Yi*nin*g Hua

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Research Interest

AI for Science, AI for Healthcare, Model Reasoning, Natural Language Processing, Digital Psychiatry

Education

Harvard T.H. Chan School of Public Health, Epidemiology (Ph.D.)   Boston, MA
Advisors: Profs. Lori B. Chibnik, Marzyeh Ghassemi, and John Torous   *Expected May 2028*

Harvard Medical School, Biomedical Informatics (MSc.)   Boston, MA
Advisors: Profs. Li Zhou and David W. Bates   *Sep 2021 - March 2023*

Harvard College, Undergraduate Visiting Program   Cambridge, MA
Advisor: Dr. Chris Tanner   *Sep 2020 - May 2021*

Smith College, Computer Science (B.A.)   Northampton, MA
Advisor: Profs. Joseph O'Rourke and Jamie Macbeth   *Sep 2017 - May 2021*

Research Experience

Division of Internal Medicine, Brigham and Women's Hospital   Boston, MA
Research Assistant (I and II)   *Oct. 2021 - Present*
- Supervisors: Li Zhou, PhD; David W. Bates, MD; Lauren V. Moran, MD; Dinah Foer, MD
- Conducted data-driven discovery by analyzing large-scale Twitter data to monitor COVID-19 trends, using NLP methods to extract insights from unstructured data.
- Develop multimodal algorithms to identify patient cohorts from EHRs.

The Comp. Health Info. Prog., Boston Children's Hospital   Boston, MA
Research Assistant II   *Feb. 2023 - Aug. 2023*
- Supervisors: Scott HS. Wang, MD, PhD; Michael Lingzhi Li, PhD
- Used large and middle-sized language models to extract multi-class labels/outcomes from urodynamic investigation charts.
- Examined efficiency of different active learning algorithms in multi-task and multi-class prediction.

Department of Dermatology, Massachusetts General Hospital   Boston, MA
Research Trainee   *Nov. 2021 - May 2022*
- Supervisors: Yevgeniy R. Semenov, MD, PhD
- Analyzed IBM Truven MarketScan data for health utilization studies.
- Examined image segmentation methods for melanoma stage II predictions.

Department of Anesthesia, Beth Israel Deaconess Medical Center   Boston, MA
Clinical Research Assistant II   *Jun. - Sep. 2022*
- Supervisors: Maximilian S. Schaefer, MD; Haobo Ma, MD
- Developed algorithms for identifying delirium patient cohorts.
- Increased accuracy of patient identification from ICD codes (25% to 86%).

CELEHS, Harvard Medical School   Boston, MA
Research Intern   *May - Dec. 2021*
- Supervisors: Tianxi Cai, PhD

- Constructed cross‑ontology hierarchical medical relations, enhancing machine reasoning capabilities and improving the accuracy of semantic mappings by 30%.

General Internal Medicine, Massachusetts General Hospital   Boston, MA
Research Intern   *Jun. - Nov. 2021*
- Supervisors: Jennifer S. Haas, MD
- Examined COVID‑19's impact on the insurance status of breast cancer patients with data across seven institutions.

Computer Science, Smith College   Northampton, MA
Research Assistant   *May 2019 - Aug. 2020*
- Supervisors: Jamie C. Macbeth, PhD
- Developed an English Language Interpreter based on Conceptual Dependency theory, enabling machines to understand and reason about human language in a way that mimics human cognitive processes.
- Compared performance of humans and pre‑trained language models.

Selected Publications & Preprints (* denotes equal contribution)

AI for Mental wellness

1. **Hua Y**, Siddals S, Ma Z, Galatzer‑Levy I, Xia W, Hau C, Na H, Flathers M, Linardon J, Ayubcha C, Torous J. Charting the evolution of artificial intelligence mental health chatbots: from rule‑based to large language models. World Psychiatry. Accepted (2025).

