

GUOYAN LI

3920 Mystic Valley Pkwy Apt.112, Medford, MA,02155 | li.guoy@northeastern.edu | 8578911468 | [LinkedIn](#)

SUMMARY

Sensor signal analyst with 4 years of multimodal data analysis experience and 3 years of project management experience in industry settings. Core competencies grounded in data-driven decision-making and AI-assistant interdisciplinary research. Seeks to apply Bayesian Machine learning and artificial intelligence techniques to optimize high-cost manufacturing processes like semiconductor manufacturing and 2D quantum materials.

EDUCATION

Northeastern University, Department of Mechanical & Industrial Engineering

Boston, MA

Ph.D. Candidate | Advisor: Xiaoning “Sarah” Jin

Expected 2023

Relevant Coursework: Applied Linear Algebra, Probabilistic Operation Research, Data Mining in Engineering, Data Management and Database Design, Algorithms, Machine Learning, Deep Learning

Dalian Maritime University, Department of Mechanical Engineering

China

B.S. Degree in Rescue and Salvage Engineering

Jul. 2015

SKILLS

Analytical Skills: Multimodal data analysis, Sensor signal processing, Natural Language Processing, Regression Analysis, Clustering Analysis, Deep Generative Model, Sequential Decision Making, Multi-armed Bandits Analysis

Programming Languages: Python, MATLAB, MySQL, R

Machine Learning Toolbox: Scikit-Learn, Keras, TensorFlow, PyTorch, Spacy, Genism, Tkinter, GPyOpt

Visualization: Tableau, Matplotlib, Seaborn, Plotly,

Others: AWS, Git, Linux, Google Cloud, Google Collab, Latex

RESEARCH EXPERIENCE

Graduate Researcher, Northeastern University

2018-Present

Industrial AI-Assisted Synthesis of 2D Quantum Materials

- Proposed a novel closed-loop optimization framework to explore the best experimental parameters that can be controlled to discover high-quality 2D Materials.
- Creates a probabilistic semi-supervised regression model to surrogate synthesis process and quantify the intrinsic uncertainty from sensor measurements and model prediction.
- Designed a cost-efficient experimental planning strategy based on Multi-armed Bandits Problems, accelerating 60% of the speed for target materials discovery.

Developing Integrative Manufacturing and Production Engineering Curricula That Leverage Data Science

- Designed a sequential data acquisition pipeline to collect job posting data from the EMSI database (Industrial partner) to identify the disparity between industrial demand and academic supply.
- Visualized extracted data by Tableau to analyze the influence of industry 4.0 and determine the disruptive skills requirement for recent graduates in the manufacturing domain.
- Developed a novel user-interactive course recommendation system based on Latent Dirichlet Analysis to provide module recommendations according to users’ demand.

Data-Driven Inference Modeling for Multi-objective Decision Making in Fleet Management

- Developed a real-time monitoring system based on more than 20 multimodal sensor measurements to optimize the speed of fleets on multiple operational conditions increasing reliability and safety and decreasing costs.
- Designed a Nonlinear Inference Model unifying Random Forest and LASSO to predict real-time fuel consumption for different fleets under different shipping conditions.
- Applied statistical techniques to determine the health conditions of different fleets to make a dynamic maintenance schedule, minimizing the economic loss and human workload.
- Designed a graphical user interface allowing onboard workers to interact with our real-time monitoring system to optimize their daily operations.

PROFESSIONAL EXPERIENCE

Beihai Rescue Bureau of the Ministry of Transport

Assistant Project Manager

Dalian, China

Jul. 2015 - Mar. 2018

- Checked the accuracy of products according to AutoCAD drawings and proposed improvement measures for specific processes such as shape polishing.
- Recorded details about the manufacturing process weekly in EXCEL to analyze potential problems related to workers, equipment, and working conditions.

SELECT COURSE PROJECT

Deep Learning-based tool wear condition monitoring

Sept. 2021- Dec.2021

- Conducted feature preprocessing and exploratory data analysis for over six heterogeneous sensor signals.
- Developed an anomaly detection framework based on Variational Autoencoder and Temporal convolutional neural networks to monitor a milling machine.
- Our latent space feature-based detection method decreased algorithm complexity and achieved PR-AUC 0.883.

Adaptive First-order Optimizer for Gradient-based Machine learning Algorithm

Jun. 2020- Dec.2020

- Created a novel first-order optimization method for training gradient-based machine learning algorithms designed to resist the noise data and improve the convergence.
- Involved a hyperparameter in controlling optimization speed, calculated by an exponentially decaying moving average of the previous gradients.
- Our proposed optimizer outperformed the performance of traditional optimization methods (SGD, AdaGrad, Adam) tested on the CIFAR-10 classification task.

Hyperparameters Database Design

Feb.2019 - Apr.2019

- Built a hyperparameter database to allow public users to visualize and understand how to choose hyperparameters that maximizes the predictive power of different machine learning models
- Created conceptual models to visualize the relationship between diverse models and their hyperparameters
- Used SQL to build a physical model to store the data generated from models generated from the AutoML toolbox
- Designed extracted functions to find the most effective model and clarify which parameter can accurately evaluate the model

PUBLICATIONS

- Li, Guoyan, et al. "Data science skills and domain knowledge requirements in the manufacturing industry: A gap analysis." Journal of Manufacturing Systems (2021)
- Yuan, Chenxi, Li, Guoyan, et al. "Trends in intelligent manufacturing research: a keyword co-occurrence network-based review." Journal of Intelligent Manufacturing (2022)

SELECT PRESENTATION

- "Industrial AI-Assisted Synthesis of 2D Quantum Materials" MEIE6830, Ph.D. Traineeship, Fall 2021
- "Data Science Skills Gap analysis in the Manufacturing Industry" MIE Research Expo, Fall 2021
- Lecturer, "Data Visualization in Manufacturing Industry" INFORMS at Northeastern University, Fall, 2020
- Guest lecturer, "Machine learning algorithms in Material Science" MIE Undergraduate Capstone, Spring, 2020

LEADERSHIP AND SERVICE

INFORMS student chapter at Northeastern University

Boston, MA

President

Jan. 2022-Present

Executive Vice President

Jun. 2020-Dec.2021

- Maintain the relationship between INFORMS organization and NEU to attract more student members
- Organize weekly seminars or workshops for MIE department graduate students to learn technical skills

INFORMS Student Member

Jun. 2020-Now

ADVANCED TRAINING AND CERTIFICATES

'Lean SIX SIGMA GREEN BELT' Institute of Industrial and Systems Engineers, 2018

"Advanced Research Computing: advanced LINUX commands" Northeastern University, 2021