HAN WANG

407B, 3401 Walnut St., Philadelphia, PA 19104

(+1)267-570-6839 ⋄ wanghan2@sas.upenn.com

EDUCATION

University of Pennsylvania,Philadelphia, PA *2018 - Present*
M.A. in Applied Mathematics
Department of Applied Mathematics and Computational Science
Advisor: Victor M. Preciado
GPA: 4.00 / 4.00

National University of Singapore, Singapore *2016 - 2018*
M.S in Mathematics
Department of Mathematics
Advisor: Haizhao Yang
GPA: 4.75 / 5.00

Stanford University, CA, USA *2015*
Summer school in Financial Modeling and Statistics

Capital University of Economics and Business, Beijing, China *2013 - 2016*
B.S in Economics
Department of Economics
Advisor: Jiazhang Zhao
GPA: 4.24 / 5.00 Rank: 1 / 121

RESEARCH INTERESTS

My research interests lie in the intersection of **Machine Learning, Optimization, Control Theory**. I want to exploit robust control ideas to design robust algorithms for nonconvex optimization, provide theoretical insights or mathematical framework for understanding deep learning and verify the robustness of learning-based problems. Also, I want to investigate the connection between robust control and deep reinforcement learning.

PUBLICATIONS

1. **Han Wang**, Mahyar Fazlyab, Shaoru Chen and Victor Preciado. *Robust Convergence Analysis of Three-Operator Splitting.* Allerton Conference on Communication, Control, and Computing, Urbana, IL, 2019. [pdf]

2. Jiang Chen, **Han Wang**, Xin Zhang, Sihan Chen and Zongyu Bao. *Analysis of carbon emissions from transportation in Beijing*, International Journal of Services Technology and Management, 22:271-286,01 2016.

3. **Han Wang**, Shaoru Chen, Nikolai Matni, Victor Preciado. *Robust Modern Predictive Control via System Level Synthesis* (To be submitted to Automatica). [pdf]

HONORS AND AWARDS

- National Scholarship (top 1% students nationwide)
- First Prize in the Chinese Mathematical Contest (8/ 70,000)
- President Scholarship (top 10 students in university and I ranked 1st)
- Chinese Telecom Scholarship (top 5000 students nationwide)
- Outstanding Undergraduate Thesis
- Meritorious Winner of The Interdisciplinary Contest in Modeling

RESEARCH PROJECTS

Analysis of Three Operator Splitting Using Integral Quadratic Constraints
University of Pennsylvania   Advisor: Victor M. Preciado   *Mar 2019 ∼ July 2019*
• Proposed a unified framework for certifying both linear and sublinear convergence rates for three-operator splitting method under a variety of assumptions about the objective function.
• Leveraged robust control theory to analyze the worst-case performance of the algorithm using matrix inequalities by viewing the algorithm as a dynamical system with feedback uncertainty.
• Paper accepted by the 57-th (2019) Allerton Conference on Communication, Control, and Computing.

Robust Model Predictive Control via System Level Synthesis
University of Pennsylvania   Advisor: Nikolai Matni   *Aug 2019 ∼ Present*
• Used System Level Synthesis (SLS) from robust control theory to solve the robust MPC problem with time variant dynamics and uncertainties over closed-loop system responses.
• Greatly reduced the conservativeness of the solutions to the robust optimal control problem by exploiting the linear fractional transform structure of the SLS reformulation.
• Significantly reduced the computational complexity compared with dynamic programming based robust MPC methods.

Counterfactual Programming in Wireless Communication
University of Pennsylvania   Advisor: Alejandro Ribeiro   *Sept 2019 ∼ Present*
• Leveraged duality theory to design a stochastic counterfactual optimization algorithm that simultaneously determines the optimal constraint violation while solving the nonconvex problem of optimal power allocation in wireless fading channels.
•Will use deep neural networks (DNNs) to represent the power allocation and develop a stochastic primal-dual learning method to obtain the optimal violation and find the optimal allocation policies.

INTERNSHIP

Economic Researcher, BMW group (Beijing, China)   April 2017 ∼ July 2017

• Utilized statistical methods like SARIMA, SVM or BP to forecast macroeconomic index.
• Predicted CPI by using dynamic regression model and foreign exchange rate by using ARIMA+SVM.
• Predicted the growth rate of GDP by exploiting GARCH combined with SVM. Simulate the short-term trend of the population by GM $(1, 1)$ and long-term trends with partial differential equations.

SELECTED COURSES

• **Mathematics:** Complex Analysis, Real Analysis, Functional Analysis, Advanced Algebra, Measure Theory, Probability, Advanced Mathematical Programming, Stochastic Process II, Stochastic Analysis in Mathematical Finance, Optimization Methods in Machine Learning, Topics of Applied Mathematics II (Deep Learning).
• **Engineering Mathematics:** Linear System, Learning and Control, Mathematics for Visual Data Processing, Data-driven Modeling and Probabilistic Scientific Computing, Data Modelling and Computation (Machine Learning, Audit).
• **Statistics and Finance:** Mathematical Statistics, Bayesian Statistics, Stochastic Analysis of Networks, Statistical Models: Theory and Applications, Time Series Analysis, Game Theory and Information Economics, Econometrics.