Chi-Ning Chou

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Research Interests

Theoretical Computer Science, Applied Mathematics

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, with 5 Presidents Awards (top 5% each semester)

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.

Undergraduate Research Assistant, Networked Information and Communications Lab
Department of EE, NTU, Taipei, Taiwan. Feb. 2015 - June. 2016

Research Experience

Computational Aspects of Spike Neural Networks (manuscript)
Advisor: Dr. Kai-Ming Chung

- Initiated theoretical study on 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
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.

Estimating and Testing the Number of Components in Gaussian Mixture Models
Advisor: Prof. I-Hsiang Wang

- Defined the estimation and testing problems for the number of components in Gaussian Mixture Models.
- Designed testing algorithm for low dimension GMM 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.

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, 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, Discrete Mathematics, Mathematical Analysis of Algorithms, Elementary Model Theory, Introduction to Mathematical Logic, Formal Languages and Automata Theory

Mathematics
Calculus (I, II), Advanced Calculus (I, II), Linear Algebra (I, II), Abstract Algebra (II), Applied Algebra, Graph Theory (I, II) Stochastic Processes, Probability, Advanced Statistical Inference (I)

On-line/Auditing
Advanced topics in database theory (NTU Spring 16'), Proofs, beliefs, and algorithms through the lens of sum-of-squares (Harvard Fall 16'), Pseudorandomness (Harvard), Cryptography (Coursera), Machine Learning (Coursera).

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 for 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
Advised for undergraduate research

- 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