2. Torous J, Linardon J, Goldberg SB, Sun S, Bel I, Nicholas J, Hassan L, **Hua Y**, Milton A, Firth J. The evolving field of digital mental health: current evidence and implementation issues for smartphone apps, generative artificial intelligence, and virtual reality. World Psychiatry. Accepted (2025).

3. **Hua Y**, Na H, Li Z, Liu F, Fang X, Clifton D, Torous J. A scoping review of large language models for generative tasks in mental health care. npj Digit. Med. 8, 230 (2025).

4. Ma J, Na H, Wang Z, **Hua Y**, et al. Detecting Conversational Mental Manipulation with Intent‑Aware Prompting. Proceedings of the 31st International Conference on Computational Linguistics (COLING), 9176–9183, 2025.

5. Wang Z, Na H, Gao R, Ma J, **Hua Y**, Chen L, Wang W. From posts to timelines: modeling mental health dynamics from social media timelines with hybrid LLMs. In: Proceedings of the 10th Workshop on Computational Linguistics and Clinical Psychology (CLPsych 2025). 2025:249–255.

6. **Hua Y**, Blackley S, Shinn A, Skinner J, Moran L, Zhou L (2024). Identifying Psychosis Episodes in Psychiatric Admission Notes via Rule‑based Methods, Machine Learning, and Pre‑Trained Language Models. In revision at Translational Psychiatry - Nature.

7. **Hua Y**, Liu F, Yang K, Li Z, Na H, Sheu Y, Zhou P, Moran L, Ananiadou S, Beam A, Torous J (2024). Large Language Models in Mental Health Care: a Scoping Review. Current Treatment Options in Psychiatry. Accepted (2025).

8. **Hua Y**, Beam A, Chibnik LB, Torous J. From statistics to deep learning: using large language models in psychiatric research. Int J Methods Psychiatr Res. 2025;34(1):e70007.

9. Na H, **Hua Y**, Wang Z, Shen T, et al. A Survey of Large Language Models in Psychotherapy: Current Landscape and Future Directions. Association for Computational Linguistics (ACL). Accepted (2025).

10. Wu J, Wu X, **Hua Y**, Lin S, Zheng Y, Yang J. Exploring Social Media for Early Detection of Depression in COVID‑19 Patients. Proceedings of the ACM Web Conference (WWW), 2023

11. Zhang Z, **Hua Y**, Zhou P, Lin S, Li M, Zhang Y, Zhou L, Liao Y, Yang J. Sexual and Gender‑Diverse Individuals Face More Health Challenges during COVID‑19: A Large‑Scale Social Media Analysis with Natural Language Processing. Health Data Sci. 2024;4:0127.

AI for healthcare

1. **Hua Y**, Xia W, Bates D W, Hartstein L, Kim H T, Li M L, Nelson B W, Stromeyer C IV, King D, Suh J, Zhou L, Torous J (2024). Standardizing and Scaffolding Healthcare AI‑Chatbot Evaluation. In revision at [undisclosed] (2025).

2. Liu J*, Zhou P*, **Hua Y***, et al. (2023). Benchmarking Large Language Models on CMExam–A Comprehensive Chinese Medical Exam Dataset. Advances in Neural Information Processing Systems (NeurIPS), 36

3. Liu F, Zhou H, Gu B, Zou X, Huang J, Wu J, Li Y, Chen SS, **Hua Y**, Zhou P, Liu J, Mao C, You C, Wu X, Zheng Y, Clifton L, Li Z, Luo J, Clifton DA. Application of large language models in medicine. Nat Rev Bioeng. 2025;1–20.

4. Liu F, Li Z, Zhou H, Yin Q, Yang J, Tang X, Luo C, Zeng M, Jiang H, Gao Y, Nigam P, Nag S, Yin B, **Hua Y**, Zhou X, Rohanian O, Thakur A, Clifton L, Clifton DA. Large language models are poor clinical decision‑makers: a comprehensive benchmark. In: Proceedings of the 2024 Conference on Empirical Methods in Natural Language Processing (EMNLP). 2024. p. 13696–13710.

