

XIAOMU LIU

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EXPERTISE

Mathematical and applied statistics: Frequentist and Bayesian inference, estimation theory, hypothesis testing, regression analysis, sampling theory, design of experiments

Machine learning: supervised and unsupervised learning algorithms, anomaly detection, probabilistic graphical models

Stochastic process: time series analysis, signal processing, image processing, state-space models

Optimization: linear and nonlinear programming

Computational statistics: Monte Carlo simulation

EXPERIENCE

Data Scientist

Nov 2019 - Present

Amazon.com, Inc., Seattle, WA

Perform quantitative modeling and analysis for transportation network design and planning team. Deliver recommendations to a wide variety of stakeholders, including executive-level sponsors.

- Developing models for forecasting transportation network's ability for promising fast deliveries.
- Used queueing theory to analyze warehouse backlog issues.
- Conducted a quasi-experimental study on elasticity of demand to delivery promises displayed on item detail pages.

Data Scientist

Sep 2017 - Nov 2019

Uptake Technologies Inc., Chicago, IL

Responsible for helping major industry customers optimize asset performance and reduce downtime through leveraging industrial Internet-of-things (IoT) data, including conducting proof of concept and bridging the gap to model production.

- *General Motors:* Led the work of developing data-driven solutions for improving effectiveness of the alarm system of stamping press lines. Productionized a model for detecting premature wear and tear.
- *Ryder:* Identified signal patterns of health status on a variety of operating modes from satellite transmitted truck sensor data. Prototyped a condition monitoring model for exhaust and cooling systems.
- *Ford:* Supported data insight generation for the performance of rivet gun robots by conducting statistical analysis; Designed experiments for comparing failure rate, maintenance effectiveness, and asset availability for two rivet feeding systems.
- *Panduit:* Enhanced the functionalities of network monitoring system by adding an anomaly detection feature for potential disconnection issues. Studied associations between environmental factors and intranet data transmission interruption.
- *Caterpillar:* Improved models for predicting component life for spark plugs and failures for compressor valves on gas compression engines.

Research Assistant

Aug 2010 - Aug 2017

Medical Imaging Research Center, Illinois Institute of Technology, Chicago, IL

Predictive policing project in collaboration with the Chicago Police Department, funded by the National Institute of Justice.

- Built time-series models for forecasting daily citywide violent crime count. Identified the most influential factors that lead to daily crime rate fluctuation.
- Developed a framework that predicts Chicago daily violent crime rates at the district level, including a mesh grid model for spatially adaptive crime density mapping which was further integrated in modeling stochastic point process.
- Applied graphical-model-based clustering to identify regions of common crime patterns. Proposed an approach that provides a way to extend the concepts of accuracy and reproducibility in supervised learning to model selection in clustering.
- Conducted feature engineering utilizing geospatial data, designed and built street-level spatiotemporal models that predict crime incidents in a city block next day.
- Designed experiments for location selection for surveillance camera placement. Drew causal inference for the attribution of the presence of surveillance camera in crime reduction.
- Participated in social network analysis research on assessing the likelihood of individual involvement in violent criminal activities.

Application of sparse Bayesian learning in computer-aided breast cancer diagnosis

- Applied relevance vector machine model to detecting microcalcifications in mammograms.

Application of Curvelet transform in tomography image reconstruction

- Compared two fast discrete curvelet transform algorithms in terms of sparsity and complexity.

Software Engineer - Contract

Jan 2014 - Aug 2016

Chicago Police Department, Chicago, IL

Deployed a real-time forecast dashboard incorporated in the internal web portal.

Teaching Assistant

Jan 2011 - May 2012

Department of Electrical and Computer Engineering, Illinois Institute of Technology, Chicago, IL

Led lab sessions, prepared and graded assignments for several signal processing track courses.

Research Assistant

May 2008 - Jun 2009

Bioinformatics Center, United Genes Group Ltd., Shanghai, China

Bioinformatics Analyst Intern

July 2008 - Aug 2008

Biochip National Engineering Research Center, CapitalBio Technology Co., Ltd and

Tsinghua University Joint laboratory, Beijing, China

EDUCATION

Ph.D. in Electrical Engineering, GPA 4.0, Illinois Institute of Technology, Chicago, IL Aug 2017

Thesis: Temporal and spatiotemporal models for short-term crime prediction

M.S. in Electrical Engineering, GPA 4.0, Illinois Institute of Technology, Chicago, IL Dec 2011

B.S. in Biomedical Engineering, Fudan University, Shanghai, China Jul 2009

ACTIVITIES AND HONORS

Amazon Machine Learning Conference reviewer, May 2020

Data science bootcamp curriculum designer, Flatiron School, May 2017 - Jul 2017

2018 Quarter 3 Most Valuable Employee Award (Top 3), Uptake, 2018

Highest Standards of Academic Achievement, Illinois Institute of Technology, Mar 2012

TECHNICAL SKILLS

Python, R, SQL, Matlab, C/C++, Linux, Spark, Bash Scripting, Markdown, Git, LaTeX