

EDUCATION**University of Southern California**

Ph.D. of Industrial System Engineering; GPA:3.76

Aug. 2018~ May. 2023

Master of Computer Science; GPA: 3.9

Aug. 2021~ Dec. 2022

Harbin Institute of Technology

Master of Electrical Engineering; GPA: 3.64 (Top 5%)

Sep. 2016~Jul. 2018

Bachelor of Electrical Engineering; GPA:3.71 (Top 2%)

Sep. 2012~Jul. 2016

SKILLS**Computer Science:** Analysis of Algorithms; Machine Learning; Deep Learning and Its Applications; Foundations of Artificial Intelligence; Database Structure**Operation Research:** Foundations of Optimization; Foundations of Stochastic Process; Large Scale Optimization for Machine Learning; Advance Design of Experiments; Linear Programming; Mixed-Integer Programming**Statistics:** Mathematical Statistics; Numerical Analysis and Computation; Theory of Probability; Real Analysis**Software/Tools:** Pytorch; TensorFlow; AWS; Keras; Tableau; GitHub; Google Colab; Latex; Simulink**Programming Language:** Python (pandas, numpy, scikit-learn, etc); R (dplyr, ggplot2, Shiny); SQL; MATLAB**RESEARCH EXPERIENCE****Dynamic Multimodal Route Planner for Large-Scale Mobility Analysis**

NREL – June 2023

- **Dynamic Multimodal Route Planner Development:** Collaboratively developed a dynamic multimodal routing algorithm utilizing the A* search algorithm. This approach innovatively integrated various travel modes, dynamically adjusted travel times based on active modes, and leveraged parallel AWS capabilities for enhanced performance.
- **Mobility, Energy, and Productivity (MEP) Metric Fusion:** Integrated the multimodal search algorithm with MEP framework, underlining the criticality of path-centric computations. This approach captures nuanced variations in time, cost, and energy across diverse travel scenarios, thus magnifying the precision of accessibility computations.

Self-attention Graph Convolution Network Model for International Air Passenger Flow

NREL – Oct 2022

- **Innovative SAGCN Model Development:** Pioneered a unique Self-Attention Graph Convolutional Network (SAGCN) model on the Eagle HPC platform. This model leveraged node embedding and self-attention mechanisms to forecast international air passenger flows, filling gaps in existing methodologies by considering the complex network of air routes.
- **Leveraged extensive data for enhanced accuracy:** Employed the expansive DB1B International dataset, resulting in enhanced model reliability, thus driving sustainable and informed global transportation planning.

Integrated Modeling and Healthcare Resource Optimization in Pandemics

USC – Aug 2021

- **Probabilistic Epidemic Modeling:** Led the development of a probabilistic epidemic transmission model, employing time-varying compartmental model to assess intervention efficacy amidst parameter uncertainties.
- **Dynamic Vaccine Distribution Optimization:** Formulated a cutting-edge dynamic optimization methodology for vaccine distribution, prioritizing healthcare outcomes by dynamically balancing vaccine availability and regional transmission.
- **Public Data Aggregation Portal:** Architected a comprehensive public website aggregating vital COVID-19 data, encompassing transmission metrics, transport data, policy interventions, and healthcare resources.

MACHINE LEARNING PROJECTS**Multi-model Route Energy Prediction under Uncertainty with Routee Powertrain**

- Designed and deployed a suite of algorithms, including Random Forest, XGBoost regression, and Multi-layer Perceptron Neural Network, to accurately forecast energy costs under uncertainty for individual road links, offering a diverse model selection for Routee Powertrain users.

Geometric Shape Deviation Prediction with RNN Model for Additive Manufacturing

- Pioneered an RNN-driven prediction model to intuitively grasp layer-by-layer assembly effects in additive manufacturing, particularly under low-volume, high-variety production. Further enhanced manufacturing precision with a tailored compensation approach based on RNN insights. Orchestrated experimental trials in the Fused Deposition Modeling process, validating the prediction and compensation methodology, achieving a significant 44% reduction in shape deviation.
- Esteemed research findings published in the IEEE Transaction on Automation Science and Engineering and showcased at INFORMS 2019.

NLP sentimental analysis of StockTwits by SentimentRNN model

- Devised a SentimentRNN-based text classifier, integrating an Embedding layer, RNN layer, Forward layer, and SoftMax layer. After rigorous preprocessing and class balancing, trained the model to predict sentiment orientation, achieving a commendable average accuracy of 70.6% across half a million stock twits.

CNN based Pneumonia detection from chest X-ray

- Masterfully processed 30,805 patient X-ray images, utilizing advanced augmentation techniques for optimized model training. Leveraging the VGG16 architecture, the CNN model was adapted by freezing its initial 17 layers and integrating additional dense layers. Hyperparameters were finely tuned using the Adam Boost algorithm, culminating in a 75% accuracy rate for Pneumonia detection.

PUBLICATIONS

1. Mingyi He, **Mingdong Lyu** et al., "A Hierarchical Optimization Method (HOME) for eVTOL Network Design", Computer-Aided Civil and Infrastructure Engineering, 2023 (Under review)
2. Mingyi He, **Mingdong Lyu** et al., "GravAttn: A spatially-transferable gravity model for trip distribution based on Graph Attention Network and self-attention", Transportation Research Board, 2023.
3. **Mingdong Lyu**, R. Hall et al., Dynamic Vaccine Allocation for Control of Human Transmissible Disease, Health Care Management Science, 2023 (Under review)
4. **Mingdong Lyu**, R. Hall, A. Moore, "Modeling Reported Covid19 with Time Varying Case Fatality and Transmission Rates", Computational and Mathematical Methods in Medicine, 2023 (Under review).
5. A. Moore, **Mingdong Lyu**, R. Hall, "Tracking Covid-19 Cases and Deaths in the United States Distribution of Events by Day of Pandemic", Statistical Methods in Medical Research, 2021
6. Decker Nathan, **Mingdong Lyu**, Yuanxiang Wang, Qiang Huang. "Geometric Accuracy Prediction and Improvement for Additive Manufacturing Using Triangular Mesh Shape Data." Journal of Manufacturing Sci. and Eng., June 2021
7. Q. Huang, Y. Wang, **Mingdong Lyu**, and W. Lin, "Shape Deviation Generator—A Convolution Framework for Learning and Predicting 3-D Printing Shape Accuracy", IEEE Trans. Autom. Sci. Eng., January 2020

AWARDS

- Health Systems Science and Innovation Student Innovators Fellowship 2022
- USC Viterbi Ph.D. Fellowship in Industrial & Systems Engineering 2018~2019
- Outstanding Graduate of Harbin Institute of Technology 2018
- First Prize Academic Scholarship of Harbin Institute of Technology 2016~2017
- First Prize Scholarship Sponsored by Infineon Technology 2016~2017
- First Prize Scholarship for Graduate Student of Harbin Institute of Technology 2015~2016
- Outstanding Graduate Thesis of Harbin Institute of Technology 2016
- Meritorious Winner of Mathematical Contest in Modeling 2015