Yongzi Yu

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Personal Profile

I am an undergraduate from the Beijing Institute of Technology. My research interests previously focused on Machine Learning, Federated Learning, Medical AI, and Differential Privacy. I was advised by Prof. KunQian, Prof. Jinyan Liu in Beijing Institute of Technology. Previously I worked as a research assistant at Tsinghua University Discover lab, supervised by Prof. Hao Zhao. I am also the president of the Student Science and Technology Committee and I have strong self-motivation. In the future, I want to do something about artificial intelligence with healthcare and biomedicine.

Education

Beijing Institute of Technology *Beijing, China*

Undergraduate *Sept 2020 - June 2024*

- **Major:** Data Science and Big Data Technology
- **College:** School of Computer Science & Technology
- **GPA:** 87/100, 3.6/4.0
- The **President** of the Student Science and Technology Committee of Beijing Institute of Technology.
- The **co-founder** and **vice-president** of "Universe" club
- **Courses:** Linear Algebra(100), Natural Language Processing(100), Mathematical Analysis in Engineering I(99), Computer Composition and Architecture(99), Probability and mathematical statistics(97), Computer graphics(95), Computer technology and programming(94), Algorithmic game theory(93)

Publications

Journal Articles

Wanyong Qiu, Chen Quan, Lixian Zhu, **Yongzi Yu**, Zhihua Wang, Yu Ma, Mengkai Sun, Yi Chang, Kun Qian, Bin Hu, Yoshiharu Yamamoto and Bjeorn W.Schuller "Heart Sound Abnormality Detection from Multi-institutional Collaboration: Introducing a Federated Learning Framework", IEEE Transactions on Information Forensics and Security, **under review**, pp. 1-11, April 2023.(IF=7.231)

Yifan Feng, Cheng Chen, Shuxian Liu, Bingyu Dong, **Yongzi Yu**, Chen Chen, Xiaoyi Lv, "A novel technology of structural distance feature of Raman spectra and convolutional neural network for alcohol dependence diagnosis", Microchemical Journal, 189, 108485. (IF=5.304)

Conference Proceedings

Yongzi Yu, Wanyong Qiu, Chen Quan, Kun Qian*, Zhihua Wang, Yu Ma, Bin Hu*, Björn W. Schuller, and Yoshiharu Yamamoto, “Federated Intelligent Terminals Facilitate Stuttering Monitoring”,in Proceedings of ICASSP, pp. 1-5, Rhodes Island, Greek, June 2023. (**CCF-B, oral**)

Zhongxiang Lei, **Yongzi Yu**, Chongyang Shi, Yuanchi Ma, Jinyan Liu, "Data-Free Federated Transformers Distillation via Diversity Randomly Sample", in Proceedings of NeurIPS, **under review**, pp. 1-12, New Orleans, Dec 2023. (**CCF-A**)

Xiaoyu Shen, Wanyong Qiu, Kun Qian*, **Yongzi Yu**, Bin Hu, "Self-supervised Federated Learning for Heart Sound Recognition", in Proceedings of China Multimedia2023, **under review**, pp. 1-7, Kunming Yunnan, China, August 2023.

Yu Ma, Yuting Huang, Kaixiang Yuan, Guangzhe Xuan, **Yongzi Yu**, Hengrui Zhong, Rui Li, Jian Shen, Kun Qian, Bin Hu, Bj¨orn W. Schuller and Yoshiharu Yama, "Explainable Stuttering Recognition using Axial Attention", in Proceedings of ICIC 2023, **under review**, pp. 1-11, Zhengzhou, China, August 2023. (**CCF-C**)

Research Experience

Discover Lab, Institute for AI Industry Research (AIR), Tsinghua University — ***Advisors:*** *Hao Zhao, Jiangtao Guo, Guyue Zhou*
Direction: Research of Computer Vision on Autonomous Driving — *Aug 2022 - Current*

Brain Health Engineering Club(BHEC), Beijing Institute of Technology — ***Advisors:*** *Kun Qian, Bin Hu, Björn W.Schuller*
Direction: Federated Learning (FL) on Audio in Healthcare — *Dec 2021 - Current*

