# YUYAN WANG

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## ACADEMIC EMPLOYMENT

**Assistant Professor of Marketing,** Stanford University Graduate School of Business          *July 2023 - present*

## EDUCATION

**Princeton University, Princeton, NJ**          *Sept. 2012 - June 2016*
- **Ph.D.** in Statistics, Department of Operations Research & Financial Engineering

**University of Science and Technology of China (USTC), Hefei, China**          *Sept. 2008 - July 2012*
- **B.S Honors** in Statistics, Special Class for the Gifted Young. GPA: 3.95/4.0
- Guo Moruo Scholarship (<1%, highest award for undergrad) and National Scholarship (<1%, twice)

## RESEARCH INTERESTS

**Topics:** Machine Learning, Recommender Systems and Personalization, Consumer Modeling, Long-Term Optimization, Algorithmic Fairness

**Methodologies:** Deep Learning, Reinforcement Learning, Statistical Machine Learning, High-Dimensional Statistics, Causal Inference, Field Experiment, Big Data Analytics

## WORKING PAPERS

- Wang, Y., Tao L., Zhang X.. "Recommending for a Multi-Sided Marketplace: A Multi-Objective Hierarchical Approach."
  - *$2^{nd}$ round revision at Marketing Science.* ***Best Paper Award*** *at CIST 2022.*

- Li, P., Wang, Y., Chi, E.H., Chen, M. "Prompt Tuning Large Language Models on Personalized Aspect Extraction for Recommendations."

- Li, P., Wang, Y., Chi, E.H., Chen, M. "Hierarchical Reinforcement Learning for Modeling User Novelty-Seeking Intent in Recommender Systems."

## JOURNAL PUBLICATIONS

- Li, Q., Cheng, G., Fan, J., <u>Wang, Y.</u> (2018). "Embracing the Blessing of Dimensionality in Factor Models." *Journal of the American Statistical Association, 113.521 (2018): 380-389. (**JASA**).*

- Fan, J., Li, Q., <u>Wang, Y.</u> (Alphabetical order) (2017). "Estimation of High-Dimensional Mean Regression in Absence of Symmetry and Light-tail Assumptions." *Journal of the Royal Statistical Society: Series B (Statistical Methodology) 79.1 (2017): 247-265. (**JRSS-B**).*

- Lin, N., Jing, R., <u>Wang, Y.</u>, Yonekura E., Fan, J., Xue, L. (2017). "A statistical investigation of the dependence of tropical cyclone intensity change on the surrounding environment." *Monthly Weather Review, 145 (7), 2813-2831.*

## CONFERENCE PUBLICATIONS

- Chang B., Karatzoglou A., <u>Wang, Y.</u>**,** Xu, C., Chi, E.H., Chen, M.. "Latent User Intent Modeling for Sequential Recommenders." *Proceedings of the ACM Web Conference 2023 (theWebConf 2023).*
  - *Full paper with oral presentation; Acceptance rate: 19.8%.*

- <u>Wang, Y.</u>, Sharma, M., Badam, S., Xu, C., Sun, Q., Richardson, L., Chung, L., Chi, E.H., Chen, M.. "Surrogate for Long-Term User Experience in Recommender Systems." *Proceedings of the 28th ACM SIGKDD Conference on Knowledge Discovery & Data Mining (KDD 2022).*
  - *Top Computer Science conference. Full paper with oral presentation; Acceptance rate: 15.0%.*
  - *Selected as most influential KDD papers in 2022. Highlighted by an invited talk at KDD 2022.*
  - *Short version accepted to BayLearn 2022.*

- <u>Wang, Y.</u>, Tao L., Zhang X.. "Recommending for a Multi-Sided Marketplace with Heterogeneous Contents." *Sixteenth ACM Conference on Recommender Systems (Recsys 2022).*
  - *Top Recommender Systems conference. 4-page short paper with oral presentation; Acceptance rate: 28.0%. Media coverage: Shaped.*

- <u>Wang, Y.</u>, Zhao, Z., Dai B., Fifty, C., Lin, D., Hong L., Li, W., Chi, E.H.. "Can Small Heads Help? Understanding and Improving Multi-Task Generalization." *Proceedings of the ACM Web Conference 2022 (WWW / theWebConf 2022).*
  - *Full paper with oral presentation; Acceptance rate: 17.7%.*

