

Hsin-Yuan Huang (Robert)

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EDUCATION

Ph.D., California Institute of Technology

Oct. 2018 - Now

Advised by John Preskill (Physics) and Thomas Vidick (CS, Math).

Participated in “Quantum Machine Learning for High Energy Physics” led by Maria Spiropulu (Caltech), Seth Lloyd (MIT) and Daniel Lidar (USC).

B.S., National Taiwan University

Sep. 2014 - Jun. 2018

Studied in Computer Science (major) and Physics (minor). GPA: 4.30/4.30, Rank: 1/120.

Member of the Machine Learning and Data Mining Group; Advisor: Chih-Jen Lin

RESEARCH EXPERIENCE

Research Intern, Google AI Quantum, Mentor: Jarrod R. McClean

Jun. 2020 - Now

Research Assistant, Institute for Quantum Information and Matter, Caltech

Oct. 2018 - Now

Visitor, Centre for Quantum Technologies, Host: Patrick Rebentrost

Jul. 2019 - Aug. 2019

Research Intern, Allen Institute for Artificial Intelligence, Mentor: Wen-tau Yih

Jun. 2018 - Sep. 2018

Research Intern, Microsoft Research, Redmond, USA, Mentor: Chenguang Zhu

Jun. 2017 - Sep. 2017

Research Assistant, Dept. of Computer Science, NTU, PI: Chih-Jen Lin

Sep. 2014 - Jun. 2018

Research Assistant, Dept. of Life Science, NTU, PI: Hsueh-Fen Juan

May 2013 - Aug. 2014

Research Assistant, Institute of Earth Sciences, Academia Sinica, PI: Fong Chao

Mar. 2012 - Mar. 2013

ACADEMIC PAPERS

- [1] **H.-Y. Huang**, R. Kueng, J. Preskill. Provable classical machine learning for predicting quantum many-body ground states. In preparation.
- [2] **H.-Y. Huang**, M. Broughton, J. R. McClean. Power of data in quantum machine learning. In preparation.
- [3] C.-F. Chen, **H.-Y. Huang**, R. Kueng, J. Tropp. Quantum simulation via randomized product formulas: Low gate complexity with accuracy guarantees. arXiv preprint, arxiv:2008.11751, 2020.
- [4] A. Elben, R. Kueng, **H.-Y. Huang**, R. van Bijnen, C. Kokail, M. Dalmonte, P. Calabrese, B. Kraus, J. Preskill, P. Zoller, B. Vermersch. Mixed-state entanglement from local randomized measurements. To appear on Physical Review Letter, 2020.
- [5] **H.-Y. Huang**, R. Kueng, J. Preskill. Predicting many properties in a quantum system from very few measurements. Nature Physics, 2020.
- [6] **H.-Y. Huang**, K. Bharti, P. Rebentrost. Near-term quantum algorithms for linear systems of equations. arXiv preprint, arxiv:1909.07344, 2019.
- [7] **H.-Y. Huang**, R. Kueng. Predicting features of quantum systems using classical shadows. In *23rd Annual Conference on Quantum Information Processing (QIP-20)*, 2020. (single-track talk)
- [8] **H.-Y. Huang**, E. Choi, W. Yih. FlowQA: grasping flow in history for conversational machine comprehension. In *7th International Conference on Learning Representations (ICLR-19)*, 2019.

- [9] **H.-Y. Huang**, C. Zhu, Y. Shen, W. Chen. FusionNet: Fusing via Fully-aware attention with application to machine comprehension. In *6th International Conference on Learning Representations (ICLR-18)*, 2018. (top 3% in review score)
- [10] H.-F. Yu, **H.-Y. Huang**, I. S. Dhillon, C.-J. Lin. A unified algorithm for one-class structured matrix factorization with side information. In *31st AAAI Conference on Artificial Intelligence (AAAI-17)*, 2017. (acceptance rate: 24.6%)
- [11] **H.-Y. Huang**, C.-J. Lin. Linear and kernel classification: When to use which? In *SIAM International Conference on Data Mining (SDM-16)*, 2016. (acceptance rate: 25.8%)
- [12] C.-Y. Chen, A. Ho, **H.-Y. Huang**, H.-F. Juan and H.-C. Huang. Dissecting the human protein-protein interaction network via phylogenetic decomposition. In *Scientific Reports*, 4, 7153 (2014).

