Chenyu Gao

369 Jacobs Hall, 2301 Vanderbilt Pl, Nashville, TN 37235
+1 (667) 910-5300 | chenyu.gao@vanderbilt.edu | chenyugoal.github.io | Google Scholar

Research Interests

Image processing, machine learning, and computer vision with application to medical imaging.

Education

Vanderbilt University July 2022 – Present
Doctor of Philosophy in Electrical & Computer Engineering *Nashville, TN*

Johns Hopkins University Aug 2020 – May 2022
Master of Science in Biomedical Engineering, GPA: 3.84/4.0 *Baltimore, MD*

Sun Yat-sen University Aug 2016 – June 2020
Bachelor of Science in Biomedical Engineering, GPA: 3.7/4.0 *Guangzhou, China*

Experience

Graduate Research Assistant July 2022 – Present
Medical-image Analysis and Statistical Interpretation Lab, Prof. Bennett Landman *Nashville, TN*

- Statistical interpretation of the variance in the measurements from brain diffusion MRIs during aging.

Teaching Assistant Jan 2022 – May 2022
EN.520.623 Medical Image Analysis, Electrical & Computer Engineering *Baltimore, MD*

- Design homework assignments and the final project, which is about registration-based brain segmentation.
- Hold weekly office hours to answer questions from students.

Graduate Research Assistant Dec 2020 – May 2022
Image Analysis and Communication Lab, Prof. Jerry L. Prince *Baltimore, MD*

- Examine the effects of defacing algorithms on the segmentation of brain MRI.
- Implement traditional and deep-learning-based computer vision algorithms for tasks such as registration, segmentation, harmonization, super resolution, and so on.

Machine Learning Research Assistant Aug 2020 – May 2021
NeuroData, Prof. Joshua Vogelstein *Baltimore, MD*

- Extend the application of a homemade lifelong learning algorithm, *Progressive Learning*, to audio processing.
- Validate the omnidirectional knowledge transfer of the algorithm and visualize the result for publication.

Undergraduate Research Assistant Aug 2017 – June 2020
Sensor Technology and Biomedical Instruments Lab, Prof. Jun Wu *Guangzhou, China*

- Design and synthesize bioactive materials for bone tissue engineering.
- Support research teams in bone tissue regeneration as the in-vivo technical specialist. Perform craniotomy on more than 50 rats with a survival rate above 92 percent.

Projects

High Throughput QA and Tabulation of Measurements From Longitudinal Diffusion MRI Nov 2022
Advisor: Prof. Bennett Landman

We performed a high-throughput QA on the microstructural and macrostructural features measured from scan and re-scan diffusion MRIs acquired during 2742 sessions of 1035 subjects of the Baltimore Longitudinal Study of Aging (BLSA), whose age ranges from 22.4 to 103 years old. In the end, we generated a spreadsheet with 2742 rows and 13900 columns to share with our collaborators for studying aging.

Effects of Defacing Whole Head MRI on Neuroanalysis July 2022
Advisor: Prof. Jerry L. Prince

Recent advances in magnetic resonance (MR) scanner quality and the rapidly improving nature of facial recognition software have necessitated the introduction of MR defacing algorithms to protect patient privacy. In this project, we evaluated six popular defacing algorithms in terms of their effects on brain segmentation. (presentation)

Shiny APP for Bird Recognition Using Convolutional Neural Network May 2021

Advisor: Prof. Brian S. Caffo

Build a website for bird image classification from scratch in 8 days independently. It is based on a residual convolutional neural network that was pretrained on ImageNet by Keras and transfered onto Caltech-UCSD Birds. (Demo)

Multimodal Brain Tumor Segmentation and Survival Prediction May 2021

Advisor: Prof. Jerry L. Prince

Implement a 3D U-net and a cascaded anisotropic convolutional neural network for brain tumor segmentation. Based on the segmentation result, extract radiomic features to train a regression tree ensemble model for survival prediction. The presentation was the 1st place winner in the final competition. (presentation)

Neural Decoding with Traditional and Advanced NLP Algorithms Apr 2021

Advisor: Prof. Gene Y. Fridman

Inspired by the experiment of Elon Musk's Neuralink, in which the monkey could play video games with its imagination, we implement two algorithms in natural languae processing , Kalman Filter and LSTM, for decoding 164-channel neural signals from a monkey controlling a cursor. (Demo)

Computational Medicine: i) Imaging & ii) Physiome Aug 2020 – Dec 2020

Advisor: Prof. Michael I. Miller, Prof. Tilak Ratnanather, Prof. Raimond L. Winslow, and Dr. Joseph L. Greenstein

i) Perform statistical analysis to demonstrate the association between Alzheimer's disease and frontal lobe volumes, which are quantified from T1-weighted MRI scans with multi-atlas segmentation method.
ii) Implement classical models to estimate cardiac output from arterial blood pressure using ICU physiologic data.

Publications & Conferences

[1] Chenyu Gao, Linghao Jin, Jerry L. Prince, Aaron Carass, **"Effects of defacing whole head MRI on neuroanalysis"**, *SPIE Medical Imaging Conference*, San Diego, California, United States, 21 Feb 2022

[2] Jayanta Dey, Joshua Vogelstein, Hayden Helm, Will Levine, Ronak Mehta, Ali Geisa, Gido van de Ven, Emily Chang, Chenyu Gao, Weiwei Yang, Bryan Tower, Jonathan Larson, Christopher White, Carey Priebe, **"Representation Ensembling for Synergistic Lifelong Learning with Quasilinear Complexity"**, PREPRINT

[3] Lili Wang, Long Chen, Jiping Wang, Liying Wang, Chenyu Gao, Bo Li, Yuanzheng Wang, Jun Wu, Changyun Quan, **"Bioactive gelatin cryogels with BMP-2 biomimetic peptide and VEGF: a potential scaffold for synergistically induced osteogenesisa"**, *Chinese Chemical Letters*, 26 Oct 2021

Awards & Honors

Scholarship of Sun Yat-sen University for Outstanding Students Sept 2019

Scholarship of Sun Yat-sen University for Academic Progress Jan 2019

2nd Prize: Guangdong Undergraduate BME Innovation Design Competition Aug 2018