Yiming Che

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PROFESSIONAL SKILLS & KNOWLEDGE

- **Programming Languages:** Python, Matlab, R
- **ML Frameworks:** PyTorch, TensorFlow, scikit-learn, HuggingFace, LangChain
- **Data Pipeline:** SQL, Pandas, PySpark, Snowflake, Databricks
- **Cloud/DevOps:** AWS(S3, EC2), SageMaker, Docker, CI/CD, MLflow/Wandb, Flask
- **Tools:** Linux (Slurm), Git/GitHub, Bash

EDUCATION BACKGROUND

- **Binghamton University, State University of New York, NY, United States**
  Doctor of Philosophy in Systems Science (focus on Machine Learning) May 2023
- **Binghamton University, State University of New York, NY, United States**
  Master of Science in Industrial Engineering May 2018
- **Capital University of Economics and Business, Beijing, China**
  Bachelor of Science in Industrial Engineering July 2017

PROFESSIONAL EXPERIENCE

- **Postdoctoral Scholar at Arizona State University**
  Research (Data) Scientist at ASU-Mayo Center for Innovative Imaging (Concurrent)
  July 2023 - Present, Tempe, AZ
  - **Led Development of End-to-End Cycle-GAN for Tracer Data Translation (In Progress)**
    - Optimized Cycle-GAN model for translation between FBP and PiB tracer (tabular data) in amyloid PET images. **Eliminated the requirement of paired data without loss of accuracy (achieved correlation 0.97)**. Reduced clinical trial costs and expand access to amyloid imaging in non-specialist settings. [Project Link] (Paper in preparation)
    - Utilized **Airbyte** for data extraction from **AWS S3** to **Snowflake** for **data ELT**, and performed data **EDA** using **Pandas**.
    - Implemented modified Cycle-GAN model using **PyTorch** and deployed the **dockerized** model using **AWS SageMaker** and **Flask** for inference. Utilized GitHub Action for **CI/CD**.
    - Collaborated with clinicians from Banner Alzheimer's Institute to validate model outputs.
  - **Led Development of End-to-End Multi-agent Medical Q&A System (In Progress)**
    - Implemented medical Q&A system with multi-agent retrieval-augmented generation (RAG) using **HuggingFace** and **PyTorch** to build fully customized clinical support tools. [Project Link]
    - Vectorized medical datasets for corpus using **FAISS**.
    - Fine-tuned LLMs with 7B parameter with **LoRa** utilizing distributed training.
    - Deployed the inference pipeline using **AWS SageMaker** and **Flask** for real-time inference.
    - Optimizing the RAG with **ReAct** using **LangChain** and **OpenAI API** to enhance the performance.
  - **Led Development of Diffusion Models on Medical Imaging**
    - Developed a fully weakly-supervised anomaly detection/segmentation framework (AnoFPDM) using guided diffusion models. **Achieved state-of-the-art performance on lesion segmentation with DICE score 77.4 on BraTS21 dataset**, eliminating pixel-level labels for hyperparameter tuning, which significantly reduces the annotation cost.
    - Implemented various diffusion models in **PyTorch** using **distributed training/inference** on Linux (Slurm job scheduler).
  - **Led Development of Fusion of CT and MRI for Traumatic Brain Injury Recovery Prediction**
    - Utilized Cycle-GAN to generate synthetic MRI from real CT to address long waiting time of MRI. Developed a multi-modal classification pipeline combining CT and synthetic MRI using ResNet. **Achieved ∼16% AUC improvement** compared to only using single CT modality.
    - Collaborated with clinicians at Mayo Clinic to validate model outputs, ensuring the solution addressed real patient-care needs. (Paper under review)
  - **Co-led Development of Machine Learning for Cognitive Decline Prediction**
    - Conducted **model selection** from classification models, e.g., **XGBoost, random forest and SVM**, with nested cross-validation for robust cognitive decline prediction.

- Applied **SHAP analysis** and **A/B test** (Wald test) for feature importance in cognitive decline prediction. **Identified top 5 features**, providing insights to the clinical research. (paper)
- Collaborated cross-functionally with clinicians and data engineers from Mayo Clinic to preprocess patient cognitive assessments.

- **Co-led Development of Multi-modality (Text and Image) Models for Headache Diagnosis**
  - Fine-tuned multi-modal classification pipelines combining MRI and clinical notes based on BioMedCLIP using **PyTorch**. Fine-tuned solely on PubMedBERT and ViT for co-learning. **Achieved state-of-the-art performance in headache diagnosis with 0.96 AUC**. Reduced misdiagnosis rates, potentially saving hospitals and insurance companies on unnecessary treatments. (Paper under review)
  - Collaborated cross-functionally with clinicians from Mayo Clinic for biomarker extraction and clinical interpretation.

- **Research Assistant (PhD) at Binghamton University**
  Aug. 2017 - May 2023, Binghamton, NY
  - **Researched Bayesian Statistics and Uncertainty Quantification**
    - Integrated a Bayesian framework into traditional PINN for enhanced robustness and uncertainty quantification. Provided confidence intervals for predictions and improved reliability over non-Bayesian PINNs for more trustworthy decision-making process.
    - Developed a novel Bayesian surrogate model which combines generalized polynomial chaos and Gaussian process for efficient surrogate modeling of stochastic systems. Achieved ∼90% improvement in computational budget without loss of accuracy compared to traditional Monte Carlo simulation.
    - Developed single-section and batch-selection sampling algorithms with Gaussian process. Achieved ∼70% improvement in computational efficiency compared to traditional one-shot design.
    - Developed uncertainty quantification framework using generalized polynomial chaos expansion for machining process. Achieved ∼80% improvement in computational efficiency compared to Monte Carlo simulation.

SELECTED AWARD & HONOR

- Distinguished Dissertation Award, Binghamton University **(top 1%)** 2024
- Excellence in Systems Science Research Award, Binghamton University 2023
- Binghamton University Graduate Student Excellence Award in Research **(top 1%)** 2021

SELECTED PUBLICATIONS

Summary: 14 publications, including 8 first-author papers (13 journal articles, 1 conference paper, 3 working papers).

1. **Che, Y.**, Rafsani, F., Shah, J., Siddiquee, M. M. R. and Wu, T. "AnoFPDM: Anomaly segmentation with forward process of diffusion models for brain MRI" *Proceedings of the Winter Conference on Applications of Computer Vision. 2025.* https://arxiv.org/abs/2404.15683
2. Wan, J., Kataoka, J., Sivakumar, J., Pena, E., **Che, Y.**, Sayama, H. and Cheng, C. "Sparse Bayesian learning for sequential inference of network connectivity from Small Data" *IEEE Transactions on Network Science and Engineering* 11.6 (2024): 5892-5902. https://doi.org/10.1109/TNSE.2024.3471852
3. **Che, Y.**, Guo, Z. and Cheng, C. "Generalized polynomial chaos-informed efficient stochastic Kriging," *Journal of Computational Physics* 445 (2021): 110598. https://doi.org/10.1016/j.jcp.2021.110598
4. **Che, Y.** and Cheng, C. "Uncertainty quantification in stability analysis of chaotic systems with discrete delays," *Chaos, Solitons & Fractals* 116 (2018): 208-214. https://doi.org/10.1016/j.chaos.2018.08.024