5. **Hua Y**, Wang L, Nguyen V, Rieu‑Werden M, McDowell A, Bates D W, Zhou L. A Deep Learning Approach for Transgender and Gender Diverse Patient Identification in Electronic Health Records. J Biomed Inform. 2023 Nov;147:104507.

6. Li M*, **Hua Y***, Liao Y, Zhou L, Li X, Wang L, Yang J. Tracking the Impact of COVID‑19 and Lockdown Policies on Public Mental Health Using Social Media: Infoveillance Study. J Med Internet Res. 2022 Oct 13;24(10):e39676.

7. Wang L, Novoa‑Laurentiev J, Cook C, Srivatsan S, **Hua Y**, Yang J, Miloslavsky E, Choi HK, Zhou L, Wallace ZS. Identification of an ANCA‑associated vasculitis cohort using deep learning and electronic health records. Int J Med Inform. 2025;196:105797.

8. Wan G, Nguyen N, Liu F, DeSimone M S, Leung B W, Rajeh A, Collier M R, …, **Hua Y**, et al. Prediction of early‑stage melanoma recurrence using clinical and histopathologic features. NPJ Precis Oncol. 2022 Oct 31;6(1):79.

9. Zhou P, Wang Z, Chong D, Guo Z, **Hua Y**, Su Z, Teng Z, Wu J, Yang J. METS‑CoV: A Dataset of Medical Entity and Targeted Sentiment on COVID‑19 Related Tweets. Advances in Neural Information Processing Systems (NeurIPS), 35, 21916‑21932

10. Ye Q, Liu J, Chong D, Zhou P, **Hua Y**, et al. Qilin‑med: Multi‑stage knowledge injection advanced medical large language model. *arXiv preprint arXiv:2310.09089*, 2023.

11. He G, Shi X, Cao Y, Ding J, **Hua Y**, et al. Utilizing Large Language Models to Assist in the Construction of a Rare Disease Literature Network Database. *OSF*, 2024.

12. **Hua Y**, Semenov Y, Guidon A. Application of a Validated Algorithm to Identify Contemporary Myasthenia Gravis Patients. Neurology, 2023.

Public Health Surveillance

1. **Hua Y**, Lin S, Li M, Zhang Y, Foer D, Zhou P, Zhou L, Yang J. Streamlining Social Media Information Retrieval for COVID‑19 Research with Deep Learning. J Am Med Inform Assoc. 2024 Jun 20;31(7):1569‑1577

2. **Hua Y**, Jiang H, Lin S, Yang J, Plasek J M, Bates D W, Zhou L. Using Twitter data to understand public perceptions of approved versus off‑label use for COVID‑19‑related medications. J Am Med Inform Assoc. 2022 Sep 12;29(10):1668‑1678.

3. Li W, **Hua Y**, Zhou P, Zhou L, Xu X, Yang J. Characterizing public sentiments and drug interactions in the COVID‑19 pandemic using social media: natural language processing and network analysis. J Med Internet Res. 2025;27:e63755.

4. Wu J*, Wang L*, **Hua Y**, Li M, Zhou L, Bates D W, Yang J. Trend and Co‑occurrence Network of COVID‑19 Symptoms From Large‑Scale Social Media Data: Infoveillance Study. J Med Internet Res. 2023 Mar 14;25:e45419.

Epidemiology

1. He G, Wang Y, Cheng C, Guo J, Lin Z, Liang Z, Jin B, Tao L, Rong L, Chen L, Lin T, **Hua Y**, Park S, Mo Y, Li J, Jiang X. PM2.5 constituents associated with mortality and kidney failure in childhood‑onset lupus nephritis: a 19‑year cohort study. Sci Total Environ. 2024;949:175333.

Natural Language Processing

1. Zhou P, Leon B, Ying X, Zhang C, Shao Y, Ye Q, Chong D, Jin Z, Xie C, Cao M, Gu Y, Hong S, Ren J, Chen J, Liu C, **Hua Y**. BrowseComp‑ZH: benchmarking web browsing ability of large language models in Chinese. arXiv preprint arXiv:2504.19314 (2025).

