Tzu-Heng (Brian) Huang

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Education

2021 – Jul. 2026 (Expected) **Ph.D. in Computer Science. University of Wisconsin-Madison.**
Advised by Frederic Sala.

2016 – 2020 **B.S. in Computer Science. National Chengchi University.**
Advised by Man-Kwan Shan and Ling-Jyh Chen. Major GPA: *3.96/4.00*.

Research Summary

My research focuses on ***data-centric AI for multimodal models***, with the goal of enabling systems to learn more from less but higher-quality supervision. Several ***data lifecycle*** projects I have worked on, including **(i)** visual RL with *sample-specific, synthetic data verifiers*, **(ii)** *online data mixing* for overhead-reduced multimodal training, **(iii)** *fine-grained data selection* for efficient pretraining ***(ICML'25 DataWorld Oral)***, **(iv)** *data curation* via ensemble and objective detection ***(1st place on the DataComp'23 leaderboard)***, and **(v)** a 500x cheaper *automated data labeling* system as an alternative to LLM annotators (***NeurIPS'24 Spotlight***).

Research Experience

Oct. 2025 – Jan. 2026 **AIML Research Intern. Apple Inc.**
advised by Manjot Bilkhu and Javier Movellan.
— *Rubric-based RL for Dense Captioning Tasks.*

May. 2025 – Sep. 2025 **Research Scientist Intern. Meta GenAI (now MSL).**
advised by Ernie Chang, Sang Michael Xie, Yiting Lu, and David Kant.
— *Learnability-aware Synthetic Data Generation.*

May. 2024 – Dec. 2024 **AIML Research Intern. Apple Inc.**
advised by Javier Movellan and Manjot Bilkhu.
— *Automated Model-aware Data Selection for Efficient Pretraining.*
— *Optimizing Domain Mixtures for MLLM Pretraining.*

Aug. 2021 – Present **Graduate Research Student. UW-Madison.**
advised by Frederic Sala.
— *Data-centric AI for Foundation Models: Auto-labeling and Data Curation.*
— *Parameter Marketplace: Through Model Merging and Auction Agents.*

May. 2023 – May. 2024 **Founder. Awan.AI LLC (integrated with TechTCM).**
— *Tongue Syndrome Diagnosis and LLM for Traditional Chinese Medicine.*
— *Automating TCM Diagnosis: Herbal-based Recommendation System.*

Jun. 2019 – Sep. 2019 **Research Intern. Argonne National Laboratory.**
advised by Charlie Catlett and Rajesh Sankaran.
— *Ensemble-based Time Series Calibration for Low-cost Sensors.*

Sep. 2018 – Aug. 2021 **Research Assistant. National Chengchi University.**
advised by Man-Kwan Shan.
— *Spatio-temporal Modeling in Large-scale Sensor Networks.*

Feb. 2018 – Jul. 2020 **Research Intern. Academia Sinica.**
advised by Ling-Jyh Chen.
— *Large-scale Air Quality Sensor Networks (AirBox).*

Publications and Preprints

1. **T.-H. Huang**, S. Salekin, J. Movellan, F. Sala, and M. Bilkhu, "RubiCap: Synthesized Rubrics as Rewards to Guide RL for Dense Captioning," in *submission*, 2026.

2. J. Zhao, C. Shin, **T.-H. Huang**, S. S. S. Namburi, and F. Sala, "CARE: Confounder-Aware Aggregation for Reliable LLM Evaluation," in *submission*, 2026.

3. J. Saad-Falcon, E. K. Buchanan, M. F. Chen, **T.-H. Huang**, B. McLaughlin, T. Bhathal, S. Zhu, B. Athiwaratkun, F. Sala, S. Linderman, A. Mirhoseini, and C. Re, "Shrinking the Generation-Verification Gap by Scaling Compute for Verification," in *Neural Information Processing Systems (NeurIPS), ICML Workshop: Efficient Systems for Foundation Models (ES-FoMo III), and ICML Workshop: Multi-Agent Systems in the Era of Foundation Models: Opportunities, Challenges and Futures (MAS)*, 2025. URL: https://arxiv.org/abs/2506.18203.

4. **T.-H. Huang**, H. Vishwakarma, and F. Sala, "Time to Impeach LLM-as-a-Judge: Programs are the Future of Evaluation," in *ICML Workshop: Programmatic Representations for Agent Learning (PRAL)*, 2025. URL: https://arxiv.org/abs/2506.10403.

5. J. Zhao, C. Shin, **T.-H. Huang**, S. S. S. Namburi, and F. Sala, "From Many Voices to One: A Statistically Principled Aggregation of LLM Judges," in *NeurIPS Workshop: Evaluating the Evolving LLM Lifecycle: Benchmarks, Emergent Abilities, and Scaling, and NeurIPS Workshop: Reliable ML from Unreliable Data*, 2025. URL: https://openreview.net/pdf?id=Ou53DNvjx7.

6. A. Ge, **T.-H. Huang**, J. Cooper, A. Trost, Z. Chu, S. S. S. Namburi, Z. Cai, K. Park, N. Roberts, and F. Sala, "R&B: Domain Regrouping and Data Mixture Balancing for Efficient Foundation Model Training," in *ICML Workshop: Unifying Data Curation Frameworks Across Domains (DataWorld), and ICML Workshop: Data in Generative Models (The Bad, the Ugly, and the Greats) (DIG-BUGS)*, 2025. URL: https://arxiv.org/abs/2505.00358.

7. **T.-H. Huang**, M. Bilkhu, J. Cooper, F. Sala, and J. Movellan, "Evaluating Sample Utility for Efficient Data Selection by Mimicking Model Weights," in *ICML Workshop: Unifying Data Curation Frameworks Across Domains (DataWorld)* ***[Oral Paper]***, 2025. URL: https://arxiv.org/abs/2501.06708.

