

# Jonathan Gu

Senior Machine Learning Engineer & Economist II · Experimentation, Causal Inference, Unit Economics

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Senior ML engineer and PhD economist who turns ambiguous product and marketplace questions into credible experiments, causal measurement, and production decision systems. I build the full loop: metric design, experiment analysis, uplift and incrementality modeling, allocation policies, production pipelines, rollout, monitoring, and business interpretation.

## EXPERIENCE

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### Instacart

2020 – Present · San Francisco

*Senior Machine Learning Engineer & Economist II*

- ▶ Built experimentation and causal-measurement systems for growth, ads, inventory, availability, fulfillment, and marketplace products where model outputs had to become reliable business decisions.
- ▶ **Uplift Growth Targeting:** built the MVP for growth targeting using causal experiment outcomes to prioritize users by expected incremental treatment effect rather than naive conversion propensity.
- ▶ **Causal Marketing Measurement:** measured coupon and marketing incrementality, connecting experiment results, budget allocation, campaign diagnosis, LTV/CAC tradeoffs, and in-app decisioning.
- ▶ **Production Experiment Loops:** translated noisy A/B tests and quasi-experimental evidence into allocation rules, targeting policies, dashboards, alerting, rollout decisions, and product/business recommendations.
- ▶ **Ads Optimized Bidding:** built Instacart's first optimized ads automated bidding system from scratch, replacing manual product-keyword bids with weekly-budget bidding across roughly 70% of Sponsored Products spend (~\$700M annualized).
- ▶ **Inventory Intelligence:** built item-store availability prediction systems across noisy catalog, store, fulfillment, and shopper signals, including real-time LightGBM serving, calibration, thresholding, rollout, and critical-item prioritization.
- ▶ Owned the full production loop: problem framing, metric design, data contracts, features, model/control design, Airflow/Snowflake pipelines, experiments, dashboards, alerting, migration, and rollback.
- ▶ Translated economics training into production practice: causal inference, counterfactuals, auctions, ranking, constrained optimization, calibration, and product metrics under selection bias.

### Microsoft Research New England

2013 – 2014 · Boston

*Research Assistant (Prof. Susan Athey)*

- ▶ Studied Bing search-auction counterfactuals and revenue effects under alternative ranking rules with Prof. Susan Athey; contributed to research on auction design, ranking rules, and causal effects in marketplaces.

## SELECTED EXPERIMENTATION & ECONOMICS SYSTEMS

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### Uplift Growth Targeting · Instacart growth / marketing

Converted causal experiment outcomes into uplift models and targeting policies for incremental growth impact.

### Causal Marketing Measurement · Incrementality / unit economics

Separated observed conversions from true lift and connected experimental evidence to spend allocation and campaign diagnosis.

### Ads Optimized Bidding · Marketplace economics

ROAS estimation, advertiser target/control policy, budget pacing, bid simulation, production pipelines, monitoring, and rollback.

### Production AI Evaluation Systems · jonathangu.com/ads

OpenClawBrain, Bountiful Garden, and Project Pelican: agent memory, local marketplaces, autonomous research, evaluation, monitoring, and safe rollout.

## PATENTS

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**Issued:** US 12,511,677 B2, Automated Policy Function Adjustment Using Reinforcement Learning Algorithm — reinforcement-learning control for automated bidding. **Additional portfolio:** causal targeting, dynamic offers, double-wide ad auctions, retailer classification, fulfillment routing, replacement agents, and item display decisions.

## EDUCATION

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### PhD Economics — UCLA

2014 – 2020

### BA Statistics & Economics — UC Berkeley

2007 – 2011

**ML & Methods:** experimentation, causal inference, A/B testing, incrementality, uplift modeling, LTV/CAC/payback analysis, growth optimization, ads bidding, ranking, evaluation, calibration, reinforcement learning, auction design, constrained optimization, forecasting

**Product AI Systems:** metric design, experiment platforms, evaluation harnesses, assistant memory, marketplace design, autonomous research systems, production monitoring, privacy boundaries, safe rollout, debugging

**Engineering:** Python, SQL, TypeScript, Go · LightGBM, TensorFlow · Airflow, DBT, Snowflake, Kafka, Flink SQL, MLflow, Datadog, Arize

**Systems:** batch and real-time serving, feature pipelines, data quality, monitoring, rollout, shadow validation, cost control, production debugging