Institute of Software Intelligence and Software Engineering(SISE), Beijing Institute of Technology — ***Advisors:*** *Jinyan Liu*
Direction: Research of Federated Learning and Differential Privacy — *Oct 2022 - Current*

Key Laboratory of Signal Detection and Processing(SDP), XinJiang University — ***Advisors:*** *Xiaoyi Lv*
Direction: Research of Spectral detection — *July 2022 - Aug 2022*

Projects

Student Research Training(SRT)

Intelligent body sound sensing system(Nation-level) — *10000yuan*
Leader — *May 2022 - May 2023*

- We propose an intelligent body sound perception system based on federated learning. The system combines acoustics, digital signal processing and deep learning. It can realize physiological state perception and mental state perception, and realize disease pre-diagnosis. In addition, it can be used portablely to protect personal privacy.
- This project won the 2022 Century Cup Competition Silver Medal.

Heart sound perception model based on federated learning(School-level) — *3000yuan*
Leader — *Dec 2021 - Nov 2022*

- Explore the method of traditional machine learning-based federated learning(FL) and apply it to the heart sound for disease detection. I realize the XGBoost-based FL algorithm on FATE platform.
- There is one paper product for this work, in which I am the fourth author. Besides, we also won the Challenge Cup School Silver Award

Heart sound recognition framework based on self-supervised federated learning(School-level) — *3000yuan*
Leader — *Dec 2022 - Nov 2023*

- This project we focus on the self-supervised federated learning and want to improve the personalization of FL.
- Personalized Federated Self-Supervised Learning in Knowledge Distillation Direction: Explore the method to use self-supervised FL method on the heart sound dataset.
- Personalized Federated Self-Supervised Learning in Stacking Direction: We try to use stacking method to realise the model aggregation on the server part to enhance privacy protection and performance improving.
- We plan to produce a paper about our work. Now we are doing experiments.

Multi-UAV Sea and Air Scenario Mission Planning and Simulation Verification Based on Deep Reinforcement Learning(Nation-level) *10000yuan*

Leader *May 2023 - May 2024*

- This study aims to design a distributed multi-agent deep reinforcement learning algorithm for maritime and aerial scenarios, enabling intelligent decision-making and planning. The algorithm aims to enhance mission planning efficiency of unmanned aerial vehicles (UAVs) by accomplishing tasks such as maritime and aerial area coverage, maritime and aerial transportation support, and maritime search and rescue.

A credible extracurricular activity assessment result announcement and award application platform(School-level) *3000yuan*

Member *Dec 2022 - Nov 2023*

- The project primarily utilizes the WeChat Developer Tools to establish a WeChat mini program. We have developed a mini program dedicated to serving our college community, offering functionalities such as room reservation, check-in, and class management. My responsibility within the project lies in frontend design and development.

Mobile phone user portrait construction based on big data technology (Nation-level) *10000yuan*

Leader *Dec 2020 - Nov 2021*

- Use the structure of the knowledge map to build mobile phone user portraits.
- As I was not so experienced, this project I only finished the code and no other awards.

Software and hardware integrated road damage detector(School-level) *3000yuan*

Member *Dec 2023 - Nov 2024*

- The project primarily caters to road distress detection, employing an integrated hardware and software approach for detection, with a primary focus on computer vision-based object detection techniques. My main responsibility lies in the implementation of the algorithmic component.

Lab research projects

Eye Tracking-Based Paradigm for Enhancing Autonomous Driving *Discover Lab*

Member *Aug 2022 - April 2023*

- This research aims to propose novel eye-generating algorithms and apply them to downstream tasks such as trajectory prediction, object detection, and anomaly detection.
- My main contribution lies in the implementation of the downstream tasks of trajectory prediction and anomaly detection. I successfully apply the RPL, SML, and BDDoia Algorithms.

