Xingyou (Richard) Song

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Education

University of California, Berkeley, B.S. Computer Science - Class of 2018, GPA: 3.86/4.0

Research Experience

- **Microsoft Research, Theory/ML Group Intern:** May 2016 - August 2016 in Beijing **Host**: Wei Chen. Analyzed varying ways of submodular optimization techniques to aid in speed-up and effectiveness of social network propagation behavior on 100k-node graphs. Investigated the theoretical promise of online convex optimization for Nash equilibrium computation on multi-party social networks. Also studied generalizations of multi-armed bandit (Thompson Sampling) algorithms for graphs.
- **UCSD Quantum Algorithms Group**: Summer 2013 -in UCSD, San Diego - Worked under Professor David Meyer to find discretized quantum random walk models for variants of the Dirac Equation. *Quantum Cellular Automata Models for General Dirac Equation*

Industry Experience

- **Citadel LLC, Quantitative Research Intern:** June 2017 - August 2017 in Chicago. **Team:** Quantitative Strategies (Market Making). Used a variety of robust clustering algorithms (DBSCAN, subspace clustering, spectral) and computer vision techniques for noisy popular foreign stock return data. Optimized the factor models and robust dimensionality reduction techniques for better stock return prediction and trading systems. Also investigated client trade data for strategic patterns and toxic behaviors.
- **VMWare Winter Extern:** Jan 2017 - Jan. 2017 - in Palo Alto headquarters, visited cloud computing services as an extern.
- **Microsoft Research, Theory/ML Group:** May 2016 - August 2016 in Beijing - See above in Research Experience.

Awards

- **Microsoft Research Asia Student Award** (2016)
- **UC Berkeley EECS Honors Degree Program** (2015), **Phi Beta Kappa Honors** (2017)
- **Putnam Competition** Top 120 (2016), Top 200 (2014)
- **USA Physics Olympiad** Top 100 (2014), **USA Computing Olympiad** Gold Qualification (2015)
- **USA Junior Math Olympiad Honorable Mention**, Top 24 in nation (2012); **USA Math Olympiad**, Top 40 in the nation out of 200,000 total contestants. (2013)

Programming Skills and Personal Projects

- Proficient in Python/Numpy/Scikit/TensorFlow/PyTorch, C++/C, SAGE, Mathematica, LaTeX, MatLab, R
- Github and Website contain various personal/class projects. Examples include: Sentiment Analysis for Stocks, Deep Reinforcement Learning Code, Delaunay Triangulation, Asssembly Linkers, Chess AI, Expository Papers, etc.

Research Efforts and Papers

- **Random Spanning Tree Sampling on Directed Graphs** - ongoing with graduate student to find faster algorithms for generating spanning trees on directed graphs using new directed Laplacian solvers.
- **Efficient equilibrium computation on social networks** - ongoing research to use online optimization algorithms on cascading networks based on algorithmic game theory.
- Quantum Cellular Automata Models for General Dirac Equation - http://arxiv.org/abs/1610.02425, (2013)

Selected Coursework

- Machine Learning and Statistics: Deep Learning for Time Series, Special Deep Learning topics, Graphical Models/Statistical Learning, Online Convex Opt/Comp. Learning Theory, High Dimensional Statistics,
- Algorithms and Optimization: Advanced Algorithms, Graph partitioning, Online Algorithms, Property testing/Sublinear algs, Matrix Computation, Computational Geometry
- Math and Theory: Theory's Greatest Hits, Cryptography, Lie Groups, Algebraic Topology, Probabilistic Checkable Proofs

Volunteering/Service

- (BMT) - 2016, 2017 - Helped run and write math competition held in UC Berkeley for 400 students.
- (ASDAN) - 2016 - Helped run and write Algebra test for math competition held in Beijing hosted by Stanford for 700 students
- (DRP) Directed Reading Program 2016 - Reading CS Theory related papers (Unique games conjecture, PCP Theorem) and presented Hardness of Approximation under a graduate student mentor - Daniel Fremont
- (UPE) Upsilon Pi Epsilon - 2016 CS Honor Society/Fraternity, helping with industry relations, volunteering, etc.
- (MLatB) 2016 - Machine Learning at Berkeley advisor for theoretical machine learning problems.
- (AoPS) Art of Problem Solving - October 2015 - March 2016 - Grader and TA for WOOT, I mentored and graded for the highest level class offered to students training for contests such as the US Math Olympiad (USAMO) and International Math Olympiad (IMO).
- (A*) December 2015 - I taught for the A* Winter math camp in preparing students for math competitions.

Talks

- Limitations of Submodular Sampling - *MSR Asia Theory Group*, Beijing - China, August 2016
- MAX-CUT Inapproximability and the PCP Theorem, UC Berkeley, April 2016
- Fast Convergence of Regularized Learning in Games, UC Berkeley, December 2016
- CSP-Inapproximability under UGC Hardness, UC Berkeley, May 2017