Xingyu Liu

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EDUCATION

Shanghai Jiao Tong University (SJTU)   Sept 2016 – June2020(Expected)

Bachelor of Engineering in Biomedical Engineering

- **Overall GPA**: 88.2/100   **Major GPA:** 90/100
- Summer exchange student in the Department of Informatics at King's College London, 2018.
- Summer research assistant in the Department of Computer Science at Harvard University, 2019.
- **Relevant Courses**: Biomedical Image Processing I (91/100, ranking 1st), Machine Learning (95/100), Fundamentals of Biomedical Statistics (95/100, ranking 2nd), Circuit Theory (95/100), Algorithm and Data Structure (88/100), Introduction to Data Science with Python (88/100), Computer Architecture(96/100)

RESEARCH EXPERIENCE

Intrinsic Relevant Convolution for Segmentation | Harvard University | Research Assistant   Aug 2019 – Present

Advisor: Hanspeter Pfister, An Wang Professor of Computer Science

- Proposed a weakly-supervised method to leverage images' intrinsic statistics for segmentation tasks
- In preparation for the top-tier computer vision conference ECCV 2020 as first-author

3D Mitochondria Segmentation | Harvard University | Research Assistant   July 2019 – Oct 2019

Advisor: Hanspeter Pfister, An Wang Professor of Computer Science

- Used 3D Lightweight U-Net to attain initial segmentation of the mitochondria in mammalian brain tissue electron microscopy images (>1 TB).
- Applied Connected Component labeling to filter out spurious detection and employed marker-controlled Watershed algorithm to improve boundary accuracy.
- Applied online hard negative mining, embedding, and discriminative loss to reduce false positive rate to 2%.
- Paper under preparation for top-tier biomedical journal IEEE TMI

Neuron Skeletonization and Analysis | Harvard University | Research Assistant   Aug 2019 – Oct 2019

Advisor: Jeff Lichtman, Jeremy R. Knowles Professor of Molecular and Cellular Biology

- Generated initial skeleton from 3D neuron volumes using ibexHelper, and applied up-sampling and mean filtering to identify the cell body.
- Computed dendrites' orientation and length from skeleton using networkx, and analyzed those data using Pandas.
- Provided statistical data for neuroscientists and taught another intern my pipeline hand by hand.

3D Lung Nodule Segmentation | SJTU | Research Assistant   Jan 2019 – Mar 2019

Advisor: Bingbing Ni, Professor at Department of Electrical Engineering.

- Aimed to use 2D CNN to match the performance of 3D CNN in 3D biomedical data and did ablation studies
- Used 3D DenseUNet to perform segmentation on 3D Pulmonary Nodule, achieving dice loss of 0.20.
- Used 2D DenseUNet/ResUNet, combined with Temporal Shift Module to achieved dice loss of 0.20.

Brain Segmentation Based on Deep Learning | SJTU | Research Assistant   Aug 2018– Nov 2018

Advisor: Qian Wang, Professor at School of Biomedical Engineering

- Sliced the 3D NIFTI brain images to 2D using SimpleITK. Used U-Net to extract red nucleus, substantia nigra, and swallow tails in 2D brain slices, and reconstructed 3D images from 2D slices.
- Achieved dice loss of 0.23, and segmented images are used for Parkinson's diagnosis.

Radiomics Image Analysis System Design | SJTU | Research Assistant   April 2018 – July 2018

Advisor: Qian Wang, Professor at School of Biomedical Engineering

- Used Web Scrawler and Visualization Toolkits (e.g. basemap) to investigate cervical cancer background
- Extracted and selected discriminative MRI-defined features of images with Pyradiomics and Student's t-test
- Used Support Vector Machine for classification of the selected features, and reached AUC of 0.82
- Constructed a graphical user interface (GUI) to facilitate human-computer interaction.

WORK EXPERIENCE

Deep Learning Intern| Intel   Dec 2019 – Present

Team: Intel Internet of Things Group China, Shanghai

- Developed video analytics products for a wide variety of domains such as industrial and healthcare sectors.

