Weijie Gan

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RESEARCH INTERESTS

Computational Imaging, Medical Imaging and Machine Learning.

EDUCATION

Washington University in St. Louis, St. Louis, MO   Aug. 2018 – Expected May. 2020
M.S. Student in Computer Science
GPA: 3.61/4.0
Thesis: *Toward Practical Learning-Based Image Reconstruction Methods*
Award: **Master's Fellowship** in the lab of Ulugbek Kamilov & 2019 Fall **Engineering School Tuition Scholarship**
Advisor: Prof. Ulugbek Kamilov

South China University of Technology, Guangzhou, China   Aug. 2014 – May. 2018
B.Eng. in Automation
GPA: 3.53/4.0
Minor: B.Business in Administration
Award: **University Annual Third Prize Scholarship** (2015 & 2016)

RESEARCH EXPERIENCE

Graduate Research Assistant   Aug. 2018 – Present
Computational Imaging Group, Washington University in St. Louis

- *Deep Learning 4D MR Reconstruction from Sparsely Data Without Ground Truth (Manuscript to U.S. Patent & Radiology)*

  – Proposed an novel deep learning approach by directly learning artifact-free 4D motion-resolved MR images from noisy MR data plagued by streaking artifacts, without the need of ground truth.
  – Obtained high-quality and artifacts-free images in real data from both WashU Capture and Siemens's Body Compress reconstruction machines.

- *Multi-Scale of Deep CNN for Unsupervised Image Denoising*

  – Proposed an novel unsupervised image denoising algorithm using only single corrupted images by capturing information from different scale and intensity in training and inference.
  – Obtained closed-perform result(< 0.5 dB in PSNR) by much shorter running time, compared with traditional unsupervised method, such as BM3D.

- *Iterative-Based Dynamic Fast MR Image Reconstruction Algorithm(Manuscript to)*

  – Proposed an impressive iterative method in real MRI reconstruction. Outperformed current state-of-art algorithm.

Undergraduate Research Assistant   Aug. 2017 – May. 2018
Machine Vision Lab, South China University of Technology

- *Video Super-Resolution Reconstruction*

  – Proposed two methods to enhance the resolution of videos. GitHub: bit.ly/2q7v9rW.
  – Multi-Frame method was based on Max Posteriors Estimation (MAP) with total variation minimum and sparse representation restrictions. It has an average 2dB improvement over the common bi-cubic method on the PSNR(way to estimate quality of recovered image).
  – Deep-learning method was fulfilled by three-layer Convolutional Neural Network, which has about 4dB improvement in PSNR.

Summer Research Intern May. 2017 – Aug. 2017
Robotic Vision Lab, South China University of Technology
- *Simultaneous Localization and Mapping(SLAM) of Indoor Robotic*
    - Provided an initial code for SLAM system in a robot. Implemented visual odometry, which estimated changes of robot's attitude by two nearby video frames captured by RGB-D camera. The algorithm performed well on open dataset.

PROJECT

- **Algorithm Implementation of Image-to-Image GAN-based Methods**: Implemented two high cited Image-to-Image task algorithm, Cycle-GAN and Pixel-to-Pixel-GAN, by Tensorflow and compared their performance. Found Cycle-GAN have closed performance even without paired dataset. GitHub: bit.ly/321jyrV.
- **Learning of Unrolled Optimization Network**: Implemented image reconstruction network interpreted as finite optimization iteration steps(unrolled) and compared it with general iterative method. Found that unrolled method outperformed general method in some cases. GitHub: bit.ly/2NqiRTD.
- **Track Microtubule in Medical Scan Video**: Proposed method with practical GUI tool to detect and track single microtubule movement in scan video. The tools also record the growth of target microtubule during video. It works perfectly in low/median dynamic microtubule perfectly. GitHub: bit.ly/36kOKWv.
- **Group-Based Sparse Representation for Image Denoising**: Proposed an novel image denoising algorithm, by supposing sparsity in each non-local-similarity group of single corrupted image. The method achieve good performance in different noise level. GitHub: bit.ly/32WbauZ.

"Boeing Dream Moon" Electronic Design Competition, Guangzhou, China May. 2017
Third Prize of the Senior Group
- Designed a small auto-run car can recognize track and printed word in paper by BP neural network. Took charge of designing the PC host system and network algorithms code by MATLAB. The algorithm have high accuracy(>90%) in recognition.

The 11st National "NXP Cup" Smart Car Race Competition for College Students, China May.2015 – Aug. 2016
Second Prize of South China University of Technology Division & Third Prize of the Southern China Division
- Designed a an auto-run smart car, which could recognize a pure white road with black borders by a specifics camera(Linear CCD) captured only one-row data(single dimension). Took charge of device drivers and track-recognition algorithm based on the signal detection of two black borders in track. Video Record: bit.ly/2NpDY8L.

Indoor Positioning System Based on Bluetooth Apr. 2016 – Sep. 2017
Company-University-Cooperated Project
- Built up embedded system can locate children's position with Bluetooth Received Signal Strength Indicator(RSSI) of Bluetooth. Duties included both software and hardware design. Positioning accuracy is about 1m. Deployed devices in two offline kindergarten in Shenzhen, China.

APPLICABLE COURSEWORK

- *Sparse Modeling for Imaging and Vision*
- *Introduction to Machine Learning*
- *Geometric Computing for Biomedicine*
- *Computer Vision*
- *Optimization*
- *Analysis of Imaging Data*
- *Advances in Computer Vision*
- *Convex Optimization*

SKILL

Programming Languages: Python(proficient), C/C++, Matlab. **Technologies**: AWS, GitHub.
Python-Libraries: TensorFlow, PyTorch, Keras, Scikit-Learn, Numpy, Pandas, Jupyter, OpenCV, PIL.