Luyuan Xie

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Profile

Luyuan Xie is a third-year Ph.D. candidate of Software & Microelectronics Department, Peking University Beijing, China, advised by Prof. Zhonghai Wu. He received his B.S. degree in Northeastern University, Shenyang Liaoning, China in 2016, and his M.Eng. degree in Biomedical Medicine Engineering at Tsinghua University, Beijing, China in 2019. Currently, as the first author, he has published multiple papers at ICML, MICCAI, and ICASSP conferences. His research interest lies in Healthcare and Federated Learning.

Education

2022-pres. **Peking University**, Beijing, China

Ph.D. candidate (3rd-year), Software Engineering.
Reseach topic: Federated Learning and medical data analysis.

2016-2019 **Tsinghua University**, Beijing, China

M.Eng., Biomedical Medicine Engineering.
Reseach topic: Medical Data Analysis.

2013-2016 **Northeastern University**, Shenyang, China

B.S., Biomedical Medicine Engineering .

Experiences

Aug. 2019 -
Nov. 2020 **HUAWEI Technology Co. Ltd.**, Beijing, China
Voice Algorithm Engineer.

Speech enhancement.

Dec. 2020 -
May. 2022 **Lenovo Group Ltd.**, Beijing, China
Speech Algorithm Lead Researcher.

Speech enhancement, target speaker separation.

Selected Works

- **Personalized Federated Learning via Injection and Distillation.**
  - A federated learning framework that tackles client drift issues for medical image analysis applications.
  - We can deal with the most commonly occurring scenarios in medical federated learning, in which system and data heterogeneous happens at the same time.
  - We verify our experiments on different medical tasks, including image segmentation/classification and temporal signal classification.
  - The work is published in ICML'2024.

- **Super-resolution And Classification Network.**
  - Integrating Super-Resolution (SR) and Classification (CF) to tackle the problem of LR breast cancer histopathological image reconstruction and diagnosis.
  - MFEblock adopts multi-scale receptive fields to obtain multi-scale features. A new fusion method named multi-scale selective fusion (MSF) is used to fuse multi-scale features better.
  - We combine the multi-scale receptive fields (SKNet) with the feature pyramid network (FPN) to achieve the feature extraction of this module.
  - The work has been published by MICCAI'23.

- **Model heterogeneous personalized via global bypass.**
  - This approach leverages a global bypass mechanism that obviates the need for public medical datasets, thereby reducing the additional burdens associated with local training.
  - We integrate a feature fusion module to more effectively combine features from the local model and the global bypass.
  - We demonstrate the efficacy and versatility of our MH-pFLGB through rigorous testing on a variety of medical tasks.
  - The work has been published by MICCAI'24.

- **Human body part reconstruction.**
  - A framework that independently reconstructs the mesh of each body part.
  - Input: monocular image with only a few body parts visible.
  - Part connection module when multiple parts are visible in one image.
  - The work has been accepted by ECCV'2024.

- **Personalized federated segmentation via feature enhancement.**
  - pFLFE tackles client drift problems in medical image segmentation FL with a feature enhancement network using only positive samples, which eliminates the requirements of negative samples or features from other clients.
  - We design an alternative fast-converging framework that can reach comparable performance in a few communication rounds, which is useful when communication resources are limited.
  - Our experiments on 3 segmentation tasks involving in total of 17 datasets show that pFLFE outperforms state-of-the-art results and achieves comparable performance with centralized learning, with high training stability and faster convergence.
  - The work has been published by MICCAI'24.

Selected Publications (Click here for full list)

[1]. **Luyuan Xie**, *et al*. "dFLMoE: Decentralized Federated Learning via Mixture of Experts for Medical Data Analysis." *IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR)*, 2025. [Paper]

[2]. **Luyuan Xie**, *et al*. "MH-pFLID: Model Heterogeneous personalized Federated Learning via Injection and Distillation for Medical Data Analysis." *International Conference on Machine Learning (ICML)*, 2024. [Paper][Code]

[3]. **Luyuan Xie**, *et al*. "Shisrcnet: Super-resolution and classification network for low-resolution breast cancer histopathology image." *Medical Image Computing and Computer Assisted Intervention (MICCAI)*, 2023. [Paper] [Code]

[4]. Tianyu Luan, Zhongpai Gao, **Luyuan Xie**, *et al*. "Divide and Fuse: Body Part Mesh Recovery from Partially Visible Human Images." *Accpeted by ECCV*. 2024. [Paper]

[5]. **Luyuan Xie**, *et al*. "Mh-pflgb: Model heterogeneous personalized federated learning via global bypass for medical image analysis." *Medical Image Computing and Computer Assisted Intervention (MICCAI)*. 2024. [Paper]

[6]. **Luyuan Xie**, *et al.* "pflfe: Cross-silo personalized federated learning via feature enhancement on medical image segmentation." *Medical Image Computing and Computer Assisted Intervention (MICCAI).* 2024. [Paper]

[7]. **Luyuan Xie**, *et al.* "TRLS: A Time Series Representation Learning Framework via Spectrogram for Medical Signal Processing." *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP).* 2024. [Paper]

Services

- Conference Review: ICCV2025, CVPR'25, MICCAI'23'24, ICASSP'23'24'25.