Chi-Ning Chou

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Research Interests

Complexity Theory, Algorithm Analysis, Combinatorics, Optimization, and High-dimensional Statistics

Education

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

- GPA 4.17/4.3 (3.98/4.0); Ranked 2nd out of 104.
- 5-time recipient of Presidents Awards. (top 5% each semester)
- Member of Networked Information and Communications Lab; Advisor: Professor I-Hsiang Wang.
- Member of Cryptography and Computational Complexity Lab; Advisor: Dr. Kai-Min Chung.

Work Experience

Research Assistant, Cryptography and Computational Complexity Lab July. 2016 - present
Institute of Information Science, Academia Sinica, Taipei, Taiwan.

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

Summer Intern, Cryptography and Computational Complexity Lab June. 2015 - July. 2015
Institute of Information Science, Academia Sinica, Taipei, Taiwan.

Research Experience

Computational Aspects of Spike Neural Networks (Manuscript)
Advisor: Dr. Kai-Ming Chung, Dr. Chi-Jen Lu

- Formulated a theoretical study on the computational aspect of spike-based neural network.
- Discovered and proved the connection of spike neural network and ℓ_1 minimization problem.
- Proposed new algorithmic tool by using spike as a light-weight projection method.

Computational and Statistical Tradeoff in Graphical Problems (Technical report)
Advisor: Prof. I-Hsiang Wang

- Surveyed the theoretical works on planted clique problem and its applications in providing computational hardness guarantee for network problems.
- Worked on proving information-theoretic hardness results and designing rate-optimal algorithm for planted subgraph problem under locating and detecting settings.
- Surveyed the Sum-of-Square methods and its recent planted clique lower bound result.

Analysis of the Number of Components in Stochastic Mixture Models (Technical report)
Advisor: Prof. I-Hsiang Wang

- Defined the estimation and testing problems for the number of components in stochastic mixture models.
- Designed testing algorithm for low dimension Gaussian mixture model and proved tight lower bound under certain separation condition.

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

- Under the assumption of semi-address identifiability, designed a dynamic difficulty scheme in Bitcoin in order to improve the efficiency while preserving security.
- Design a stochastic model for analyzing the dynamic difficulty scheme and showed that the probability of double spending will decrease exponentially with respect to the number of blocks.
- Shih-Wei Liao, Che-Jui Chang, Chi-Ning Chou. *Electronic currency management method and electronic currency system.* US Patent, filed Oct 5th 2015.

Honors & Awards

Government Fellowship for Studying Abroad 2017-2020
- Funded by Ministry of Education, Taiwan, USD 120,000.

Mrs. May Jen Memorial Scholarship 2015
- In recognition of the exceptional performance of undergraduate students.

Presidential Awards, National Taiwan University 2012-2014
- Sequentially awarded for 5 semesters from Fall 12' to Fall 14'.

Mr. Chien Shih-Liang Memorial Scholarship 2014
- In recognition of the exceptional performance of undergraduate students.

Third Prize in National Physics Competition 2012
- Top 20 students in the national finals.

Professional Experience

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

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

Winter School, Parallel Programming for Multicore/Manycore Clusters Feb. 2015
Department of Mathematics, NTU, Taipei, Taiwan.

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

Teaching Experience

Teaching Assistant, Formal languages and automata theory Sep. 2016 - Jan. 2017
Department of CSIE, NTU, Taipei, Taiwan.

Teaching Assistant, Cryptography, Winter School July. 2015 - Aug. 2015
Institute of Mathematics, Academia Sinica, Taipei, Taiwan.

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

Highlighted Coursework

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

Mathematics
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, Differential privacy seminar, Quantum Computing Reading Group, Statistical Learning Theory Reading Group, High-dimensional Statistics Reading Group

Extracurricular Activities

Active Learner, NTU Oct. 2015 - May 2016
Topic: Exploring the limit of computing and self-learning
- Studied advanced computational complexity and pseudorandomness by following on-line lecture notes.
- Wrote 10+ technical blog posts in English and a 200+ pages book about computational complexity in Mandarin.

Interdisciplinary Study Group, NTU Aug.2014 - June. 2015
Founder & Organizer

- Leading 20+ members from various department, ranging from CS and EE to Mathematics, Psychology, Biology, Geography etc.
- Arranging 20+ meetings in which the members presented their own expertises.

NTU Varsity Baseball Team Sep. 2012 - May 2015
Starting Infielder.
- Won the championship of Taipei college baseball tournament out of 10+ teams two years in a roll.

Volunteering Experience Feb. 2013 - July 2015
- Teaching underprivileged and mentally disabled children one night a week for two years.

References

Doctor Kai-Min Chung, Associate Research Fellow, Institute of Information Science, Academia Sinica
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- Address: Room 716 New Building, No 128, Academia Road, Section 2, Nankang, Taipei 11529, Taiwan
- Email: kmchung@iis.sinica.edu.tw

Professor I-Hsiang Wang, Assistant Professor, Department of Electrical Engineering, NTU
Advised for undergraduate research
- Address: MD-524, No 1, Roosevelt Rd. Sec. 4, Taipei 106, Taiwan
- Email: ihwang@ntu.edu.tw