- Wang, J., Le, Y., Chang, B., <u>Wang, Y.</u>, Chi, E.H., Chen, M.. "Learning to Augment for Casual User Recommendation." *Proceedings of the ACM Web Conference 2022 (WWW / theWebConf 2022).*
  - *Full paper with oral presentation; Acceptance rate: 17.7%.*

- Oberst, M., D'Amour A., Chen M., <u>Wang, Y.</u>, Sontag D., Yadlowsky S. Bias-robust Integration of Observational and Experimental Estimators. *American Causal Inference Conference (ACIC 2022).*
  - *Journal version on arXiv: https://arxiv.org/pdf/2205.10467.pdf.*

- Wang, Y., Wang, X., Beutel, A., Prost, F., Chen, J., Chi, E. H.. "Understanding and Improving Fairness-Accuracy Trade-offs in Multi-Task Learning." *Proceedings of the 27th ACM SIGKDD Conference on Knowledge Discovery & Data Mining (KDD 2021)*.
  - *Top Computer Science conference. Full paper with oral presentation; Acceptance rate: 15.4%.*
  - *Short version accepted to BayLearn 2021.*

- Chen, M., Wang, Y., Xu C., Le, Y., Sharma, M., Richardson, L., Wu S., Chi, E.H.. "Values of User Exploration in Recommender Systems." *Fifteenth ACM Conference on Recommender Systems (Recsys 2021)*.
  - *Top Recommender Systems conference. Full paper with oral presentation; Acceptance rate: 18.4%.*

- Chen, Z., Wang, Y., Lin, D., Cheng, D.Z., Hong, L., Chi, E.H., Cui, C.. "Beyond Point Estimate: Inferring Ensemble Prediction Variation from Neuron Activation Strength in Recommender Systems." *Proceedings of the 14th ACM International Conference on Web Search and Data Mining (WSDM 2021)*.
  - *Full paper with oral presentation; Acceptance rate: 18.6%.*

## PATENTS & BLOGS

- Wang, Y., Zhang, X., Liu, I., Ning, Y., Peng, C. (2021). "Multi-layer Optimization for a Multi-sided Network Service." **U.S. Patent No. 11,127,066**. Washington, DC: U.S. Patent and Trademark Office.

- Zhang, X., Zhang, S., Wang, Y., Gogate, M., Ning, Y., Peng, C. Liu, I., Lee, C. (2021). "Optimizing Listing Efficiency and Efficacy for a Delivery Coordination System." **U.S. Patent No. 11,157,579**. Washington, DC: U.S. Patent and Trademark Office.

- Wang, Y., Ning, Y., Liu, I., Zhang, X. (2018). "Food Discovery with Uber Eats: Recommending for the Marketplace." *Uber Engineering Blog*.
  - *Media coverage: [Top 10 machine learning articles of the month](#).*

## INVITED TALKS & CONFERENCE PRESENTATIONS

- "Recommending for a Multi-Sided Marketplace: A Multi-Objective Hierarchical Approach."
  - UCLA Anderson School of Management. May 2024 *(scheduled)*.
  - Columbia Business School. Mar 2024 *(scheduled)*.
  - UC Berkeley Haas School of Business. Mar 2024 *(scheduled)*.
  - University of Arizona Wieland Speaker Series. Feb 2024 *(scheduled)*.
  - Virtual Quant Marketing Seminar Series (VQMS). Jan 2024 *(scheduled)*.
  - Warrington College of Business, University of Florida. Jan 2024 *(scheduled)*.
  - Peking University Guanghua School of Management. Dec 2023 *(scheduled)*.
  - UChicago Booth Marketing Seminar. Nov 2023.
  - USC Marshall Statistics Seminar. Nov 2023.
  - AIBA Workshop, Temple University (virtual). Oct 2023.
  - Reading Group Sequence on Interference & Marketplace, Stanford GSB. Sept 2023.
  - KDD 2023 "[AI for Open Society](#)" Day Invited Talk. Aug 2023.

