

HSIANG (SHAWN) HSU

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OVERVIEW

I have been working on information theory, with applications to promoting the interpretability of representations, improving privacy and fairness, and understanding prediction uncertainty in machine learning. I am currently funded by Meta Ph.D. Fellowship with a [spotlight](#).

EDUCATION

Harvard University Cambridge, MA, USA
Ph.D. Candidate in Computer Science *Sept., 2017 – Spring, 2023 (expected)*
– Advisor: Prof. Flavio du Pin Calmon

Harvard University Cambridge, MA, USA
M.S. in Computer Science *Sept., 2017 – May, 2020*

National Taiwan University (NTU) Taipei, Taiwan
Master of Science in Electrical Engineering *Sept., 2014 – June, 2016*
– Visiting Student at the RLE at Massachusetts Institute of Technology (MIT) *Feb., 2016 – Mar., 2016*
– Best Master Graduate Thesis Award: Efficient Resource Allocation on Graphs - Crowdsourcing

National Taiwan University (NTU) Taipei, Taiwan
Bachelor of Science, Double Major in Electrical Engineering (EE) and Mathematics *Sept., 2010 – June, 2014*

PUBLICATIONS

[[Google Scholar](#)]

Pre-prints

- [P1] Antoine Wehenkel, Jens Behrmann, **Hsiang Hsu**, Guillermo Sapiro, Gilles Louppe, Joörn-Henrik Jacobsen, “[Robust Hybrid Learning With Expert Augmentation](#),” arXiv preprint arXiv:2202.03881, 2022.
- [P2] Marguerite Basta, Sarfaraz Hussein, **Hsiang Hsu**, Flavio du Pin Calmon, “[Automated Segmentation and Recurrence Risk Prediction of Surgically Resected Lung Tumors with Adaptive Convolutional Neural Networks](#),” arXiv preprint arXiv:2209.08423, 2022.

Journal Papers

- [J9] **Hsiang Hsu**, Salman Salamatian, Flavio du Pin Calmon, “[Generalizing Correspondence Analysis for Applications in Machine Learning](#),” IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), 2021.
- [J8] **Hsiang Hsu**, Natalia Lucienne Martinezgil, Martin Bertran, Guillermo Sapiro, Flavio du Pin Calmon, “[A Survey on Privacy from Statistical, Information and Estimation-Theoretic Views](#),” IEEE BITS the Information Theory Magazine, 2021.
- [J7] Hao Wang, **Hsiang Hsu**, Mario Diaz, Flavio du Pin Calmon, “[To Split or Not to Split: The Impact of Disparate Treatment in Classification](#),” IEEE Transaction on Information Theory (TIT), 2021.
- [J6] Shao-Yu Lien, Shao-Chou Hung, **Hsiang Hsu**. “[Latency Control in Edge Information Cache and Dissemination for Unmanned Mobile Machines](#),” IEEE Transactions on Industrial Informatics, 2018.
- [J5] Shao-Yu Lien, Shao-Chou Hung, **Hsiang Hsu**, and Der-Jiunn Deng. “[Energy-Optimal Edge Content Cache and Dissemination: Designs for Practical Network Deployment](#),” IEEE Communications Magazine, vol. 56, no. 5, pp. 88-93, 2018.
- [J4] Shao-Chou Hung, **Hsiang Hsu**, Shin-Ming Cheng, Qimei Cui, and Kwang-Cheng Chen, “[Delay Guaranteed Network Association for Mobile Machines in Heterogeneous Cloud Radio Access Network](#),” IEEE Transactions on Mobile Computing (TMC), 2018.
- [J3] **Hsiang Hsu**, and Kwang-Cheng Chen, “[A Resource Allocation Perspective on Caching to Achieve Low Latency](#),” IEEE Communications Letters (COMML), vol. 20, no. 1, pp. 145-148, 2016.

- [J2] Shao-Chou Hung, **Hsiang Hsu**, Shao-Yu Lien, and Kwang-Cheng Chen, “[Architecture Harmonization Between Cloud Radio Access Networks and Fog Networks](#),” *IEEE Access*, vol. 3, pp. 3019-3034, 2015.
- [J1] Yan-Kai Tzeng, Pei-Chang Tsai, Hsiou-Yuan Liu, Oliver Y. Chen, **Hsiang Hsu**, Fu-Goul Yee, Ming-Shien Chang, and Huan-Cheng Chang, “[Time-Resolved Luminescence Nanothermometry with Nitrogen-Vacancy Centers in Nanodiamonds](#),” *Nano letters*, vol. 15, no. 6, pp. 3945-3952, 2015.

