George Wang

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Education

University of Pennsylvania — Philadelphia, PA
PhD, Mathematics (Algorithmic Combinatorics) — 2016 – 2021 (Expected)

University of Southern California — Los Angeles, CA
BS, Mathematics — 2012 – 2016

Selected Projects

Daily Fantasy Sports | Python, Integer Linear Programming — 2020 – Present
- Volatile but positive cash flow, experimentally positive expected value based on backtesting
- Used **integer linear programming** to generate diversified lineups for DraftKings contests (NFL, NBA)
- Approached the top-heavy payout as a set covering problem, strategy centered on stacking correlations
- Used player **data analysis (pandas) and backtesting** to optimize constraints for linear optimization

C1 Terminal Competition | Python, Game AI Hackathon — 2021
- Worked in a team of two to rapidly implement and iterate strategies over five days
- 6th place and $1000 prize earned, corresponding to ∼**99.8th percentile** of applicants

Kaggle Halite Competition | Python, Deep Reinforcement Learning — 2020
- Led a team of four to create an AI for a four player resource collection game
- Trained and iterated **multiple deep reinforcement learning frameworks (PyTorch)** through self-play
- Constructed complex loss functions to **adapt single-agent frameworks to a multi-agent setting**

Arbitrage in "Magic: The Gathering" | Python, Automated Trading — 2019 – 2020
- Positive cash flow, ∼**300% return over 4 months**, production running 24/7 via AWS
- Generated and cleaned **over 1 billion rows of data** using data interception and computer vision
- Conducted **simultaneous arbitrage** across multiple exchanges **to exploit market maker mispricing**

Selected Publications

Research methodology typically centers around **pattern recognition on computer generated experimental data sets** to produce conjectures, which are then proven using carefully tailored **combinatorial algorithms**.

1. Locks fit into keys: a crystal analysis of lock polynomials — 2020
   George Wang, *Annals of Combinatorics*
2. Some conjectures on the Schur expansion of Jack polynomials — 2019
   Per Alexandersson, Jim Haglund, **George Wang**, *Journal of Combinatorics*
3. A cornucopia of quasi-Yamanouchi tableaux — 2019
   George Wang, *Electronic Journal of Combinatorics*
4. Enumerating quasi-Yamanouchi tableaux of Durfee size two — 2016
   George Wang, *Preprint, arXiv:1610.04206*
5. Multilinear polynomials of small degree evaluated on matrices over a unital algebra — 2016
   Katherine Cordwell, **George Wang**, *Linear Algebra and its Applications*
6. Effect of the Imaginary Part of the Refractive Index on Light Scattering by Spheres — 2015
   George Wang, Amit Chakrabarti, Christopher M. Sorensen, *Journal of the Optical Society of America A*

Leadership and Outreach

Directed Reading Program | Co-organizer, Mentor — 2019 – Present
- Facilitated and oversaw over 50 grad mentor/undergrad mentee independent study pairs

Teacher Training Program | Master TA — 2019 – Present
- Designed and presented training curriculum as a team of five, evaluated and mentored new math TAs

Math Fest | Lead organizer — 2018 – 2019
- Managed grad student volunteers to design and run an outreach program with 100+ participants

Graduate Student Combinatorics Conference | Grant writer, lead organizer — 2019
- Grant writer for ∼**$50,000 total funding** from NSA and NSF, supported ∼80 participants nationwide

Awards

NSF Graduate Research Fellow — 2017 – Present

University of Pennsylvania Calabi Scholar — 2016 – Present