Chaowei Wu

Curriculum Vitae

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Education

2015.9– Present **B.S.E in Biomedical Engineering, Shanghai Jiao Tong University**.
- *Overall GPA - 3.57/4, Junior Year - 3.74/4.*

Research Interest

My research interest lies in Biomedical Imaging, especially in Magnetic Resonance Imaging (MRI). In particular, I am interested in image reconstruction and post-processing. Also open to sequence design or image analysis.

Research Experience

2018.1– Present **New Strategy for Super-resolution in Magnetic Resonance Imaging**.
Advisor: Prof. Zhi-Pei Liang, Beckman Institute, University of Illinois, Urbana Champaign
- Established a unique pipeline to super-resolution image reconstruction using machine learning:
  - Leveraged the power of deep learning to give a nice initial estimation of the high-resolution image given the limited low-resolution image
  - Extracted and recovered novel features which existed in practical patient images, based on k-space residual and sparsity limitation
  - Utilized optimization model based on data consistency to eliminate artifacts coming along with high-resolution images generated by neural network and gave final prediction
- Evaluated by Shanghai Jiao Tong University and given an A (Top 5%)

2016.10– 2017.7 **Multi-modal Imaging Classification using Machine-learning Algorithm in First-episode Schizophrenia**.
Advisor: Prof. Yao Li, BME, Shanghai Jiao Tong University
- Established a method to distinguish the health and first-episode schizophrenia (SZ) patients given multi-modal MRI data (fMRI, DTI, T1):
  - Exploited t-test analysis after data processing using FSL and other toolkits
  - Utilized Sparse Coding algorithms to screen out potential features among various biomarkers
  - Implemented Random Forest algorithms to estimate the potential relationship among selected features to reach an ideal group discriminating performance
- Proposed multimodal classification method had 81.2% accuracy with 92.5% sensitivity and 66.7% specificity for SZ diagnosis
- This project received an A (Top rank of the program); the full manuscript has been published in Tenth International Conference on Digital Image Processing (ICDIP 2018)

2017.7– 2018.12 **Research of Brain Microstructure Alterations for Upper-limb Amputees**.
Advisor: Prof. Xiaoli Guo, BME, Shanghai Jiao Tong University
- Analyzed white matter microstructure alterations after upper-limb amputation given DTI images
  - Found significant lower Fractional Anisotropy (FA) and other significant different indices in subregions of corpus callosum (CC) in patients with residual limb pain
  - Implemented Probabilistic Diffusion Tractography (PDT) and found similar changes in corresponding transcallosal tracts
  - Indicated interhemispheric pathways contributing to pain sensation; chronic pain were reorganized in upper limb amputees
- Paper in preparation; Plan to submit to journal shortly

2016.11–2017.11 **A Universal Multifactorial Visualized Detection System**.
Advisor: Dr. Lin He & Prof. Gang Ma, Bio-X, Shanghai Jiao Tong University

- Transformed genetically engineered escherichia coli into a visualized monitor:
  - Detected multiple metal ions at the same time, displaying the concentration as a combination of colors
  - Achieved quantitative measurement by building models and developing APP
- Vice leader of the research team; Orally presented it and got a gold medal in the International Genetically Engineered Machine (iGEM) Competition (top-level international competition in synthetic biology). More details available here.

Course Project

2017.9–2018.1 **Evaluation of the Effect of Blood Vessel Position and RF Power in Tumor Ablation Simulation**.
Course: Bio Heat Transfer

- Established a RF tumor ablation model on finite element model software COMSOL Multiphysics
- Explored the effect of blood vessel position and RF power in temperature distribution and necrosis tissue fraction distribution
- Got the **highest** score of the class in project report

Publications

1. H. Zhuang, Y. Li, R. Liu, **C. Wu**, and M. Liu, "Multimodal Analysis of Structural and Functional MRI for Schizophrenia Diagnosis", in *Tenth International Conference on Digital Image Processing (ICDIP 2018)*, 2018, p. 6.
2. H. Zhuang, Y. Li, R. Liu, **C. Wu**, Z. Meng, D. Wang, D. Liu, M. Liu, "Multimodal Classification of Drug-naive First-episode Schizophrenia Patients Combining Structural and Functional Magnetic Resonance Imaging", *Neuroscience Letters*, under review
3. X. Guo, R. Liu, J. Lu, **C. Wu**, Y. Lyu, Z. Wang, J. Xiang, C. Pan, S. Tong, "Alternations of Brain Structural Connectivity after Unilateral Upper-limb Amputation", *IEEE Transactions on Biomedical Engineering (TBME)*, under review

Skills

OS Linux, Windows

Programming Matlab, C, C++, Python (Tensorflow, VTK, Opencv), LaTeX

Awards and Scholarships

2018 Rong Chang Innovation Scholarship ($5000, Top 1%)

2017 National Encouragement Scholarship ($1000, Top 5%)

2016,2017 Academic Excellence Scholarship

2017 Gold Medal in 2017 International Genetically Engineered Machine Competition

2017 Merit Student of Shanghai Jiao Tong University (Top 5%)

2017 Third Prize in the National Mathematical Modeling Contest

Miscellaneous

Activity Vice Minister of the Academic Department, Student Union of Biomedical Engineering School

Choir Music Core Member of SJTU Choir, 1st Prize in 5th National University Art Performance Competition, 2018

Martial Art 2nd Prize in Martial Art, Shanghai University Sports League, 2016