MODELING CONTEST PROJECTS

[Modeling Opioid Crisis Based on Cellular Automata and Chi-Square Test](#) | MATLAB &Python   Jan 2019
- Established an Opioid Spread Model based on Cellular Automata, whose update rules are determined by the number of total drug reports in the county itself and its neighboring counties.
- Constructed a Feature Selection Model based on Chi-Square tests to identify the important socio-economic determinants of drug abuse.
- Finalist Winner of the 2019 Mathematical Contest in Modeling (top 0.25% in 25,370 teams).

[Heat Conduction Model Based on Finite Difference Method](#) | R & MATLAB   Sept 2018
- Derived differential equations (numerically solved by finite difference schemes) to model the heat distribution data in a multilayer high temperature resistant coverall. Used MATLAB for simulation and inference.
- Used Bisection to optimize a single layer of the overalls, and applied the Genetic Algorithm to find the optimal thickness for two layers.
- Won National Second Prize at 2018 Contemporary Undergraduate Mathematical Contest in Modeling (top 4% in 38,573 teams)

COURSE PROJECTS

[Filtered Backprojection Algorithm Implementation](#) | C++ & MATLAB   June 2019
- Implemented radon transform, Shepp-Logan and backprojection reconstruction using C++.
- Achieved 0.44 normalized mean square distance for the reconstructed image and built GUI.
- Final grades ranked top ten in this class (Biomedical Image Processing II).

[Understanding Cache Memories](#) | C   May 2019
- Built a cache simulator and successfully calculated the hits, misses and evictions with the input of traces.
- Optimized matrix transpose to cause as few cache misses as possible.
- Achieved a final grade of 96/100 in the class (Computer Architecture).

[Game 2048 Agent based on AI](#) | C++ & Python   Jan 2019
- Collected the decision data of a C++ complied search-based 2048 Agent as my training dataset.
- Designed a Neural Network and used online training to train my AI-based 2048 Agent.
- My AI-based 2048 Agent achieved scores above 1000 when playing the Game 2048.
- Got 95/100 final grades for this class (Machine Learning).

[Fundus Image Segmentation System](#) | MATLAB& Python   Dec 2018
- Implemented three different segmentation methods (indicated below) and built GUI.
- A. Morphological method. Applied morphology and bit plane slicing to get the shape and orientation map of blood vessels; Used the first Gaussian filter to mark the centerline; Combined the map and centerline using region-growing algorithm. Achieved 0.956 Accuracy (ACC), 0.732 Sensitivity (SE) and 0.978 Specificity (SP).
- B. Deep learning method. Used DenseUNet for segmentation. Achieved 0.953 ACC, 0.931 SE and 0.955 SP.
- C. Filtering method. Used match filtering and region-growing algorithm. Achieved 0.951 ACC, 0.684 SE and 0.977 SP.
- Ranked 1st in class (Biomedical Image Processing I).

COURSE PROJECTS

- Hong-Yi Scholarship (10 selected in SJTU)   2019
- Finalist Winner in 2019 Mathematical Contest in Modeling (top 0.25%)   2019
- National Second Prize at 2018 Contemporary Undergraduate Mathematical Contest in Modeling (top 4%)   2018
- Academic Excellence Scholarship, Shanghai Jiao Tong University (top 10%)   2017&2018&2019
- Merit Student, Shanghai Jiao Tong University (top 6%)   2018
- Outstanding Individual in Social Practice (top 1%)   2017

LEADERSHIP

Study Mentor | School of Biomedical Engineering, SJTU   Dec 2018 – Present
Vice Minister | Student Union, SJTU   Feb 2018 – Feb 2019
Assistant Director | Student Career Development Union, SJTU   May 2018 – May 2019
Dean Assistant | Youth Volunteer Service Team, SJTU   May 2017 – May 2018

SKILLS

Programming: Python (Pytorch, Pandas, Scrawler, Opencv, etc.), C/C++, Verilog, MATLAB, Assembly, R, SQL
Software/Applications: LaTeX, Keil, Proteus, Arduino, Xilinx, Origin, LabVIEW