Xingxing Liu

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Summary

I am a final-year Ph.D. candidate in Electrical and Computer Engineering at the University of Iowa, with 5 years of experience in deep learning based medical image analysis, including CT and MRI segmentation. During the summer of 2023, I completed an internship at Philips North America, where I developed deep learning models for 3D cerebral angiography segmentation and catheter navigation. In the summer of 2024, I interned at Alcon Laboratories, focusing on optimizing eye pupil and limbus programs with GPU acceleration. I am proficient in Python and C++ programming and have extensive experience with deep learning frameworks, such as Pytorch and Tensorflow. I am actively seeking a full-time Machine Learning Engineer position.

Professional Experience

Alcon Laboratories

Research & Development Intern — Jun. 2024 - Aug. 2024

Work on optimizing eye limbus and pupil detection programs with GPU acceleration. Employ CUDA to accelerate key stages of the eye image processing pipeline including rotation, filtering, edge detection, etc.

Philips North America

Research Scientist Intern — Jun. 2023 - Aug. 2023

Develop deep network models for 3D cerebral angiography segmentation to enhance catheter navigation in endovascular procedures.

University of Iowa

Graduate Research Assistant — Aug. 2019 - present

My research mainly focus on deep learning based medical image analysis and surgical navigation. Here is a list of these projects.

- Spine Surgical Navigation System
  Develop a surgical navigation system that enables 3D visualization of spine anatomy and precise tracking of surgical tools, with the potential to enhance the accuracy and safety of spine procedures.
- Deep Learning Based Cross-domain Spine MRI Segmentation
  Develop a deep network model for cross-domain spine segmentation, trained on T2 MRI images and capable of accurately segmenting both T1 and T2 MRI images.
- Deep Learning Based Fluorescence-to-Color Image Registration
  Develop an algorithm for fluorescence-to-color image registration using features detected by a convolutional neural network.

Education

University of Iowa — Aug. 2019 - May 2025 (expected)

Ph.D. in Engineering, Department of Electrical and Computer Engineering
Overall GPA: 3.65/4.0

University of Science and Technology of China — Aug. 2014 - June 2019

B.S. in Applied Physics, Department of Modern Physics
Overall GPA: 3.32/4.3

Skills

Programming
- C++
- Python
- C#
- Verilog

Tools
- Pytorch
- Tensorflow
- OpenCV
- PCL

Software
- 3D Slicer
- Matlab
- Qt Creator
- Unity

Publications

1. **Liu, Xingxing**, Quang, T., Deng, W., & Liu, Y. (2021). Deep convolutional feature-based fluorescence-to-color image registration. *2021 IEEE International Symposium on Medical Measurements and Applications (MeMeA)*. Retrieved from https://ieeexplore.ieee.org/abstract/document/9478607
2. **Liu, Xingxing**, Deng, W., & Liu, Y. (2021). Application of hybrid network of unet and feature pyramid network in spine segmentation. *2021 IEEE International Symposium on Medical Measurements and Applications (MeMeA)*. Retrieved from https://ieeexplore.ieee.org/abstract/document/9478765
3. Wang, L., Li, R., Sun, J., **Liu, Xingxing**, Zhao, L., Seah, H. S., ... Tandianus, B. (2019). Multi-view fusion-based 3d object detection for robot indoor scene perception. *Sensors*. Retrieved from https://www.mdpi.com/1424-8220/19/19/4092

Projects

Eye Limbus and Pupil Detection with GPU Acceleration

June 2024 - Aug. 2024
- In this project, we optimized the programs for eye limbus and pupil detection with GPU acceleration, which significantly reduce processing latency and improve system efficiency.

Deep Learning Based Intravascular Catheter Navigation

June 2023 - Aug. 2023
- In this project, we developed an automated catheter navigation pipeline by employing SwinUNETR for multi-class vessel segmentation. This segmentation served as the foundation for catheter navigation.

Deep Learning Based Spine MRI Segmentation

Supervisor: Prof. Yang Liu | Jan. 2021 - June 2021 | Link to Project Demo
- In this project, we proposed a deep network named Res50_UNet for spine MRI segmentation. Res50_UNet combines the architectural characteristics of UNet and FPN and can achieve accurate segmentation on spine MRI images.

Deep Learning Based Fluorescence-to-Color Image Registration

Supervisor: Prof. Yang Liu | Jan. 2021 - June 2021 | Link to Project Demo
- In this project, we built a fluorescence imaging system to capture both color image and fluorescence image. We achieved fluorescence-to-color image registration with image features extracted by a deep network model, VGG-16.

Deep Learning Based 3D Object Detection in Indoor Environment

Supervisor: Prof. Hock Soon Seah | July 2018 - Aug. 2018 | Link to Project Demo
- In this project, we used Mask R-CNN to get 2D object bounding boxes and segmentation masks, then located objects in 3D point clouds based on 2D detection results.