Conference and Workshop Papers

- [C21] Antoine Wehenkel, Jens Behrmann, **Hsiang Hsu**, Guillermo Sapiro, Gilles Louppe, Joörn-Henrik Jacobsen, “[Improving Generalization with Physical Equations](#),” Machine Learning and the Physical Sciences (ML4PS) workshop at **NeurIPS**, 2022.
- [C20] **Hsiang Hsu**, Flavio du Pin Calmon, “[Rashomon Capacity: A Metric for Predictive Multiplicity in Probabilistic Classification](#),” Advances in Neural Information Processing Systems (**NeurIPS**), 2022.
- [C19] Wael Alghamdi*, **Hsiang Hsu***, Haewon Jeong*, Hao Wang, Winston Michalak, Shahab Asoodeh, Flavio du Pin Calmon, “[Beyond Adult and COMPAS: Fairness in Multi-Class Prediction](#),” Advances in Neural Information Processing Systems (**NeurIPS**), Oral, 2022 (*: equal contribution).
- [C18] **Hsiang Hsu**, Flavio du Pin Calmon, “[Rashomon Capacity: Measuring Predictive Multiplicity in Probabilistic Classification](#),” in Proc. of International Conference of Machine Learning (**ICML**) Responsible Decision Making in Dynamic Environments (RDMDE) Workshop, 2022.
- [C17] **Hsiang Hsu**, Flavio du Pin Calmon, “[Rashomon Capacity: Quantifying Predictive Multiplicity in Probabilistic Classification](#),” in Proc. of International Conference of Machine Learning (**ICML**) Workshop on Distribution-Free Uncertainty Quantification (DFUQ), 2022.
- [C16] Wael Alghamdi*, **Hsiang Hsu***, Haewon Jeong, Hao Wang, Winston Michalak, Shahab Asoodeh, Flavio du Pin Calmon, “Just Tilt It: A Scalable Approach for Fair Classification,” in Proc. of International Conference of Machine Learning (**ICML**) Responsible Decision Making in Dynamic Environments Workshop, 2022.
- [C15] Hao Wang, **Hsiang Hsu**, Mario Diaz, Flavio du Pin Calmon, “[The Impact of Split Classifiers on Group Fairness](#),” in Proceeding of IEEE International Symposium on Information Theory (**ISIT**), 2021.
- [C14] Sungmin Cha, **Hsiang Hsu**, Flavio du Pin Calmon, Taesup Moon, “[CPR: Classifier-Projection Regularization for Continual Learning](#),” International Conference on Learning Representations (**ICLR**), 2021.
- [C13] Sungmin Cha, **Hsiang Hsu**, Flavio du Pin Calmon, Taesup Moon, “[CPR: Classifier-Projection Regularization for Continual Learning](#),” in Proc. of the Joint Conference of Korean Artificial Intelligence Association (**JKAIA**), 2020.
- [C12] Sungmin Cha, **Hsiang Hsu**, Flavio du Pin Calmon, Taesup Moon, “[CPR: Classifier-Projection Regularization for Continual Learning](#),” in Proc. of International Conference of Machine Learning (**ICML**) Lifelong ML Workshop, 2020.
- [C11] Hao Wang, **Hsiang Hsu**, Mario Diaz and Flavio du Pin Calmon, “[To Split or Not to Split: The Impact of Disparate Treatment in Classification](#),” in Proceeding of the Symposium on Foundations of Responsible Computing (**FORC**), 2020.
- [C10] **Hsiang Hsu**, Shahab Assodeh, Flavio du Pin Calmon, “[Obfuscation via Information Density Estimation](#),” in Proceeding of the International Conference on Artificial Intelligence and Statistics (**AISTATS**), 2020.
- [C9] **Hsiang Hsu**, Shahab Asoodeh, Flavio du Pin Calmon, “[Discovering Information-Leaking Samples and Features](#),” Advances in Neural Information Processing Systems (**NeurIPS**) PriML Workshop, Spotlight talk, 2019.
- [C8] **Hsiang Hsu**, Shahab Asoodeh, Flavio du Pin Calmon, “[Information-Theoretic Privacy Watchdogs](#),” in Proceeding of IEEE International Symposium on Information Theory (**ISIT**), 2019.
- [C7] **Hsiang Hsu**, Salman Salamatian, Flavio du Pin Calmon, “[Correspondence Analysis Using Neural Networks](#),” in Proceeding of the International Conference on Artificial Intelligence and Statistics (**AISTATS**), 2019.

