability in MR Image Denoising and Super Resolution. ISMRM 2023
3. Poster session, Total Generalized Variation (TGV) Constrained Reconstruction Improves Test-retest Reliability of High-Resolution 3D pCASL in Children. ISMRM 2023
3. Oral session, Measuring Spinal Cord Blood Flow with Multi-delay Arterial Spin Labeling (pCASL). ISMRM 2022
4. Poster session, Age Dependent Changes of Water Exchange Rate in Blood Brain Barrier (BBB) Assessed by Diffusion-Prepared Arterial Spinal Labeling. ISMRM 2022
5. Poster session, Arterial Spin Labeling Denoising with Convolutional Neural Network and Convolutional Long-Short-Term-Memory (ConvLSTM). ISMRM 2021
6. Poster session, Optimization and Evaluation of Super-Resolution SMS ASL with Slice-Dithered Enhanced Resolution (SLIDER) technique. ISMRM 2021
7. Oral session, Super Resolution Multi-band ASL using Slice Dithered Enhanced Resolution (SLIDER) Technique. ISMRM 2020

Skills

Programming Languages: C++, Matlab, Python, Latex
Deep Learning tools: TensorFlow, Keras, Pytorch
MRI brain image study tools: Freesurfer, FSL, AFNI