Simulated Anomalous Dataset *Discover Lab*

Member *April 2022 - May 2023*

- This is a project that proposes a simulated anomalous dataset sourced from the simulation generation of GTA-5.
- My work involves providing corresponding benchmarks using anomaly detection algorithms. The anomaly detection algorithms I employed include RPL and SML.
- We plan to submit our paper to NeuIPS (Conference on Neural Information Processing Systems) 2023.

XGBoost-based FL System for Stuttering Detection
BHEC Lab

Leader
Jan 2021 - Jun 2022

- We proposed a FL system based on the XGBoost model for stuttering classification. This is the first time that FL is applicated in stutter classification, which protects privacy effectively.
- I wrote a paper about this work and it has been accepted by ICASSP(IEEE International Conference on Acoustics, Speech, and Signal Processing) 2023 which is CCF-B International Conference

Explainable Stuttering Recognition using Axial Attention
BHEC Lab

Member
Jan 2021 - Jun 2022

- We obtain explainable images based on the Gradient-weighted Class Activation Mapping (GradCAM) as the input of our final recognition model, which is an axial attention-based EfficientNetV2.
- I am responsible for explainable part.
- There is one paper about this work for ICIC (International Conference on Intelligent Computing) 2023, which is CCF-C conference.

A Comprehensive Review of the Application of IoT for the Aging
BHEC Lab

Leader
Jan 2022 - current

- I took the initiative to propose and lead the writing of this review article.

Improvement of Federated Learning Using Transformers with Knowledge Distillation
SISE Lab

Member
Oct 2022 - May 2023

- We proposed three sample ways to solve the problem that the data issue in the transformers-based knowledge distillation in the context of cross-silo FL.
- We also offered a method to solve the data imbalance in cross-silo Federated Learning senarios.
- I am the second author in the paper submitted to Neurips 2023.

Research on Differential Privacy
SISE Lab

Leader
Feb 2023 - May 2023

- I learned the traditional differential privacy, DP-sgd and GDP algorithms. And I successfully realized them.

Research on Raman spectra for alcohol dependence diagnosis
SDP Lab

Member
July 2022 - Oct 2022

- We established an AD auxiliary diagnosis method based on the DistCNN-AD framework, which proved the feasibility of using CNN for AD spectral diagnosis. At the same time, the spectral analysis technology based on the distance characteristics between different spectral peaks was explored, which provided a new idea for spectral analysis.
- I am responsible for transforming the data in the experiment. And there is one paper accepted by Microchemical Journal.

Achievements

2021	**Gold Medal**, International Genetically Engineered Machine (iGEM) competition	*International*
2021	**Silver Medal**, National College English Translation Competition	*National*
2022	**Silver Medal**, The 7th China International Internet+ College Students Competition	*Province*
2021	**Third Prize**, The 38th Beijing Municipal and Regional National College Physics Competition	*Province*
2022	**Silver Medal**, The 19th Century Cup Final of Beijing Institute of Technology	*School*
2022	**Silver Medal**, The 17th "Challenge Cup"	*School*

2020 **Second Prize**, Academic Excellence Scholarship *School*
2021 **Third Prize**, Academic Excellence Scholarship *School*
2022 **Third Prize**, Academic Excellence Scholarship *School*

Extracurricular Activities

President 2022.3-2023.9 The Student Science and Technology Association at BIT
Vice President 2022.9-2023.9 Cofunder of Codiverse, the student organization at BIT.
Senior member 2021.3-2021.12 Beijing Institute of Technology swimming team

Skills

Programming Python (PyTorch, TensorFlow, Pandas, Spark, NumPy. etc.), Matlab, C/C++, HTML/CSS, JavaScript, SQL.
Miscellaneous Linux, Shell (Bash/Zsh), LaTeX(Overleaf/R Markdown), Gephi, Microsoft Office, Git.
Soft Skills Time Management, Teamwork, Problem-solving, Documentation.

Interests

Biking I love Road Biking and I frequently ride a bicycle on Tanwang Road.
Swimming I won the third place in the 200-meter breaststroke competition in BIT.
Running Several times won the second place in the relay race.
Reading Passionate about poetry, I enjoy the rhythmic flow of words.

References available upon request.