Shawn(Xiaoyu) Wang

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EDUCATION

Ph. D. in ECE, 4.0/4.0 **New York University**	Sep 2021 - Present
B.S in EE, 88.09/100 **University of Science and Technology of China**	Sep 2015 - June 2019
Undergraduate Visiting Researcher Program **University of Florida**	July 2018 – Sep 2018

SKILLS

Languages: Python, MATLAB, C/C++/STL, C#, Linux/Bash, SQL, Git, Latex, Verilog, VHDL, HTML5, JavaScript
Frameworks: Pandas, Scikit-learn, Numpy, Matplotlib, SciPy, TensorFlow, Seaborn, PyTorch, pickle, nltk, LSTM
Databases/Tools: Git, MySQL, AWS, Jira, Docker, Slack
Knowledge: Machine Learning, Deep Learning, Reinforcement Learning, Federated Learning, Data Science, NLP, Computer Vision, Network Modeling and Design, Data Structure.

PROFESSIONAL EXPERIENCE

Research Engineering Intern (Cloud & AI Group, DOCOMO Innovations, Inc) **(Remote)**

Dynamic Hybrid Vertical Federated Learning   **Oct 2023 – Dec 2023**

- Developed a Dynamic Hybrid VFL algorithm and system incorporating parallel training, selective aggregation, and dynamic resource allocation strategies to accelerate the training process.
- Conducted experiments validating its effectiveness, showcasing an average linear-times speedup while preserving accuracy levels.
- Currently working on theoretical analysis to substantiate the speed improvements and convergence bound.

Research Engineering Intern (Cloud & AI Group, DOCOMO Innovations, Inc, Sunnyvale, CA 94085)

AWS-Sparse Vertical Federated Learning platform and Hybrid VFL   **May 2023 – Aug 2023**

- Developed Open-sourced Vertical Federated Learning framework on AWS platform, by techniques including S3, State Machine as well as Lambda Function and so on.
- Implemented Sparse Encode algorithm on AWS platform, reducing communication message size by 70%~80% and the training time by 10%~ 13% while maintaining accuracy.
- Designed a Hybrid VFL prototype and demonstrate its significant speed improvements.

Machine Learning Intern (Open Source Platform Project Team, AI Department, Peng Cheng Laboratory, Shenzhen, China)

Federated Learning Come Across With Label Noise Learning   **Sep 2019 - Jan 2020**

- Deployed autoML frameworks to Peng Cheng Cloud Clusters with frameworks include Ray.tune, TPOT, Skopt and so on, which can implement algorithms including Xgboost, bayesian optimization, decision tree, random forest, ensemble trees, SVM, KNN, etc.
- Eliminated the label noise in federated learning and improved accuracy, evaluated by CIFAR and MNIST data.
- Key Points: Class-dependent label noise, Estimated probabilities transition matrix, Anchor point samples.
- Collaborated with a team of 3 Data Scientists intern to achieve 88% accuracy from 30% by recovering from noise.

RESEARCH EXPERIENCE

Research Assistant (Wireless Lab, ECE Department, NYU)

Decentralized Federated Curriculum Learning for Emotion Recognition   Dec **2024 – Present**

- Designing curriculum learning strategies to improve the efficiency, resource utilization, and privacy protection of federated learning in emotion recognition tasks.
- Developing client evaluation and ranking mechanisms using key metrics (e.g., loss) to optimize curriculum-based training progression.
- Researching curriculum decision algorithms and providing theoretical analysis to ensure robust convergence.

Multimodal Federated Learning with Model Fusion in Overlay Networks   **Sept 2024 – Present**

- Investigating federated learning with model fusion for multimodal data, including images, videos, and audio.
- Proposing a model fusion and feature-sharing framework via overlay networks to mitigate missing modality issues and enhance training performance.

- Currently designing overlay network architectures and optimizing model training algorithms for efficiency.

Federated Learning with Caching in Decentralized Vehicle Network   **July 2022 – August 2024**

- **Framework Design:** Developed an innovative decentralized FL framework incorporating model caching on mobile agents, enabling delay-tolerant model communication and aggregation.
- **Theoretical Analysis:** Conducted a rigorous theoretical analysis of model aggregation convergence, addressing the impact of model staleness.
- **Algorithm Design:** Designed and evaluated various model caching algorithms tailored for different DFL scenarios and mobility patterns.
- **Results:** Achieved significant performance improvements and faster convergence with cached DFL compared to non-cached DFL.
- Accepted to **AAAI 2025** for oral presentation.

Recommendation System for Content Deliver Network   **Oct 2021 – May 2023**

- Proposed a novel Predictive Edge Caching (PEC) system that predicts the future content popularity, and opportunistically prefetches contents predicted using idle network bandwidth.
- Fine-grained learning models that mine sequential patterns in user content retrieval behaviors.
- Published at **Computer Networks 2023**.

Research Intern (Microsoft Key Laboratory, USTC)

Instance-Dependent NN Learning by Bayesian Optimal Relabeling   **Jan 2019 – May 2019**

- Designed and developed a mathematical method to eliminate the noise among the binary labels, evaluated by synthetic dataset and UCI Benchmark dataset.
- Modified Bayes classifier and used synthetic anchors to determine the boundary for relabeling, then used Kernal Matching to eliminate the statistical bias between the relabeled data and origin data.
- Key Points: Relabel Technique, Boundary estimate via SVM, sigmoid, Synthetic anchor set.
- Improved the method from PU-learning to NN learning.

Research Assistant (Medical Imaging Center, USTC)

Histopathologic Cancer Detection and Diagnosis Based on Deep Learning   **Sep 2018-May 2019**

- Designed an algorithm to identify metastatic cancer in small image patches, evaluated on PCam benchmark dataset.
- Three modified networks: ResNet-50 based on Octave Convolution, Non-local Neural Networks, and ResNeXt-101.
- Outstanding 2018-2019 Undergraduate Innovative Research, SIST, USTC. (Top 4/16)

Publication

Wang, X., Xiong, G., Cao, H., Li, J., & Liu, Y. (2025). *Decentralized Federated Learning with Model Caching on Mobile Agents*. AAAI 2025 (Oral Presentation).

Li, C., **Wang, X.**, Zong, T., Cao, H. and Liu, Y., 2023. *Predictive edge caching through deep mining of sequential patterns in user content retrievals*. Computer Networks, p.109866.

HONORS & AWARDS

Ernst Weber Fellowship of ECE at the NYU	**Sept 22**
School of Engineering (SoE) Fellowship of ECE at the NYU	**Sept 21**
Outstanding Graduate of USTC	**June 19**
Outstanding Undergraduate Innovative Research	**May 19**
Scholarship of Institute of Electrics, Chinese Academy of Sciences (Top 4/75)	**Sept 17**
Electromagnetism Course paper Contest, First Prize (Top 1/70)	**Dec 16**