Liwei Che

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Education

- **Pennsylvania State University** — State College, PA, USA
  Master of Science in Informatics; GPA: 3.9/4.0 — *Aug. 2021 – Aug.2023*
- **University of Glasgow** — Glasgow,UK
  Bachelor of Engineering in Electronic Information Engineering; Honors of First Class — *Sep. 2017 – Jul. 2021*
- **University of Electronic Science and Technology of China(dual degree)** — Chengdu, China
  Bachelor of Engineering in Electronic Information Engineering; GPA:3.8/4.0 — *Sep. 2017 – Jul. 2021*

Publication

1. Liwei Che, Zewei Long, Jiaqi Wang, Yaqing Wang, Houping Xiao, and Fenglong Ma. Fedtrinet: A pseudo labeling method with three players for federated semi-supervised learning. In *2021 IEEE International Conference on Big Data (Big Data)*, pages 715–724, 2021 (acceptance rate: 19.9%)

2. Zewei Long, Liwei Che, Yaqing Wang, Muchao Ye, Junyu Luo, Jinze Wu, Houping Xiao, and Fenglong Ma. Fedsemi: An adaptive federated semi-supervised learning framework. *CoRR*, abs/2012.03292, 2020

3. Zewei Long, Liwei Che, Yaqing Wang, Muchao Ye, Junyu Luo, Jinze Wu, Houping Xiao, and Fenglong Ma. Fedsiam: Towards adaptive federated semi-supervised learning, 2020

4. Bernard M. Cobbinah, Christian Sorg, Qinli Yang, Arvid Ternblom, Changgang Zheng, Wei Han, Liwei Che, and Junming Shao. Reducing variations in multi-center alzheimer's disease classification with convolutional adversarial autoencoder. *Medical Image Analysis*, 82:102585, 2022

5. Cobbinah B. Mawuli, Liwei Che, Jay Kumar, Salah Ud Din, Zhili Qin, Qinli Yang, and Junming Shao. Fedstream: Prototype-based federated learning on distributed concept-drifting data streams. *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, pages 1–13, 2023

6. Liwei Che, Jiaqi Wang, Yao Zhou, and Fenglong Ma. Multimodal federated learning: A survey. *Sensors*, 23(15), 2023

7. Jiaqi Wang, Xingyi Yang, Suhan Cui, Liwei Che, Lingjuan Lyu, Dongkuan Xu, and Fenglong Ma. Towards personalized federated learning via heterogeneous model reassembly, 2023 (Accepted by *NIPS 2023*)

8. Pennsylvania State University. EvoquerBot: A Multimedia Chatbot Leveraging Synthetic Data for Cross-Domain Assistance. In *Alexa Prize TaskBot Challenge 2 Proceedings*, 2023

9. Liwei Che, Jiaqi Wang, Fenglong Ma. Learning from the Pre-trained: Multi-modal Federated Learning with Modality Missing (Under review at *AAAI 2024*)

Academic Experience

- **Pennsylvania State University** — State College, PA
  Research Assistant (Supervisor: Dr.Fenglong Ma) — *Apr.2020 - Jul.2023*
  - **Contrastive Multimodal Federated Framework for Visual and Textual Representation Learning**:
    Leveraged large-scale pre-trained models enhancing multimodal FL systems with incomplete modalities.
    Achieved state-of-art performance with **11× less communication cost**.
    Maintain excellent performance with up to **80% modality missing** and unimodal testing input.
  - **Exploiting Unlabeled data in Federated Learning**:
    Proposed efficient FL frameworks to explore unlabeled data without extra communication cost.
    Achieved around **50% higher accuracy** than vanilla baseline with only **0.1%** labeled data.
- **Data Mining Lab, University of Electronic Science and Technology of China** — Chengdu, China
  Research Intern (supervisor Dr.Junming Shao) — *Sep.2018-Feb.2021*

- **Federated Semi-supervised Learning with Triple GAN**: Proposed FedtriGAN achieved state-of-art performance for semi-supervised classification task on several benchmarks, with extremely scarce labeled data.
- **FedStream: Federated Learning on Data Streams**: Proposed FedStream framework for distributed concept-drifting data streams, achieving competitive performance with state-of-the-art centralized methods.
- **Distributed Machine Learning for Multi-center Alzheimer's Disease Classification**: Introducing CAAE to reduce MRI data variations among multiple medical centers for Alzheimer's disease classification.

Industrial Experience

- **Tencent** Shenzhen, China
  Algorithm Engineer(Intern) *Mar.2021-Jun.2021*
  - **Generative models for 3D scene synthesis**: Designed a 3D game scenes generation pipeline transferring AI model output to Unreal Engine 4 object. Implement recursive generative adversarial networks and cellular automation methods to generate 3D scenes for FPS game. **(Python, PyTorch, C++, Unreal Engine 4)**
- **UnionBigData** Chengdu, China
  Algorithm Engineer(Intern) *Sep.2019-Mar.2020*
  - **Real-time speech recognition system with mouth shape simulation**: Built a Deep Learning system for Chinese speech recognition with **an 82% accuracy**.**(Python, TensorFlow, Keras)**
  - **Detection of intersections and flaws in LED Display**: Perform part recognition and defect detection on LED display circuit board inspection images. **(Python, OpenCV)**

Projects

- **Amazon Alexa Prize TaskBot Challenge 2** State College, PA
  Tech Leader (Supervisor: Dr.Rui Zhang) *Mar.2023 - Jul.2023*
  - **Dialogue and recommendation module design**:
    Designed dialogue flow with humanistic care (allergies, religious sensitivities) for the Alexa taskbot system
    Pushed the design and implementation of the recommendation system and helped the team to **improve the users' satisfaction from 32.8% to 58.8% within two weeks**.
  - **Multimedia Interaction**:
    Applied crawler techniques to collect images and match them with text instruction based on CLIP model.
    Leverage prompt engineering to generate high quality synthetic images with DALLE2 to pairing the text steps of recipe and DIY instructions.

Teaching Experience

- **Pennsylvania State University** State College, PA
  Teaching Assistant *Sep.2021-Present*
  - **DS 320**: Data Integration; **DS 300**: Privacy and Security in Data Science (2022 Fall)
  - **SRA 365**: Statistical Security and Risk Analysis (2022 Spring)
  - **IST 230**: Language, Logic, and Discrete Mathematics (2021 Fall)

Selected Talk

- Federated Learning For Private Web Search and Data Mining (WSDM2022 Workshop) Feb. 2022

  Topic: Federated Semi-supervised Learning

Programming Skills

- **Programming Languages**: Python, R, MATLAB, C++, SQL, Java
- **Tools**: Git, Docker, Django, AWS, GCE, Linux, LaTex

Achievements

Lixin Tang Scholarship: Top 1%, $5000 2021
UESTC Outstanding Leadership Scholarship: Top 5%, $2000 2017–2020
UESTC Excellent Student Scholarship: Top 5%, $500 2017–2020
UESTC Liren Scholarship: Top 2.5%, $2000 2018