Chi-Ning Chou

+886-9-18510264
cnchou@iis.sinica.edu.tw
www.cnchou.tw

Research Interests

Complexity Theory, Algorithm Analysis, Combinatorics, Optimization, Cryptography, and Statistics

Education

National Taiwan University (NTU), Taipei, Taiwan Sep. 2012 - June 2016
Bachelor of Computer Science & Information Engineering, Minor in Mathematics

- GPA 4.17/4.3 (3.98/4.0); Graduated with class rank 2^{nd} out of 104 and received 5 Presidential Awards.

Work Experience

Research Assistant July 2016 - present
Institute of Information Science, Academia Sinica, Taipei, Taiwan

- Investigating the computational power of the spiking neural network.
- Coordinating and presenting in seminar on randomness extractors and reading group on quantum computation.

Undergraduate Research Assistant Sep. 2015 - June 2016
Institute of Statistical Science, Academia Sinica, Taipei, Taiwan

- Designed and analyzed a dynamic difficulty scheme in Bitcoin. The result was filed as an U.S. Patent.

Undergraduate Summer Intern July 2015 - Aug. 2015
Institute of Information Science, Academia Sinica, Taipei, Taiwan

- Attended winter school in cryptography, and studied pseudorandomness and black-box separation.

Research Experience

Computational Aspects of Spiking Neural Networks (Manuscript)
Advisors: Dr. Kai-Min Chung, Dr. Chi-Jen Lu

- Formulated a theoretical study on the computational aspect of a specific spiking neural network (SNN).
- Derived the first asymptotic results proving that the firing rate of SNN solves the linear system.
- Observed that SNN is approximating the ℓ_1 minimization problem and developed a geometric-optimization connection to explain the discovery.

Computational and Statistical Gaps in Mixture Models (Technical Report)
Advisor: Prof. I-Hsiang Wang

- Aimed for separations between counting and locating problems in mixture model in sample/time complexities.
- For the sample complexity, found a quadratic separation when the minimum distance between the components is large, and a linear separation when the minimum weight of the components is small.
- For the time complexity, studied the Sum-of-Square (SOS) method and its recent lower bound for the planted clique problem. Currently working on proving the SOS lower bound for the locating problem.

Dynamic Difficulty Scheme in Bitcoin (Manuscript)
Advisors: Prof. Shih-Wei Liao, Dr. I-Ping Tu

- Designed a dynamic difficulty scheme in Bitcoin on the assumption of semi-address identifiability.
- Showed that the probability of double spending will decrease exponentially in the number of blocks.
- Shih-Wei Liao, Che-Jui Chang, **Chi-Ning Chou**. *Electronic currency management method and electronic currency system.* U.S. Patent, filed Oct. 5^{th}, 2015.

Teaching Experience

Teaching Assistant, Formal Languages and Automata Theory Sep. 2016 - Jan. 2017
Department of CSIE, NTU, Taipei, Taiwan

Teaching Assistant, Cryptography, Summer School July 2016 - Aug. 2016
Institute of Mathematics, Academia Sinica, Taipei, Taiwan

Teaching Assistant, Data Structures and Algorithms Feb. 2015 - June 2015
Department of CSIE, NTU, Taipei, Taiwan

Honors & Awards

Governmental Fellowship for Studying Abroad 2017 - 2020

- Funded by Ministry of Education, Taiwan, USD 120,000.

Mrs. May Jen Memorial Scholarship Nov. 2015

- In recognition of the exceptional performance of undergraduate students.

Presidential Awards (5 times), National Taiwan University 2012 - 2014

- Awarded for the Fall '12, Spring '13, Fall '13, Spring '14, and Fall '14 semesters.
- Awarded to the top 5% of students in each department in terms of GPA for that semester.

Third Prize in National Physics Competition Jan. 2012

- Top 20 students in the national finals.

Academic Experience

Visiting Student July 2016
Institute of TCS, Shanghai University of Finance and Economics, Shanghai, China

- Attended the summer school, *Highlights of Theoretical Computer Science*, lectured by Prof. Jin-Yi Cai.
- Presented my SNN research to local researchers and exchanged ideas for potential new directions.

Summer School, Cryptography July 2015 - Aug. 2015
Institute of Mathematics, Academia Sinica, Taipei, Taiwan

- Studied traditional and lattice-based cryptography as well as related mathematical tools.
- Mentored four undergraduates to study the seminal paper, *Candidate indistinguishability obfuscation and functional encryption for all circuits*, and prepared a two-hour presentation.

Summer School, Mathematical Signal Processing and Data Analysis June 2014 - July 2014
Institute of Mathematics, Academia Sinica, Taipei, Taiwan

- Studied Fourier analysis, compressed sensing, principal component analysis, etc.
- Attended 10+ talks on both theoretical and practical topics about data analysis.

Highlighted Coursework

Theoretical Computer Science (Straight A's)
Computing Theory, Information Theory, Introduction to Computational Mathematics, Algorithm Design and Analysis, Mathematical Analysis of Algorithms, Advanced Topics in Database Theory (auditing).

Mathematics (Straight A's)
Advanced Calculus (I, II), Abstract Algebra (II), Applied Algebra, Graph Theory (I, II), Stochastic Processes, Advanced Statistical Inference (I), Elementary Model Theory, Introduction to Mathematical Logic.

Seminar/Reading Group
Randomness Extractor seminar (coordinator), Differential Privacy seminar, Statistical Learning Theory Reading Group, High-dimensional Statistics Reading Group, Quantum Computing Reading Group (coordinator).

Extracurricular Activities

Active Learner, Center for Teaching and Learning Development, NTU Oct. 2015 - May 2016
Topic: Exploring the limit of computing and self-learning

- Studied advanced computational complexity and pseudorandomness.
- Wrote 10+ technical blog posts in English and a 200+ page book in Chinese on computational complexity.

NTU Varsity Baseball Team Sep. 2012 - May 2015
Starting Infielder

- Won 6^{th} place in a college baseball national tournament out of 100+ teams.
- Won championship in the Taipei College Baseball Tournament out of 20+ teams, three years in a row.

Volunteering Experience Feb. 2013 - July 2015

- Teaching underprivileged and mentally-disabled children one night per week for two years.