

Hua Zheng

zheng.hua1@northeastern.edu | hua.zheng0908@gmail.com | (206)565-7698

Personal Website: <http://zhenghuazx.github.io/hua.zheng>

Github: <https://github.com/zhenghuazx> | LinkedIn: [linkedin.com/in/hua-zheng-b064a8b0](https://www.linkedin.com/in/hua-zheng-b064a8b0)

PhD in Industrial Engineer and former 3-year ML Engineer. Industrial experience in big data, product search, recommender system; research experience in (deep) reinforcement learning, stochastic optimization and graphic model. Multi-disciplinary skill set including computer engineering (2-year SDE), optimization, machine learning (PhD research) and statistics (MS).

EDUCATION

Northeastern University, Mechanical and Industrial Engineering 2019-present, Boston, WA
PhD in Industrial Engineering | GPA: 3.89

Honor: John and Katharine Cipolla PhD Merit Award

University of Washington, Department of Statistics 2014-2016, Seattle, WA
M.S. in Statistics (Statistical Learning track) | GPA: 3.6

Shandong University, Department of Mathematics 2010-2014, Jinan, China
B.S. in Mathematics | Overall GPA: 91.75 | Rank 1st over 38 (in class) and 2nd over 188 (in department)

SKILLS

- **Programming:** Scala, Python, R, Java; Familiar with Apache Spark, TensorFlow, Hadoop, and Keras;
- **Operations Research:** Computer Simulation, Stochastic Optimization, Discrete-event Simulation, Queueing;
- **Machine Learning:** Reinforcement learning (RL), deep learning, recommender system, Graphical Model and etc;
- **Statistics:** Bayesian inference, method for missing data, advanced regressions, learning theory.

WORK EXPERIENCE

MIE Northeastern University. July. 2019-Present, Boston, MA US
Research Assistant, PhD candidate & Advisor for MIE Undergraduate Capstone Project (Nov, 2019 - Present)

- Currently working on a cell therapy optimization application aiming to optimize the decisions during cell culture using Bayesian reinforcement learning; *collaborated with Genentech and MIT.*
- Developed a novel green-simulation based policy gradient algorithm (GS-PG) with a new “experience reply” method which allows GS-PG to intelligently select and reuse the most relevant historical trajectories through creating a proposal mixture distribution close to the target trajectory distribution. Comparatively, it shows the significant acceleration of convergence both empirically and theoretically.
- Created an off-policy deep RL to control the oxygen flow rate to reduce the in-hospital counterfactual mortality rate of COVID-19 patients from 7.9% to 2.6%; *collaborated with NYU Langone Health.*
- Innovated a sample-efficient model-based reinforcement algorithm called BN-MDP with the theoretical guarantee of local convergence. The empirical study showed the policy learned by BN-MDP achieved human-level control of Yeast fermentation with 15 episodes while DDPG used 3000 episodes to achieve the same performance; *collaborated with BioSEL Lab at UML.*
- Developed a deep Q network algorithm for personalized multimorbidity management for patients with type 2 diabetes based on electronic health records; *collaborated with NYU Langone Health.*

Amazon Web Services (AWS), Inc. June. 2021-Sep. 2021, Seattle, WA US
Applied Scientist Intern (with 2022 return internship offer)

- Developed a kNN-GBDT algorithm to solve a cold-start demand forecast problem. It models the associations between “nearby” historical time series in various sub-input spaces via k nearest neighbor search (KNN) and makes a forecast based on a gradient boosted decision tree (GBDT).

Point Inside, Inc. Nov. 2016-May. 2019, Bellevue, WA US
ML Scientist, Research (1-year) & Software Engineer, Backend (2-year)

- **Responsibility:** Providing product search, recommendation, customer analytics, in-store map solution to Target, Lowes, and Macys. (SDE) Backend data pipeline maintenance and ML solution implementation; (ML Scientist) Model prototyping with Apache Spark, Keras and Mathout for search, product recommender system and product location prediction/assignment.
- Led research projects, including data collection, modeling, architecture design and engineer projects including map viewport search and search by distance (Solr), Spark-Scala based “data enrichment” backend system to identify shopper visit behavior by processing billions of mobile locations per day.
- Led mobile location data enrichment project, which processes billions of location records per day and estimates probabilities of the visiting tenants/stores and analyzes users’ in-store shopping behavior.
- Led Macy’s Product Location Assignment project.
- Implemented the autocomplete search, map viewport search and search by distance using Apache Solr and worked their search relevancy improvement.

Fields Institute for Research in Mathematics Sciences

July 2013- Oct. 2013, Toronto, Canada

Research Assistant, Supervised by Professor Matheus Grasselli

- Built locally stable differential equations system to extend Goodwin-Keen model with stock-flow consistency and adding new economic sectors: the equity market, which shows a stabilizing effect due to its function of absorbing more household savings.

PUBLICATIONS (4 First-Author Journals & 2 Conference)

- Zheng, H., Xie, W., & Feng, M. B. (2021). Green Simulation Assisted Policy Gradient to Accelerate Stochastic Process Control. arXiv preprint arXiv:2110.08902.
- Zheng, H., Xie, W., Ryzhov, I. O., & Xie, D. (Preprint). Policy Optimization in Bayesian Network Hybrid Models of Biomanufacturing Processes. *arXiv preprint arXiv:2105.06543*.
- Xie, W., Yi, Y., & Zheng, H. (2020). Global-local Metamodel-assisted Stochastic Programming via Simulation. *ACM Transactions on Modeling and Computer Simulation (TOMACS)*, 31(1), 1-34.
- Zheng, H., Ryzhov, I. O., Xie, W., & Zhong, J. (2021). Personalized Multimorbidity Management for Patients with Type 2 Diabetes Using Reinforcement Learning of Electronic Health Records. *Drugs*, 81(4), 471-482.
- Zheng, H., Zhu, J., Xie, W., & Zhong, J. (Preprint). Reinforcement Learning Assisted Oxygen Therapy for COVID-19 Patients Under Intensive Care. *ArXiv*.
- Zheng H., Xie W., Feng B. (2020). Green Simulation Assisted Reinforcement Learning with Model Risk for Biomanufacturing Learning and Control. *Proceedings of the 2020 Winter Simulation Conference*. <https://informs-sim.org/wsc20papers/028.pdf>
- Wei Xie, B. Kris Jaeger-Helton, Jared Auclair, Jinxiang Pei, Hua Zheng (2020). STEM Education and Industry Workforce Life-Long Training Platform Development to Facilitate Smart Biopharmaceutical Manufacturing *Proceedings of the 2020 ASEE Zone 1 conference*.

CONFERENCE PRESENTATION & TALKS

INFORMS Annual Meeting (virtual), 10/26/21.

Winter Simulation Conference (virtual), 12/15/20.

SCHOLARSHIPS AND AWARDS

- John and Katharine Cipolla PhD Merit Award (PhD)
- China National Scholarship (Undergraduate)
- Presidential Scholarship of Shandong University (Undergraduate)
- Provincial Level Outstanding Student in Shandong Province (Undergraduate)