Yaoshen Yuan

Co-op/Internship, May-Aug 2020

Senior PhD candidate with skills in programming, GPU acceleration, image processing and data analysis. Professional experience includes interdisciplinary collaboration with doctors, real-world problem solving and public presentation. Other interests includes deep learning and machine learning.

Education

2016-now **Northeastern University**
PhD, Electrical and Computer Engineering GPA: 3.86/4.0
Courses: Numerical Optimization, Numerical Analysis, Computer Vision, Graph Theory, Biomedical Optics.

2014-2016 **Tufts University**
Master of Engineering, Electrical and Computer Engineering GPA: 3.7/4.0
Courses: Image Processing, Signal Processing, Probability, Stochastic Process, Linear Algebra, Algorithm, Data structure, Intro to Machine Learning.

2010-2014 **Southeast University, China**
Bachelor of Engineering, Automation GPA: 3.3/4.0
Courses: Advanced Mathematics, Automation and Control, Visual C++ Programming, Analog Circuit Design, Digital Circuit Design, Microcomputer Systems.

Experience

PhD Research Assistant, Northeastern University

2018-now
Implicit mesh-based Monte Carlo (MMC) light modeling algorithm.
- Devised an innovative algorithm using implicit shapes-edge, node and face-in tetrahedral meshes to represent complex tissue structures such as vessels.
- Reduced the mesh memory of complex vessel networks by over 200-fold.
- Achieved 20% speed improvement compared to conventional MMC method.
- Accelerated implicit Monte Carlo method by hundreds fold by using GPU.

2018-2019
Photobiomodulation (PBM) dosimetry across lifespan for depression treatment
- Built accurate 5-layer brain models for 5 to 89 years of age using MRI dataset.
- Applied the state-of-art Monte Carlo light transport simulator on brain models to quantify the light dosage across lifespan.
- Reported a general decrease of energy deposition over age for all target regions.
- Discovered a strong correlation (R^2 >0.9) between the thickness of extra-cerebral tissue (ECT) of and energy deposition in different regions of interest.

2016-2018
3D image denoising using GPU-accelerated adaptive nonlocal means (ANLM) filter
- Designed a memory-saving strategy for GPU-accelerated ANLM filter by using 3-D share memory to increase memory usage.
- Streamlined the pre-processing and the main filtering processes in GPU without redundant data exchange between host and device.
- Achieved 6 dB improvement in signal-to-noise ratio (SNR) which is equivalent to adding 3.5-fold more photons in Monte Carlo simulation.

Master's Student Researcher, Tufts University

2015-2016
Multi-energy approach in Compton and PE reconstruction in CT imaging
- Studied multi-energy bin to reconstruct the Compton and photoelectric images
- Introduced a weighted reconstruction method based on a quadratic approximation of Poisson likelihood function that deemphasizes energy bins with low signal.
- Applied Cramer-Rao lower bound to compare the SNR between dual and multiple bins reconstruction methods.
- Improved SNR of reconstructions by over 20 dB for the high-attenuation phantom.

Teaching Assistant, Tufts University

2015-2016
Introduction to Electrical Systems
- Completed work including grading, mentoring and holding office hour.

Certifications and awards

Coursera certifications
Convolutional Neural Networks, Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization, Neural Networks and Deep Learning.

Awards
Second Prize in Electronic Design Competition at Southeast University; Chinese Software Patent (2015SR137375); Course Scholarship for Microcomputer Systems and Interfaces

Personal Info

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ISEC 360
Northeastern University
Boston, MA 02120

Language

C, MATLAB, C++, CUDA, Java, Python, Latex

Hard skills

- Programming
- Image processing
- GPU acceleration
- Data analysis

Soft skills

- Problem-solving
- Communication
- Time-management