- o SICS, Haas School of Business, UC Berkeley. June 2023.
- o University of California, Riverside School of Business. Feb 2023.
- o Coupang, Inc. May 2023.
- o Stern School of Business, New York University. Nov 2022.
- o The Wharton School, University of Pennsylvania. Nov 2022.
- o Stanford Graduate School of Business. Nov 2022.
- o Kellogg School of Management, Northwestern University. Oct 2022.
- o 2022 INFORMS Annual Meeting. Oct 2022.
- o Conference on Information Systems and Technology (CIST) 2022 (**Best Paper Award**).
- o SC Johnson College of Business, Cornell University (virtual). Oct 2022.
- o Naveen Jindal School of Management, UT Dallas. Oct 2022.
- o 16th ACM Conference on Recommender Systems (Recsys 2022). Sept 2022.
- o HKUST Business school (virtual). Sept 2022.
- o CUHK Business school (virtual). Sept 2022.
- o ISMS Marketing Science Conference 2022 (virtual). June 2022.

- "Surrogate for Long-Term User Experience in Recommender Systems."
  - o Netflix Research Seminar Talk. Oct 2023.
  - o DataFun Summit 2023 (virtual). Aug 2023.
  - o Bay Area Machine Learning Symposium (BayLearn) 2022. Oct 2022.
  - o Google Search Tech Talk. Sept 2022.
  - o 28th ACM SIGKDD Conference on Knowledge Discovery and Data Mining. Aug 2022.
  - o Google Research Brain Dump. Feb 2022.
  - o Google Research Conference 2021. Oct 2021.
  - o Google Research Reinforcement Learning Workshop. July 2021.

- "Can Small Heads Help? Understanding and Improving Multi-Task Generalization."
  - o Snap Inc Tech Talks. Nov 2022.
  - o ACM The Web Conference 2022. Apr 2022.

- "User Intent Modeling in Recommender Systems."
  - o CONSEQUENCES+REVEAL '22: Causality, Counterfactuals, Sequential Decision-Making & Reinforcement Learning,16th ACM Conference on Recommender Systems (Recsys 2022 Workshop). Sept 2022 (*Invited Speaker and Panelist*).

- "Moonshot Ally: Assistive Machine Learning for Long-Term User Journeys."
  - o Google Brain Summit. Sept 2022.

- "Understanding and Improving Fairness-Accuracy Trade-offs in Multi-Task Learning."
  - o Mays Business School, Texas A&M University. July 2022.
  - o ISMS Marketing Science Conference 2022 (virtual). June 2022.
  - o Bay Area Machine Learning Symposium (BayLearn) 2021. Oct 2021.
  - o 27th ACM SIGKDD Conference on Knowledge Discovery and Data Mining. Aug 2021.
  - o Faire Wholesale, Inc. July 2021.

- "Food Discovery with Uber Eats: Recommending for the Marketplace."
  - SigOpt. Aug 2019.
  - Facebook Research. June 2019.
  - Airbnb. June 2019.

- "Uber Eats Restaurant Ranking and Recommendation."
  - Moving the World with Data Meetup. San Francisco, CA, Oct 2018.
  - AI Applications @ Uber Eats Meetup. San Francisco, CA, Oct 2017.

- "Robust Approximate Lasso for High-Dimensional Regression."
  - IBM Thomas J. Watson Research Center. Feb 2016.
  - Yale University. Sept 2015.
  - 2015 Joint Statistical Meetings (JSM), Aug 2015.
  - NSF Workshop for Empr Process and Mod Stat Decision Theory. May 2015.

- "Bayesian time series for online query frequency prediction."
  - Internet Services & Research Center, Microsoft Research, Aug 2015.

## INDUSTRY EXPERIENCE

**Google Brain,** Mountain View, CA                                      Oct 2019 – May 2023
- Selected projects:

  **Surrogate for Long-Term Consumer Experience in Recommender Systems**
  - Developed a framework to identify sequential and temporal consumer behavior patterns that are predictive of long-term consumer experience in recommender systems, which is a sparse, noisy and long-horizon signal that is hard to optimize directly. Online large-scale field experiments on an RL-based recommendation system demonstrated significant improvements in key business metrics including consumer growth and retention.
  - Paper accepted to KDD 2022. Quote from a Vice President at Google: "This is an excellent paper. I think the entire Core Experiences team (900+ employees) would benefit from reading it, and I would like to send it to everyone in the Core Experiences team."

  **Understanding and Modeling Consumer Intent for Long-Term Optimization**
  - Developed a framework for extracting consumer intents (e.g. exploration or variety-seeking intent) on the personalized platforms, and a scalable personalized diversification framework based on the predicted intents for long-term optimization.
  - [Invited talk at Recsys 2022](#). Work deployed globally with significant movement in consumer retention.

