Menghan Liu

EDUCATION

Arizona State University Tempe, AZ
Ph.D., Industrial Engineering Dec. 2023
Dissertation: *Adaptive Gray Box Reinforcement Learning Methods to Support Therapeutic Research: From Product Design to Manufacturing*
Advisor: Dr. Giulia Pedrielli

Huazhong University of Science and Technology Wuhan, Hubei
B.S., Logistic Management and Supply Chain July 2018
Honor Student

SKILLS

Research focus: Data-driven optimization and control methods development based on simulation and operations research in dynamic and stochastic environment.
Programming and Software: Python, C++, Java, Matlab, SAS, R, Scikit-learn, SQL, ARENA Simulation, Git, Tableau, AWS, Spark, Hadoop, Linux, PyTorch, TensorFlow, Keras, CUDA, JMP, Minitab, SPSS, Large-scale computational server (HPC), AMPL, ERP software
Data and Algorithms: Machine Learning, Deep Learning, NLP, Statistical Inference, Dynamic Programming/ Reinforcement Learning, Bio-inspired Computing, Monte Carlo Tree Search, Simulation, Graph Theory, Time Series Analysis, Database Management, Data Visualization (Tableau, Power BI, Matplotlib, Seaborn), Simulation, Simulation Optimization, Mathematical Programming, Stochastic Process
Healthcare: Clinical data, Surgical/ Procedural data, Medical Supply Chain data, Medical Imaging (CT/ MRI/ ultrasound/ nuclear medicine), Medical Physics, Particle Physics, Radiation Interaction, Radiobiology, Anatomy and Physiology, U-Net

TEACHING EXPERIENCE

Arizona State University Tempe, AZ
School of Computing and Augmented Intelligence

- **Adjunct Lecturer** 2021 - 2023
  - Instructed IEE 545 Advanced Simulating Stochastic System for 2 semesters, developed and gave in-person lectures, office hours, homeworks and exams
  - Instructed IEE 575 Applied Stochastic Operations Research Methods for 3 semesters, developed and gave in-person lectures, and provide office hours, homeworks and exams
  - Inspired students to enter domains like manufacturing, airlines and healthcare with contents of these domains
- **Capstone/ Project Instructor** 2021 - 2023
  - Instructed K-14 student to build a factory simulator - based visualization using Python
  - Mentored undergraduate capstone team to build factory simulator on Arena and analysis

- Mentored undergraduate capstone team to use Unity and C# to build manufacturing simulation-based game

- **Graduate Teaching Assistant** 2019 - 2020
  - Instructed IEE 506 Web-enabled Decision Support Systems for 1 semester, organized online lectures, office hours, homeworks and exams
  - Instructed IEE 380 Probability and Statistics for Engineering Problem Solving for 1 semester, organized online lectures, developed and gave in-person lectures, and provide office hours, homeworks and exams
  - Instructed IEE 505 Information System Engineering for 1 semester, organized online lectures, SQL labs, office hours, homeworks and exams
  - One student from IEE 505 used final project contents to outperform in later job interviews in airlines, and now became a successful analyst

Educational Docent Volunteer San Francisco, CA
Aquarium of the Bay 2023 - 2025
- Took rotational shifts to educate information about sea creatures, ocean environmental sciences, animal welfare and ocean conservation
- Specialized in ray behavioral science and protection

PROFESSIONAL EXPERIENCE

Postdoctoral Fellow 2023-2025
University of California, San Francisco San Francisco
- **MRI Image-based Glioblastoma Occurrence Correlation Study with Brain Functional Area**
  - Developing image-based (MRI) algorithmic and statistical method for Glioblastoma (GBM) tumor prediction
  - Performing machine learning based statistical correlation test on clinical data for testing Glioblastoma (brain tumor) occurrence with brain functional area
  - Developing deep learning based segmentation tools for brain tumor recurrence
- **CAMPEP-accredited Medical Physics Program**
  - Certificate expected in June 2025
  - Clinical and medical data processing, Radiation Interaction and Dosimetry, Medical Imaging, Radiobiology

