Wenxiao Yang

Curriculum Vitae, October 2022

(+1) 2176939750
wenxiao5@illinois.edu

Education

2020–2023 (expected) **University of Illinois at Urbana-Champaign**, *GPA – 3.97/4.00*,
B.S., Triple Major: *Mathematics, Statistics, Economics*; Minor: *Computational Science & Engineering*.
Spring 2021: Visiting Research Student at HKUST Business School

2018–2020 **Zhejiang University**, *Undergraduate coursework*,
Experimental Class of Social Science (Major Economics), [transferred to UIUC].
Spring 2020: GEM Trailblazer Exchange Student at Nanyang Technological University

Research Projects

Ongoing **Privacy-protected Online Advertising: Information Design in Auctions with Flexible Information Acquisition**, *Supervised by Prof. Yunchuan (Frank) Liu (UIUC) and Prof. Song Lin (HKUST).*

- Presented at *ISMS Marketing Science Conference 2022*
- *Submitted as Writing Sample*
- ***Abstract:*** *In auctions, bidders learn information about products in two ways: provided by sellers and acquired by themselves. We consider a model where bidders' information about a product is obtained in both ways. We build a second-price auction model in online advertising of one seller (platform) and two bidders (advertisers). We set the seller only has information about the product but cannot distinguish bidders because of the trend of banning third-party cookies, which prevents platforms from using users' data to help advertisers target customers. Besides receiving information from the seller's signals, bidders can acquire extra information by themselves in a rational inattention framework. We find that signals with low and high expected product value information discourage bidders from participating in auctions. As a result, sellers mix low-value and high-value information up to the maximum threshold that incurs both bidders to participate. This information threshold is independent of the value distribution of the product but decreases as the per-unit information cost increases. Sellers may increase bidders' information costs when the expected product value is low and decrease them when the expected product value is high. We find that bidders' information acquisition behavior may have a positive externality on other bidders, which may lead bidders who spend more to obtain information finally receive fewer profits. In the extension, we examine the importance of first-party data in the world without third-party cookies by discussing the scenarios in that one bidder has extra free information. Contrary to popular belief that additional private information is beneficial, we find that free additional information may harm both the owner and its competitors.*

Ongoing **Predicting Long-run Coupons Effects with Customer Learning**, *Deep Learning course project.*

- According to the literature on marketing and economics, coupons, in addition to promoting sales in the short run, can also affect the future consumption of customers. It is, therefore, essential to consider more than the one-stage effect of coupons when considering firms' optimal promotion strategies. Unlike Gabel and Timoshenko's model (2022) which predicts purchase probabilities with coupons in one stage, I intend to develop a model that predicts the long-run effects of coupons in my deep-learning project. Unfortunately, there is a problem in that coupons may have relatively weak long-run effects, and the traditional deep-learning model may find it challenging to learn them directly. To help my deep-learning model learn the long-run effects, I introduce the mechanism of customer learning. In this mechanism, coupons can be used to attract some consumers who fit a product but haven't purchased it due to the lack of information. These customers can be attracted by the low price with coupons of the product and realize the information of the product's high value for them. The first step in my deep-learning process is to estimate consumers' prior knowledge based on historical data, followed by adding the estimated prior knowledge to the input layer of the model. This deep-learning model combined with economic structure is more interpretable and can give better instructions to firms' promotion policies.

2021 **Advertising Coupon**, *Supervised by Prof. Song Lin (HKUST).*

- **Abstract:** We build a new promotional model that combines coupons and advertising. Customers can help the company with advertising in exchange for coupons. We compare this program with other types of referral programs and discounts. If the profit from selling the product is low, the program is always profitable compared to other promotional methods. However, if the profit from selling the product is relatively high, in which case the company will use the program when the consumer values the product very low or very high, and it will use discounts when the consumer values it moderately.

2021 **Should Firms Pay for Useless Referrals?**, *Algorithmic Game Theory course project*.

- **Abstract:** Many firms provide referral programs for consumers, which allows consumers to get rewards by referring new customers. Firms pay for successful referrals that lead to new customers. This project discusses another kind of program, and I call it the same return program. The program rewards customers according to the number of friends they refer. In the program, a firm pays for all referrals, no matter whether it generates new customers. The project proves that if the product is hard for consumers to infer others' valuations towards it, the same return program is better than the referral programs because the same return program could eliminate the game in the referral programs and remains the best equilibrium for firms and consumers.

