SIXING YU

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EDUCATION

Iowa State University Aug. 2020 – 2025 (Expected)
Ph.D. in Computer Science Ames, IA

- Lab: **Software Analytics and Pervasive Parallelism Lab**
- Ph.D. Topic: Scalable and High-performance Machine Learning **(Federated Learning, Model Compression, Foundation Models)**

Iowa State University Aug. 2020 – 2023
MSc in Computer Science Ames, IA

- GPA: 3.97 / 4

Beijing Technology and Business University Aug. 2016 – Jun. 2020
BCS in Computer Science Beijing, CHINA

- GPA: 92.3 / 100 (Ranked number 1 among 58 students)
- Outstanding Graduate

AWARDS

- Research excellence award at Iowa State University (2022)
- Department of Computer Science publication award (2021, 2022)
- Student leadership award (2016-2017)
- Outstanding student scholarship (2017, 2018, 2019)

RESEARCH EXPERIENCE

Software Analytics and Pervasive Parallelism Lab Aug. 2020 – Present
Ph.D. student, Iowa State University Ames, IA

- Research on **Efficient Foundation Models** (**Federated Foundation Model, Resource-aware Efficient Fine-tuning, Collaborative Learning, Collaborative Model Compression**) [7][8]
- Research on communication and computationally efficient **Federated Learning** [1][2][4][9]
- Research on Model Compression in Deep Learning (e.g. **Neural Architecture Search, Network Pruning**) [5][6][9]

Argonne National Laboratory Jun. 2022 – Oct. 2022
Research Aide Technical - PhD Chicago, IL

- Research on AI artifacts **FAIR** (Findable, Accessible, Interoperable, and Reproducible) principles [3]
- Containerize AI artifacts (e.g. Model/Dataset from HuggingFace) via **Docker, and MLCube**
- Maintain and develop **HPCFair**

Temp Associates Jan. 2023 – Mar. 2023
TA Emerging Technology Intern Urbandale, IA

- Design a database for effectively managing and sampling balanced data in YOLOv5 training.
- Design an ensemble and transfer learning pipeline to improve YOLOv5 performance.
- Implement real-time visual updates for estimated 3D positions.

Beijing Key Laboratory of Food Safety Data Technology Sept. 2018 – June 2020
Undergraduate Intern Beijing, CHN

- Research on **Graph Neural Networks**
- Introduced a two-layer (LSTM-RGCN) Graph Neural Network for **Named Entity Disambiguation**

RECENT PUBLICATIONS

[1] Phuong Nguyen, Sixing Yu, Pablo Muñoz, Ali Jannesari: *Enhancing Heterogeneous Federated Learning with Knowledge Extraction and Multi-Model Fusion*. In Proc. of the 4th Workshop on Artificial Intelligence and Machine Learning for Scientific Applications (AI4S), SC 2023, Denver, CO, pages 1–7, November 2023. **(Equal contribution)**

[2] Sixing Yu, Phuong Nguyen, Ali Anwar, Ali Jannesari: *Heterogeneous Federated Learning using Dynamic Model Pruning and Adaptive Gradient*. In Proc. of the 23rd IEEE/ACM International Symposium on Cluster, Cloud and Internet Computing **(CCGrid 23)**, Bangalore, India, pages 1–10, IEEE/ACM, May 2023.

[3] Sixing Yu, Murali Emani, Chunhua Liao, Xipeng Shen, Pei-Hung Lin, Ali Jannesari: *Towards Seamless Management of AI Models in High-Performance Computing*. In Proc. of the Annual AAAI Workshop on AI to Accelerate Science and Engineering (AI2ASE), co-located with AAAI 2023, Washington DC, pages 1–5, February 2023.

[4] Sixing Yu, Phuong Nguyen, Waqwoya Abebe, Ali Anwar, Ali Jannesari: *SPATL: Salient Parameter Aggregation and Transfer Learning for Heterogeneous Federated Learning*. In Proc. of the International Conference for High Performance Computing, Networking, Storage, and Analysis **(SC 2022)**, Dallas, TX, USA, pages: 1-13, November 2022. **(Badges with Artifacts Available, Artifacts Evaluated-Functional and Results Reproduced)**

[5] Sixing Yu, Arya Mazaheri, Ali Jannesari: *Topology-Aware Network Pruning using Multi-stage Graph Embedding and Reinforcement Learning*. 39th International Conference on Machine Learning **(ICML 22)**, Baltimore, Maryland, USA, July 2022. **(Long Presentation, 2% Acceptance Rate, 2022 ISU Department of Computer Science Publication Award)**

[6] Sixing Yu, Arya Mazaheri, Ali Jannesari: *Auto Graph Encoder-Decoder for Neural Network Pruning*. In Proc. of the International Conference on Computer Vision **(ICCV 21)**, pages: 1-10, IEEE, October 2021. **(2021 ISU Department of Computer Science Publication Award)**

PREPRINT

[7] Sixing Yu, J. Pablo Muñoz, and Ali Jannesari. *Bridging the Gap Between Foundation Models and Heterogeneous Federated Learning*. arXiv preprint arXiv:2310.00247 (2023).

[8] Sixing Yu, J. Pablo Muñoz, and Ali Jannesari. *Federated Foundation Models: Privacy-Preserving and Collaborative Learning for Large Models*. arXiv preprint arXiv:2305.11414 (2023).

[9] Sixing Yu, Phuong Nguyen, Waqwoya Abebe, Justin Stanley, J. Pablo Munoz, Ali Jannesari. *Resource-Aware Heterogeneous Federated Learning using Neural Architecture Search*. arXiv preprint arXiv:2211.05716 (2022).

PROJECTS

- ***RaFFM***: Resource-aware Federated Foundation Model. Specialized Model Compression algorithm for Foundation Models in heterogeneous resource Edge-FL.
- ***GNN-RL***: Topology-aware reinforcement learning Python library for efficient and scalable learning and inferences (e.g. Model Compression)
- ***FedLib***: A Federated Learning Python library. Provided general APIs and abstract classes for user-specialized FL solutions
- Staff face sign-in Android app based on Microsoft Azure cloud computing API (Undergraduate Project)

- Baidu Map street view building detection via OpenCV (C++) and Microsoft Azure API (Undergraduate Project)
- Navigation algorithm development in a mobile game project via Unity 3D and C# (Undergraduate Project)

TEACHING EXPERIENCE

Teaching Assistant | Computer Science, Iowa State University

- Distributed Software Development | *Lab, Prof. Dr. Carl Chang* Aug. 2021 – Jan. 2022
- Windows Application Programming | *Lab, Eshita Zaman* Jan. 2022 – Jun. 2022
- Introduction to the Design and Analysis of Algorithms | *Recitation, Prof. Dr. Samik Basu* Aug. 2022 – Dec. 2022
- Privacy Preserving Algorithms and Data Security | *Head TA, Prof. Dr. Meisam Mohammady* Jan. 2023 – May 2023
- Concurrent Systems | *Head TA, Prof. Dr. Ali Jannesari* Jan. 2023 – present

SKILLS

Python, PyTorch, Model training, Model optimization, Model compression, Hyper-parameter tuning, LLM Fine-tuning, Docker, Git