SELECTED AWARDS AND HONORS

Awards for Academic Excellence:

First Place Scholarship, Ministry of Education (awarded to Olympiad medalists ranking top 1)

2015, 2016, 2017, 2018

Presidential Award, National Taiwan University (awarded to students ranking top 5%)

Fall / Spring 2015, 2016, 2017, 2018

Awards for Competition in Algorithm and Informatics:

25th International Olympiad in Informatics, Bronze Medal

Jul. 2013

2013 Asia-Pacific Informatics Olympiad, Silver Medal

May 2013

National Informatics Olympiad in Taiwan, First Place

Dec. 2012

ORAL AND POSTER PRESENTATIONS

- [1] "Predicting Many Properties of a Quantum System from Very Few Measurements", Caltech Institute for Quantum Information and Matter (IQIM) Seminar, Apr. 17th, 2020.
- [2] "Predicting Features of Quantum Systems using Classical Shadows", Single-track talk, 23rd Annual Conference on Quantum Information Processing (QIP-20), Jan. 6-10, 2020.
- [3] "Understanding Machine Reading Comprehension", Invited Talk, Academia Sinica, Oct 16, 2017.
- [4] "A Unified Algorithm for One-class Structured Matrix Factorization with Side Information", 31st AAAI Conference on Artificial Intelligence (AAAI-17), Feb. 4-9, 2017.
- [5] "Linear and Kernel Classification: When to Use Which?", SIAM International Conference on Data Mining (SDM16), May 5-8, 2016.
- [6] "Linear and Kernel Classifier: When to Use Which?", Spotlight presentation (acceptance rate: 11%), Machine Learning Summer School (MLSS'15), Kyoto University, August 23-September 4, 2015.
- [7] "Brief Introduction to Automatic Machine Learning", Science Exploration Forum, National Taiwan University, August 11, 2015.
- [8] "Dissecting Human Protein-Protein Interaction Network via Phylogenetic Decomposition." 14th International Conference on Systems Biology (ICSB2013), August 30-September 3, 2013.

SYNERGISTIC ACTIVITY

Conference review: 34th Conference on Neural Information Processing Systems (2020), 23rd Annual Conference on Quantum Information Processing (2019).

Journal review: Physical Review A (2020), Quantum Machine Intelligence by Springer (2019).

Teaching Assistant: Introduction to the Theory of Computation (2017).

Conference volunteer: AAAI Conference on Artificial Intelligence (2017).

Conference review: Asia Pacific Bioinformatics Conference (2017).

Journal review: Data Mining and Knowledge Discovery (2016).

OTHER AWARDS AND HONORS

<i>Kortschak Scholarship</i>	<i>Oct. 2018</i>
<i>The Phi Tau Phi Scholastic Honor Society of the Republic of China</i>	<i>Jun. 2018</i>
<i>Undergraduate Research Project Exhibition, First Place</i>	<i>Jun. 2017</i>
<i>Appier Scholarship</i>	<i>Apr. 2016, Feb. 2017</i>
<i>AAAI Conference on Artificial Intelligence 2017 Scholarship</i>	<i>Feb. 2017</i>
<i>Shih-Liang Chien Memorial Award</i>	<i>May. 2016</i>
<i>SIAM International Conference on Data Mining 2016 Travel Award</i>	<i>Apr. 2016</i>
<i>Machine Learning Summer School 2015 Travel Award</i>	<i>Oct. 2015</i>
<i>Wang Da Gang Natural Science Scholarship</i>	<i>May 2013</i>
<i>Taiwan International Science Fair, Third Prize</i>	<i>Nov. 2012</i>
<i>Science Research Grant for High School Student, First Prize</i>	<i>Nov. 2012</i>
<i>Taipei High School Informatics Competition, First Place</i>	<i>Oct. 2012</i>
<i>Taipei High School Informatics Competition, Third Place</i>	<i>Oct. 2011</i>