**Uber Technologies Inc.,** San Francisco, CA                           Sept 2016 - Sept 2019
- Tech lead on Uber Eats home feed ranking and recommendation; Founding member of Uber Eats Data Science team which became a team of 80+ during my time there. Selected projects:

  **Multi-Objective Recommendation for a Three-Sided Marketplace**
  - Developed a personalized multi-objective optimization framework for Uber Eats restaurant recommendation. Online A/B experiments showed significant increases in consumer retention, basket

value and orders for global markets, which translate to $xx million weekly gain in revenue. My work was deployed globally as the recommender system for Uber Eats' homepage.
- Patented the work as first author.
- <u>Media Coverage</u>: First-authored <u>tech blog</u> was selected as <u>top 10 machine learning articles of the month</u> (0.7%) by an independent publisher. Won "Most Impressive Business Impact" award by Uber.

**Holistic Optimization with Heterogeneous & Hierarchical Contents**
- Proposed and developed *HRank*, a holistic recommendation framework for personalized optimal homepage layout, combining machine learning and probabilistic modeling for consumers' browsing behavior on heterogeneous and hierarchical contents.
- *HRank* was deployed globally, which brought a significant increase in consumer conversion rate, amounting to $xx million weekly gain in revenue.
- My work was featured in Uber's company-wide Machine Learning Orientation video which was circulated among 500+ ML engineers and applied scientists.

**Microsoft Research**, Redmond, WA                                                    June 2015 - Aug 2015

**Morgan Stanley**, New York City, NY                                              June 2014 - Aug 2014

## ACADEMIC SERVICES

| | |
|---|---|
| **Reviewer:** Marketing Science, Management Science | 2023 - Present |
| **Program Committee Member:** Workshop on Platform Analytics (WoPA) | 2024 |
| **Program Committee Member:** Recsys | 2023 - Present |
| **Reviewer**: Recsys, KDD, NeurIPS, ICML, CIKM, TheWebConf. | 2019 - Present |
| **Reviewer**: Google PhD Fellowship. | 2021 – 2022 |
| **Session chair**, Conference on Information Systems and Technology (CIST) 2022. | June 2022 |
| **Organizer** and **session chair**, Workshop on Action, Task and User Journey Modeling. | Oct 2022 |
| **Session chair**, ISMS Marketing Science Conference 2022. | June 2022 |
| **Session chair**, Long-term Dynamics for Responsible Recommendation Systems Workshop'21. | Nov 2021 |
| **TPC member**, Reinforcement Learning for Real Life (RL4RealLife) Workshop @ ICML 2021. | July 2021 |

## TEACHING EXPERIENCE

**Guest Lecture / Tutorials**
- A Gentle Introduction to Recommender Systems.
    - Yale School of Management (SOM).                                        Apr 2023
    - USC Marshall School of Business.                                         Feb 2023
    - Stern School of Business, New York University.                    June 2022
    - Heinz College, Carnegie Mellon University.                         Sept 2021
- Experimentation and A/B Testing Best Practices.
    - Uber Technologies.                                                               Oct 2018

**Mentorship**
- Mentor for Undergraduate Consortium at KDD 2022 (KDD-UC)          June 2022 - June 2023
- CSRMP mentor for students from historically marginalized groups.          Nov. 2021 - May 2023
- Mentor for one **student researcher** and two **interns** at Google Brain          May 2021 - May 2023
- Mentor for two **full-time** team members and one **intern** at Uber.          June 2017 - Sept 2019

**Assistant Instructor at Princeton University**

- ORF 504: Financial Econometrics                                                      Spring 2016
- ORF 245: Fundamentals of Statistics                        Spring 2014, Spring 2015, Fall 2015
- ORF 405: Regression and Applied Time Series Analysis                   Fall 2013, Fall 2014

## SELECTED AWARDS

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|---|---|
| Best Paper Award, CIST 2022 | Oct 2022 |
| Cummins Merit Fellowship, Princeton University | Jan 2013 |
| Guo Moruo Scholarship, USTC (<1%, highest award for undergrad) | May 2012 |
| Outstanding Research Award, USTC | Feb 2012 |
| CSST Award, UCLA (6 out of 90) | Sept 2011 |
| National Scholarship, Ministry of Education of China (<1%) | Nov 2010, Nov 2009 |