Tongqing(Angelina) Chen

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EDUCATION

University of Chicago Sep 2020 - Jun 2025
Ph.D. in Operations Research/Operations Management

University of Minnesota - Twin Cities Sep 2016 - May 2020
B.S. in Industrial and Systems Engineering *GPA:3.95/4.0*

SUMMARY

Curriculum focus on **optimization, dynamic programming,** analysis for **stochastic processes, machine learning and causal inference**;

5+ years of research experience on **statistical modeling, simulations, MDP, reinforcement learning** and **data-driven decision-making** projects in healthcare, resource allocation, **revenue management** and pricing;

Outstanding learning, presenting, research, and project management skills;

Leader, mentor, and proactive team player.

SKILLS

- **Computer Languages**: Python, Mathematica, R, AMPL, SQL, Java, Matlab.

- **ML/RL Methods**: Linear Regression, Logistic Regression, Multiclass Classification, SVM, Decision Trees, Random Forest, Boosting, PCA, Clustering, K-means, CNNs, MDP, Survival Analysis, Approximate Dynamic Programming (value iteration, policy iteration) and more.

- **Optimization**: Convex Optimization (Gradient Descent, Newton's method), Linear Programming, Online Optimization.

WORK EXPERIENCE

- **Uber** San Francisco, CA
  Applied Scientist PhD Intern (Global Intelligence Team) *Jun 2024 - Aug 2024*
  - Engineered and analyzed **real-time** competitor promotion strategies in Brazil using **SQL** and **Python**. Presented data-driven insights to **cross-functional** stakeholders, resulting in the integration of key recommendations into developing the new **promotion engine**.
  - Applied **machine learning** techniques, including **Random Forest** and **XGBoost** and identified the key features impacting competitor promotions among over 70 features using 2+ years of receipt data, and **Isolation Forest** and **SVM** for anomaly detection and **robustness** check.
  - Conducted **A/B testing** to evaluate promotion structure changes, incorporating **time-series analysis** to track trends over time. Evaluated the effect on key metrics using **causal inference** techniques.
  - Quantified the impact of competitor promotions on **market share** using **aggregate structural models**, revealing a potential 15.3% market share growth opportunity.

- **Uber** San Francisco, CA
  Applied Scientist PhD Intern (Pricing and User Incentives Team) *Jun 2023 - Sep 2023*
  - Responsible for an **end-to-end** project to improve the user **targeting model** and the user-promotion **matching algorithm** conditioning on multiple promotion structures.
  - Configured the **YAML** files of production models and implemented the **direct ranking model (DRM)** with new features to over 80 million users. Improved the **area under cost curve (AUCC)** of the model by 27%.
  - Employed **Spark, Hive and Presto SQL** for data acquisition and to construct hive (HDFS) user-app interactivity feature tables, optimizing data accessibility and usability for the team. Conducted **robust feature engineering** using **Python** API and packages (PySpark, Scikit-learn, TensorFlow, Seaborn, etc.)
  - Performed **backtesting** for 5 consecutive weeks to test the **robustness** of the model and **consistency** of the improvement on key metrics such as order rates and incremental gross booking per spend.

- **Exxon Mobil** Huston, TX
  Data Scientist (Senior Design) *Dec 2019 - May 2020*
  - Achieved a 11% reduction in supply chain costs through process optimization and analyzing over 60K+ orders.
  - Visualized and identified improvements in the **service levels** of the supply centers and those of the customers using **Data Guru** and **Power BI**.
  - Organized meetings with stakeholders about the project scope, risk management plans, and project deliverables.

Research Experience

- **Estimating Treatment Effects from Observational Data**
  Advisor: Prof. John R Birge (University of Chicago)   *(Work in progress)*
  - **Objective**: Estimating treatment effects from observational data with **unobserved confounding variables**, missing values, and **selection bias**.
  - Developed mathematical models using concepts of hidden Markov Chain and **maximum likelihood estimation** with **optimization** methodologies such as backtracking gradient descent and Newton's method, and implemented and realized the model with code in Python.
  - Derived analytical solutions. Proved the consistency and the **concentration bounds** of the model.
  - Conducted **numerical studies** using the UK Covid vaccination status versus excess death data and the gene types versus Warfarin overdose data, each consisting of millions of data points.

- **Liver Organ Allocation for Transplant Patients**
  Advisor: Prof. Baris Ata (University of Chicago)
  - Identified key factors of transplantation successes using (demographic, lab values, medical information, and treatment methods) data of over 300,000 patients and 200,000 donors across 20 years.
  - Modeled and studied organ offer rate and acceptance rate over different factors by looking at over 1,500,000 liver organ offer (patient and donor pair) data.
  - **Methodologies**: Survival analysis: Kaplan-Meier, Cox hazard regression, random forests; Causal analysis: Diff-in-diff, panel data analysis. Time series analysis.

- **Pricing a Product with Network Effects**
  Advisor: Prof. William L Cooper (University of Minnesota)   *(Published)*
  - **Objective**: Proposed **optimal pricing policy** and heuristics of a **dynamic pricing problem** for a product that exhibits **network effects** and that is sold to a fixed heterogeneous population of customers.
  - Developed analytical proofs for the optimal pricing strategy and the trends of optimal revenue in multi-period problems. Verified derivation results in Mathematica.
  - Developed a graphical representation for customers arrayed over two-dimensional space according to a **bivariate probability distribution**.
  - Developed tractable, 95%+ **optimal heuristics** to resolve the curse of dimensionality of the problem. Compared heuristics with **simulations** over **stochastic** cases using R, Matlab, and Python (coded from scratch.)

Publications and Selected Talks

- Chen, T., & Cooper, W. L. (2024). Pricing a product with network effects for sale to a fixed population of customers. *Naval Research Logistics (NRL)*.
- 2024 INFORMS Annual Conference (Oct 2024, Seattle), INFORMS Healthcare 2023 (July 2023, Toronto): "Estimating Treatment Effects From Observational Data Using A Hidden Markov Model."
- 2023 INFORMS Annual Conference (Oct 2023, Arizona): "Estimating Treatment Effects From Observational Data with Unobserved Confounders."
- 2022 INFORMS Revenue Management and Pricing (Jun 2022, Chicago, Session Chair): "Pricing a Product with Network Effects for Sale to a Fixed Population of Customers."

Honors and Awards

- Gold Scholar Award (2016, 2017, 2018 and 2019, total $60,000).
- Dr. Alan L. Eliason Undergraduate Achievement in ISyE Award (2018)
- Undergraduate Research Opportunity Program (Winter 2018, Summer 2019)

Leadership Involvements

- College Ambassador Mentor
  University of Minnesota   *Sep 2017 - Sep 2020*
- Presidential Board of Chinese Students Scholars Association
  University of Minnesota   *Oct 2017 - May 2019*