Data Analyst Intern 2023
DHL Global Forwarding Tempe, AZ
- Performed Air/ Ocean freight statistical optimization analysis for KPI improvement of major ports of the Americas
- Performed motivation and promotion campaigns for inner communication improvement of DHL the Americas

Data Scientist Intern 2019
Mayo Clinic Phoenix, AZ

- Developed algorithms intelligently subcategorizing medical supplies in a hierarchical way and linking surgical and procedural data, created a Tableau dashboard for presentation
- Improved efficiency by 15% of supply chain operation theoretically

Graduate Research Assistant 2018-2023
Arizona State University School of Computing and Augmented Intelligence Tempe, AZ

- **Monte Carlo Tree Search based Algorithm Design**
  - Developed and implemented (in python) a Monte Carlo Tree Search (MCTS) based, using partitioning and Gaussian Processes to accelerate and improve sampling for continuous decision space
  - Developed an efficient decision-making algorithm that can be applied in broad controlling scenarios
- **Reinforcement Learning Algorithm Design for RNA Secondary Structure Folding Problem**
  - Developed and implemented (in python) an ExpertRNA algorithm that provides a Reinforcement Learning based modular framework which can flexibly incorporate an arbitrary number of rewards and secondary structure prediction algorithms
  - Applied Artificial Intelligence based methods to provide lab-based RNA secondary structure folding suggestions and directions
- **Manufacturing Simulator Design for CART-T Therapy**
  - Elaborately designed and implemented (in python) a Discrete Event Simulator (DES) for Chimeric Antigen Receptor – T cell therapy manufacturing procedures with flexible data structure/methods
  - Allowed flexible extension of setting, factor/ feature engineering and personalization

PUBLICATIONS

[1] Liu, M., Poppleton, E., Pedrielli, G., Šulc, P., & Bertsekas, D. P. (2022). ExpertRNA: A New Framework for RNA Secondary Structure Prediction. INFORMS Journal on Computing.
[2] Liu, M., Pedrielli, G., & Cao, Y. (2021, December). Partitioning and gaussian processes for accelerating sampling in Monte Carlo tree search for continuous decisions. In 2021 Winter Simulation Conference (WSC) (pp. 1-13). IEEE.
[3] Liu, M. (2023). Adaptive Gray Box Reinforcement Learning Methods to Support Therapeutic Research: From Product design to Manufacturing (Doctoral dissertation, Arizona State University).

PRESENTATIONS

Liu, M., Poppleton, E., Pedrielli, G., Šulc, P., & Bertsekas, D. P. ExpertRNA: A New Framework for RNA Secondary Structure Prediction. Presented at INFORMS 2020 Annual Meeting; Nov. 8, 2020; Virtual
Liu, M., Pedrielli, G., & Cao, Y. Partitioning and gaussian processes for accelerating sampling in Monte Carlo tree search for continuous decisions. Presented at 2021 Winter Simulation Conference (WSC) ; Dec. 16, 2021; Phoenix, AZ

Xie, W., Pedrielli, G., & **Liu, M**. From Bio-Drug Discovery to Production: Challenges and Novel Methodologies for Next Generation Biomanufacturing. Presented at 2022 Winter Simulation Conference (WSC) ; Dec. 14, 2022; Singapore

Liu, M., Poppleton, E., Pedrielli, G., Šulc, P., & Bertsekas, D. P. ExpertRNA: A New Framework for RNA Secondary Structure Prediction. Presented at INFORMS 2023 Annual Meeting; Oct. 17, 2023; Phoenix, AZ

Liu, M., Poppleton, E., Pedrielli, G., Šulc, P., & Bertsekas, D. P. Multi-agent RNA Secondary Structure Prediction Method. Presented at INFORMS 2024 Annual Meeting; Oct. 22, 2024; Seattle, WA