Experience

Ongoing **Research Student**, *Gies College of Business, UIUC*.

- Conduct an independent quantitative marketing research project under the supervision of Professor Yunchuan Liu.

2021 Spring **Visiting Research Student**, *Department of Marketing, HKUST*.

- Conduct an independent quantitative marketing research project under the supervision of Professor Song Lin.

2020 Fall **Research Associate**, *Illinois Risk Lab, Department of Mathematics, UIUC*.

- Topic: Financial Mathematics, Stochastic Optimization
- Research associate in the program of *AI-Powered Life-cycle Financial Planning* lead by Prof. *Zhiyu (Frank) Quan* and Prof. *Runhuan Feng*.
- This project aims to build algorithms that optimize decision making process for meeting important financial goals in life. I played a pivotal role in the group that working on develop life cycle strategy in asset management.
- 1. Built a Stochastic Linear Programming model independently to optimize the expected utility under uncertainties (factors including death rate, the interest rate of risk asset.) with heterogeneous goals. 2. Assist in implementing the model by utilizing Python.

2019 Summer **Risk Management Intern**, *Wanxiang Trust*.

Core Coursework

2020–2022 **University of Illinois at Urbana-Champaign**.

Economics and Business

- ECON437 Game Theory
- ECON471 Intro to Applied Econometrics
- ECON490 Numerical Methods in Economics
- ECON530 Microeconomic Theory I (PhD Micro Sequence)
- BADM539 Math Models in Marketing (Analytical Modeling PhD seminar)

General Mathematics and Statistics

- STAT410 Statistics and Probability II (Mathematical Statistics)
- MATH416 Abstract Linear Algebra
- MATH417 Intro to Abstract Algebra
- STAT425 Statistical Modeling I (Applied Regression and Design)
- STAT426 Statistical Modeling II (Sampling and Categorical Data)
- STAT433 Stochastic Processes

Optimization and Operations Research

- MATH482 Linear Programming
- MATH484 Nonlinear Programming
- ECE490 Introduction to Optimization
- IE516 Pricing and Revenue Management (Revenue Management PhD seminar)
- IE598 Game Theory and Fair Division (Algorithmic Game Theory PhD seminar)

Computation and Learning

- MATH357 Numerical Methods I
- STAT430 Fundamentals of Deep Learning
- ECE449 Machine Learning
- MATH490 Computational Math (computations on graphs, computational topology, quantum computing, etc.)
- ECE566 Computational Inference and Learning (Computational methods in ML for ECE PhD)

2020 Spring **Nanyang Technological University (Singapore)**.

- MATH3100 Real Analysis I
- MATH3110 Ordinary Differential Equation
- HE2022 Industrial Organization

2018-2020 **Zhejiang University (China)**.

- Mathematics: Calculus, Linear Algebra, Probability Theory and Mathematical Statistics, Complex Function and Integral Transforms
- Social Science: Microeconomics, Macroeconomics, Intro to Psychology, Intro to Brain and Mind
- Management: Intro courses of Finance, Accounting and Management
- Programming courses of C, Python, Statistical Analysis

Skills

Skills: Python, LaTeX, R, C, MATLAB.

Languages: Chinese (native), English (fluent)

Extra Activities

2018–2019 **Zhejiang University Student Press Corps**, *Student Reporter*.

2018–2019 **Marketing Association of Zhejiang University**, *Student Member*.

References

Song Lin,
Associate Professor,
Hong Kong University of Science and Technology, Hong Kong,
Department of Marketing, School of Business.
mksonglin@ust.hk

Yunchuan (Frank) Liu,
Associate Professor,
University of Illinois at Urbana-Champaign, IL,
Department of Business Administration, Gies College of Business.
liuf@illinois.edu

Xin Chen,
James C. Edenfield Chair and Professor,
Georgia Institute of Technology, GA,
H. Milton Stewart School of Industrial and Systems Engineering.
xinchen@gatech.edu