Tianrui (Ray) Luo

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EDUCATION

University of Michigan, Ann Arbor, MI. USA

Ph.D. Candidate in Biomedical Engineering, *Medical Imaging*	Sep. 2020 (Anticipated)
M.Sc. Electrical and Computer Engineering, *Signal Processing and Machine Learning*	May. 2015
M.Sc. Biomedical Engineering, *Medical Imaging*	May. 2015

Beihang University (BUAA), Beijing, China

B.Sc. Biomedical Engineering	Jun. 2013

SKILLS

- Computational Imaging, Numerical Optimization, Machine Learning, Linear Algebra.
- MATLAB; C, (LAPACK); Python, (PyTorch, Tensorflow); Julia.

THESIS PROJECT

Real-Time Non-Cartesian MR Image Reconstruction Available On

- Proposed a non-iterative (fast) image reconstruction algorithm for non-Cartesian MRI.
- Optimized performance by implementing algorithm bottlenecks in C, using the LAPACK library.
- Implemented iterative reconstruction method with different regularizations for performance comparisons.
- Used kd-tree for efficient data indexing.

OTHER PROJECTS

Image Stitching Course Project

- Used Harris feature detector to find geometrically distinguished regions in photos.
- Extracted SIFT features at such regions from groups of photos to be stitched together.
- Computed inter-image pairwise feature similarities for finding potential matches of regions across photos.
- Used RANSAC algorithm to compute affine transforms for stiching (under holography assumption).

Neural Network Based Image Style Transfer Course Project

- Used a pre-trained SqueezeNet for extracting image features as style descriptors.
- Implemented combined loss (feature similarity/data consistency/total variation) for image style transfer.

VGG based CIFAR10 classification Course Project

- Implemented VGG11 using `PyTorch` for image classification on the CIFAR10 dataset.

Siamese Network Based Face Verification Course Project

- Used shallow CNN structures for extracting face feature descriptors.
- Implemented Siamese architecture with contrastive loss for face identification from extracted features.

Text Sentiment Classification Course Project

- Implemented RNN/LSTM based NN for processing sentences and determining their sentiments.

Photometric Stereo Course Project

- Used light source directions and pixel intensities to compute object albedo map, and surface normal vectors.
- Converted normal vectors to directional derivatives for restoring object stereo via numerical integration.

Julia based MRI Simulation Package Available on

- Encapsulated physics simulation tools in OOP manner for API unification and extensibility.

PUBLICATIONS

A GRAPPA algorithm for arbitrary 2D/3D non-Cartesian sampling trajectories with rapid calibration	*MRM 19*
3D Inner volume imaging with 3D tailored outer volume suppression RF pulses	*ISMRM 19*
A fast and general non-Cartesian GRAPPA reconstruction method	*ISMRM 18*
Improved aliasing suppression in steady-state, parallel imaging using inner volume excitation	*ISMRM 16*
Inflow velocity density mapping using fourier analysis of velocity selective ASL images	*ISMRM 15*