LIXUAN CHEN

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EDUCATION

ShanghaiTech University Sep. 2021 - Exp July 2024
M.Sc. Computer Science, GPA 3.63/4 (Major: 3.73/4); Advisor: Prof. Yuyao Zhang
Core Courses: Deep Learning, Medical Image Processing and Analysis, Digital Image Processing

ShanghaiTech University Sep. 2017 - July 2021
B.E. Computer Science and Technology, GPA 3.39/4

RESEARCH INTERESTS

• My research interests lie in the field of **medical image processing** and **computer vision**, from the perspective of **implicit neural representation**, **fetal brain reconstruction**, and **weakly/semi-supervised segmentation**.

PROJECTS

• **Longitudinal Brain Atlases Construction via Implicit Neural Representation.**[1][4] July 2021 - present

- Alleviated the temporal inconsistency issue caused by independently averaging brain images at discrete time points in existing longitudinal atlas construction methods.
- Formulated the time inconsistency issue as a 4D image denoising task, and used implicit neural representation to construct continuous and noise-free longitudinal brain atlases.
- Improved temporal consistency while maintaining accurate representation of brain structures on two modalities of brain atlases (QSM and fetus atlases).
- Generated finer 4D atlases with higher temporal resolution (e.g., 0.5-week interval).

• **Robust Self-supervised 3D Fetal Brain MRI Reconstruction.**[2] July 2021 - present

- Tackled the issue of corrupted reconstruction of the fetal brain caused by slice misalignment and blurring of the brain anatomy due to severe motion during MR data collection.
- Combined the MRI acquisition model and a Deep Decoder network to effectively reduce the image artifacts resulting from slice misalignment and motion.
- Outperformed SOTA methods (SVRTK, NiftyMIC, and SSGNN) in five metrics, including a 24% improvement in PSNR, on both simulated and clinical data.

• **Self-supervised Slice-to-Volume Registration for Severe Fetal Motion.**[3] July 2021 - present

- Focused on the challenging task of Slice-to-Volume Registration (SVR), which aligns the slices with severe inter-slice motion to the correct position in the volume.
- Incorporated the MRI acquisition model into the SVR network to accurately predict the spatial transformation matrix aligning 2D slices to 3D volumes.
- Achieved SOTA accuracy of SVR, and improved the performance of downstream fatal MRI reconstruction (based on NeSVoR, etc.) on both simulated and clinical data.

• **Longitudinal Infant Brain MRI Segmentation.** March 2021 - May 2021

- Investigated different segmentation model designs and extended DenseNet to 3D volumetric data to perform 3D volumetric segmentation.
- Achieved dice similarity coefficient (DSC) of 90.325% of three brain tissues across five time points.

PUBLICATIONS

[1] **Continuous longitudinal fetus brain atlas construction via implicit neural representation** [Paper]
Lixuan Chen*, Jiangjie Wu, Qing Wu, Hongjiang Wei, Yuyao Zhang*
• Accepted by *MICCAI workshop PIPPI 2022* **(Best Paper Honorable Mention)**

[2] **ASSURED: A Self-supervised Deep Decoder Network for Fetus Brain MRI Reconstruction**
*Jiangjie Wu, **Lixuan Chen**, Zhenghao Li, Lihui Wang, Rongpin Wang, Hongjiang Wei, Yuyao Zhang*
• Accepted by *IEEE ISBI 2023*

[3] **ALIGNER: A Self-supervised Slice-to-Volume Registration Network for Fetal Brain MRI Reconstruction**
*Jiangjie Wu, **Lixuan Chen**, Zhenghao Li, Lihui Wang, Rongpin Wang, Hongjiang Wei, Yuyao Zhang*
• Submitted to *MICCAI 2023*

[4] **COLLATOR: Consistent Spatial-Temporal Longitudinal Atlas Construction via Implicit Neural Representation** (Extension of [1])
***Lixuan Chen**, Jiangjie Wu, Qing Wu, Guoyan Lao, Hongjiang Wei, Yuyao Zhang*
• Submitted to *NeuroImage*

EXPERIENCE

Bell Labs Dec. 2020 - June 2021
Research Internship (Part-time); Supervisor: Dr. Chenhui Ye, Dr. Wenyi Xu, Dr. Fei Gao *Shanghai, China*

- Proposed a behavior recognition method based on meta-learning using WiFi channel state information(CSI).
- Adapted to new environments rapidly, as demonstrated by its superior performance on two public datasets and real-world data compared to traditional supervised learning methods.

TEACHING

CS270: Digital Image Processing 2021 Fall

ADDITIONAL

- Programming: Python, C++, C, MATLAB
- Tools: ITK-SNAP, FreeSurfer, ANTs, Slicer
- Languages: Chinese (Native), English (Fluent)
- Framework: PyTorch