8. **T.-H. Huang**, C. Cao, V. Bhargava, and F. Sala, "The ALCHEmist: Automated Labeling 500x CHEaper than LLM Data Annotators," in *Neural Information Processing Systems (NeurIPS)* ***[Spotlight Paper (Top 2.08%)]***, 2024. URL: https://arxiv.org/abs/2407.11004.

9. W. Tan, N. Roberts, **T.-H. Huang**, J. Zhao, J. Cooper, S. Guo, C. Duan, and F. Sala, "MoRe Fine-Tuning with 10x Fewer Parameters," in *ICML Workshop: Efficient Systems for Foundation Models (ES-FoMo), and ICML Workshop: Foundation Models in the Wild.*, 2024. URL: https://arxiv.org/abs/2408.17383.

10. N. Roberts, X. Li, D. Adila, S. Cromp, **T.-H. Huang**, J. Zhao, and F. Sala, "Geometry-Aware Adaptation for Pretrained Models," in *Neural Information Processing Systems (NeurIPS)*, 2023. URL: https://arxiv.org/abs/2307.12226.

11. **T.-H. Huang**, H. Vishwakarma, and F. Sala, "Train 'n Trade: Foundations of Parameter Markets," in *Neural Information Processing Systems (NeurIPS)*, 2023. URL: https://arxiv.org/abs/2312.04740.

12. **T.-H. Huang**, C. Shin, S. J. Tay, D. Adila, and F. Sala, "Multimodal Data Curation via Object Detection and Filter Ensembles," in *ICCV Workshop: Towards the Next Generation of Computer Vision Datasets (TNGCV)* ***[1st place on the Datacomp leaderboard (small-scale filtering track)]***, 2023. URL: https://arxiv.org/abs/2401.12225.

13. **T.-H. Huang**, C. Cao, S. Schoenberg, H. Vishwakarma, N. Roberts, and F. Sala, "ScriptoriumWS: A Code Generation Assistant for Weak Supervision," in *ICLR Workshop: Deep Learning For Code (DL4C)*, 2023. URL: https://arxiv.org/abs/2502.12366.

14. N. Roberts, X. Li, **T.-H. Huang**, D. Adila, S. Schoenberg, C.-Y. Liu, L. Pick, H. Ma, A. Albarghouthi, and F. Sala, "AutoWS-Bench-101: Benchmarking Automated Weak Supervision with 100 Labels," in *Neural Information Processing Systems (NeurIPS)*, 2022. URL: https://arxiv.org/abs/2208.14362.

15 **T.-H. Huang**, C.-H. Tsai, and M.-K. Shan, "Key Sensor Discovery for Quality Audit of Air Sensor Networks," in *ACM International Conference on Mobile Systems, Applications, and Services (MobiSys)*, 2020. URL: https://dl.acm.org/doi/abs/10.1145/3386901.3396606.

Miscellaneous

Awards

- 2025 **Oral Paper: Grad-Mimic (Over 100+)**, selected by ICML'25 DataWorld Workshop.
- 2024 **Spotlight Paper (Top 2.08%): The Alchemist**, selected by NeurIPS'24.
- 2023 **ICCV Datacomp Competition**, won the first place in the small-scale filtering track.
- **Scholar Award**, granted by NeurIPS'23.
- 2021 **First-year Departmental Scholarship**, granted by UW-Madison.
- 2020 **Research Intern Scholarship**, granted by National Chengchi University.
- **Undergrad Research Scholarship**, granted by Ministry of Science and Technology.

Invited Talks

- Jan. 2026 **Data Recipes: Labeling, Selection, and Verification**, invited by National Tsing Hua University (NTHU).
- **Data Recipes: Labeling, Selection, and Verification**, invited by National Taiwan University (NTU).
- **Data Recipes: Labeling, Selection, and Verification**, invited by Taiwan Semiconductor Manufacturing Company (TSMC).
- **Data Recipes: Labeling, Selection, and Verification**, invited by National Yang Ming Chiao Tung University (NYCU).
- Aug. 2025 **Data Recipes: Automated Labeling and Efficient Selection**, invited by Scaling Intelligence Lab (Azalia Mirhoseini's group) in Stanford University.
- Apr. 2025 **Spatio-temporal Modeling for Underwater Sensor Networks**, invited by National Taipei University of Technology (NTUT).
- Dec. 2019 **Air Quality Sensor Network Developments**, invited by Nangang High School (Taiwan).
- Sep. 2019 **Internship Research Talk**, invited by National Chengchi Univerisity.
- Jul. 2019 **LASS Conference: International Session**, invited by Academia Sinica.
- Mar. 2019 **Techbang Magazine: PiM25 Project**, invited by Techbang Magazine.
- **Raspberry Pi Jam: PiM25 Project**, invited by Raspberry Pi Foundation (Taiwan).
- Jan. 2019 **Raspberry Pi Meetup: PiM25 Project**, invited by Raspberry Pi Foundation (Taiwan).

Academic Services

- 2026 – Present **Organizer**, Data Foundations of AI (data-focus online seminars).
- 2021 – Present **Active Paper Reviewer**, NeurIPS, ICLR, and ICML.
- 2023 **Co-organizer**, AutoML Cup in AutoML Conference.
- 2022 – 2023 **President of Student Association of Taiwan**, UW-Madison.
- 2021 – 2022 **Vice President of Student Association of Taiwan**, UW-Madison.

Skills

- Programming Languages: Python, R, C++/C, SQL, LaTeX, and Shell Programming.
- Technologies: (Distributed) PyTorch, Tensorflow, Keras, PostgreSQL, and Vim.