- [C6] **Hsiang Hsu**, Flavio du Pin Calmon, José Cândido Silveira Santos Filho, Andre Calmon, and Salman Salamatian, “[Correspondence Analysis of Government Expenditure Patterns](#),” Advances in Neural Information Processing Systems (**NeurIPS**) ML4D Workshop, 2018.
- [C5] **Hsiang Hsu**, Shahab Asoodeh, Salman Salamatian, Flavio du Pin Calmon, “[Generalizing Bottleneck Problems](#),” in Proceeding of IEEE International Symposium on Information Theory (**ISIT**), 2018.
- [C4] **Hsiang Hsu**, and Kwang-Cheng Chen, “[Optimal Caching Time for Epidemic Content Dissemination in Mobile Social Networks](#),” IEEE International Conference on Communications (**ICC**), 2016.
- [C3] Shao-Yu Lien, Shao-Chou Hung, **Hsiang Hsu**, and Kwang-Cheng Chen, “[Collaborative radio access of heterogeneous cloud radio access networks and edge computing networks](#),” IEEE International Conference on Communications (**ICC**) Workshop, 2016.
- [C2] Pei-Chang Tsai, Oliver Y Chen, Yan-Kai Tzeng, Hsiou-Yuan Liu, **Hsiang Hsu**, Shaio-Chih Huang, Jeson Chen, Fu-Ghoul Yee, Huan-Cheng Chang, Ming-Shien Chang, “[Time-Resolved Luminescence Nanothermometry with Nitrogen-Vacancy Centers in Nanodiamonds](#),” 47th Annual Meeting of the American Physical Society (**APS**), Division of Atomic, Molecular and Optical Physics, 2016.
- [C1] Yan-Kai Tzeng, Pei-Chang Tsai, **Hsiang Hsu**, Ming-Shien Chang, and Huan-Cheng Chang, “[The Nitrogen-Vacancy Centers In Nanodiamonds: Super-Resolution Imaging And Quantum Sensing](#),” Annual Meeting, The Physical Society of Republic of China (**PSROC**), 2014.

Book Chapters

- [B2] Shao-Yu Lien, **Hsiang Hsu**, “MAC, Resource Management, and Congestion Control for Next Generation Machine-to-Machine Systems”, in [Key Technologies for 5G Wireless Systems](#), V. W.S. Wong, R. Schober, D. W. K. Ng, and L. C. Wang, 2017.
- [B1] Shao-Yu Lien, Shao-Chou Hung, Chih-Hsiu Zeng, **Hsiang Hsu**, Qimei Cui, and Kwang-Cheng Chen, “Resource Management of the Cloud Radio Access Networks”, in [Cloud Radio Access Networks: Principles, Technologies, and Applications](#), T. Q. S. Quek, M. Peng, O. Simeone, and W. Yu, Cambridge University Press, 2017.

HONORS, AWARDS, AND GRANTS

NeurIPS Scholar Award	<i>Oct., 2022</i>
Meta Ph.D. Fellowship, Meta, Inc. – Awarded to 21 senior Ph.D. student nationwide with 2 years tuition and stipend.	<i>Mar., 2021</i>
Teaching Award, The Derek Bok Center for Teaching and Learning, Harvard University – Awarded to teaching fellows who have an overall score of 4.50/5.00 or higher.	<i>Sept., 2019</i>
Government Scholarship to Study Abroad (GSAA), Ministry of Education, Taiwan – Granted two-year stipend to Ph.D. students in top universities.	<i>Sept., 2019</i>
Best Master Graduate Thesis Award, Graduate Institute of Electrical Engineering, NTU – Awarded as the Best Master Graduate Thesis out of 107 master graduates.	<i>Dec., 2016</i>
Young Scholar Best Paper Award, Chinese Institute of Electrical Engineering, Taiwan – Ranked 2 nd out of all outstanding master theses among nationwide graduate students.	<i>Oct., 2016</i>
International Conference Grants, Ministry of Science and Technology, Taiwan – Granted full expense to high review score papers for attending international conference.	<i>May, 2016</i>
Patent Application Award, MediaTek Inc., Taiwan – Awarded to master students with U.S. patent application approved by the R&D department of MediaTek.	<i>Feb., 2016</i>
Undergraduate Research Fellowship, Ministry of Science and Technology, Taiwan – Funded the top 7% undergraduate students proposing an excellent research project with eight-month stipend.	<i>July, 2013</i>

WORKING AND RESEARCH EXPERIENCE

Graduate Research Assistant/ Teaching Fellow
Advisor: *Prof. Flavio P. Calmon*

Sept., 2017 – present
Harvard University, MA, USA

- Generalized the information bottleneck to f -divergences, generalized correspondence analysis to functional space using neural nets, and developed feature-dependent differential privacy mechanisms.
- Spring 2019, ENI-SCI 156: Signals and Communication; Course Evaluation: 4.6/5.0.

Summer Machine Learning Research Intern

June, 2021 – Aug., 2021

Mentors: *Dr. Jörn Jacobsen and Prof. Guillermo Sapiro*

Health AI Team, Apple, Cupertino, CA, USA

- Improving distributional robustness via physics-informed neural networks.

Summer Applied Science Intern

June, 2020 – Sept., 2020

Mentors: *Dr. Nadia Fawaz and Dr. Chuck Rosenberg*

Applied Science Team, Pinterest, Palo Alto, CA, USA

- Knowledge distillation from diverse domain for fairness.

Summer Research Intern

May, 2019 – August, 2019

Mentors: *Dr. Huan Wang and Dr. Caiming Xiong*

Deep Learning Team, Salesforce IQ, Palo Alto, CA, USA

- Information-theoretic generalization benefits of multi-task learning/ knowledge transfer.

Mandatory Military Service

Aug. 4, 2016 – July 19, 2017

National Airborne Service Corps (NASC)

Ministry of the Interior, Taiwan

- Public Administration Substitute Services.

Graduate Research Assistant

Aug., 2014 – July, 2016

Advisor: *Prof. Kwang-Cheng Chen*

GICE, NTU, Taiwan

- Integrated caching, mobility, and radio resources as a general resource allocation problem in heterogeneous networks for latency-guaranteed communication, and proposed corresponding new network architecture.
- Proved the submodularity of mean cover time of graphs using graph spectrum and solved submodular function maximization problems to derive sub-optimal and performance guaranteed solutions.

Undergraduate Research Assistant

July, 2013 – July, 2014

Advisor: *Dr. Ming-Shien Chang*

Institute of Atomic and Molecular Science (IAMS), Academia Sinica, Taiwan

- Utilized the ODMR peak shift of temperature changes to measure nano-scale (≈ 100 nm) temperature up to 0.1 Kelvin precision, and proposed a new methodology of nanothermometry with nano-diamonds.

Undergraduate Research Assistant

July, 2013 – July, 2014

Advisor: *Prof. Ping-Cheng Yeh*

GICE, NTU, Taiwan

- Designed more robust nano-detectors for impulse and continuous-waveform modulation of molecules.

Undergraduate Research Assistant

June, 2012 – Sept., 2012

Advisor: *Prof. Farn Wang*

Dept. of EE, NTU, Taiwan

- Developed semi-automatic programming errors detector and classifier by SVM to help software development.

PROFESIONAL SERVICES AND ACTIVITIES

Paper Review

- IEEE Journal on Selected Areas in Communications (**JSAC**), Elsevier Physical Communication, IEEE Transaction on Mobile Computing (**TMC**), IEEE International Symposium on Information Theory (**ISIT**), IEEE Information Theory Workshop (**ITW**), IEEE Transactions on Industrial Informatics, IEEE Transactions on Information Forensics and Security (**TIFS**), ACM Transactions on Internet Technology (**TOIT**), IEEE Transactions on Information Theory (**TIT**), Machine Learning, Advances in Neural Information Processing Systems (**NeurIPS**), International Conference on Machine Learning (**ICML**), The Web Conference (**WebConf**), International Conference on Learning Representations (**ICLR**).

Conference and Workshop Attendance

- The International Conference on Artificial Intelligence and Statistics (**AISTATS**). 2019, 2020
- Neural Information Processing Systems (**NeurIPS**). 2018, 2019
- International Conference on Machine Learning (**ICML**). 2021, 2022
- International Conference on Learning Representations (**ICLR**). 2021
- IEEE International Symposium on Information Theory (**ISIT**). 2018, 2019
- Microsoft New England Machine Learning (**NEML**) Day. 2018, 2019
- IEEE International Conference on Communication (**ICC**). 2016