2. Jiang H, **Hua Y**, Beeferman D, Roy D. Annotating the Tweebank corpus on named entity recognition and building NLP models for social media analysis. Proceedings of the 13th Language Resources and Evaluation Conference (LREC), 2022.

3. Zeng Q, Garay L, Zhou P, Chong D, **Hua Y**, Wu J, Pan Y, Zhou H, Voigt R, Yang J. GreenPLM: Cross‑lingual transfer of monolingual pre‑trained language models at almost no cost. Proceedings of the 32nd International Joint Conference on Artificial Intelligence (IJCAI), 2023

4. Liu J*, Wang Z*, Ye Q*, Chong D*, Zhou P*, **Hua Y***. Qilin‑Med‑VL: Towards Chinese Large Vision‑Language Model for General Healthcare. *arXiv:2310.17956*

5. Chen J, Zhou P, **Hua Y**, Loh X, Chen K, Li Z, Zhu B, Liang J. FinTextQA: A Dataset for Long‑form Financial Question Answering. Proceedings of the 62nd Annual Meeting of the Association for Computational Linguistics (ACL), 6025–6047, 2024.

6. Zhou P, Gao J, Xie Y, Ye Q, **Hua Y**, Kim S. Equivariant Contrastive Learning for Sequential Recommendation. Proceedings of the ACM Web Conference (WWW), 2023.

7. Xie Y, Gao J, Zhou P, Ye Q, **Hua Y**, et al. Rethinking Multi‑Interest Learning for Candidate Matching in Recommender Systems. Proceedings of the 17th ACM Conference on Recommender Systems, 2023.

8. Zhou P, Cao M, Huang Y, Ye Q, Zhang P, Liu J, Xie Y, **Hua Y**, Kim J. Exploring recommendation capabilities of GPT‑4V(ision): A preliminary case study. *arXiv:2311.04199*, 2023.

9. Lin S, Garay L, **Hua Y**, Guo Z, Li W, Li M, Zhang Y, Xu X, Yang J. Analysis of longitudinal social media for monitoring symptoms during a pandemic. J Biomed Inform. 2025;104778.

10. Chen J, Zhou P, **Hua Y**, et al. Vision‑Language Models Meet Meteorology: Developing Models for Anomalies Analysis with Heatmaps. *arXiv:2406.09838*, 2024.

11. Macbeth JC, Chang E, Chen JG, **Hua Y**, et al. Humans Against Large Language Models on Hard Paraphrase Detection Tasks. Advances in Cognitive Systems, 2023.

Conference Talks (as the presenting author)

COLING, Miami, FL. *Large Language Models Are Poor Clinical Decision‑Makers: A Comprehensive Benchmark*. Nov 2024.

American Medical Informatics Association (AMIA) Informatics Summit, Boston, MA. *Identifying Psychosis Episodes in Admission Notes: A Comparative Study of Rule‑based Methods, Machine Learning Algorithms, and Pre‑Trained Language Models*. March 2024.

AMIA Informatics Summit, Boston, MA. *Wise Instance Selection Algorithms Help Reduce Annotation Work in Multi‑Task Multi‑Class Urinary Tract Dilation Prediction*. March 2024.

AMIA Informatics Summit, Boston, MA. *One Model Fits All? High‑performing Multi‑task Model of Urinary Tract Dilation (UTD) Classification Using NLP for Neonatal Ultrasound Reports*. March 2024.

NeurIPS, New Orleans, LA. *Benchmarking Large Language Models on CMExam–A Comprehensive Chinese Medical Exam Dataset*. December 2023.

AMIA Annual Symposium, New Orleans, LA. *Streamlining Social Media Information Retrieval for Public Health Research with Deep Learning*. November 2023.

IEEE International Conference on Healthcare Informatics (ICHI), Houston, TX. *Streamlining Social Media Information Retrieval for Public Health Research with Deep Learning*. June 2023.

IEEE ICHI, Houston, TX. *A Deep Learning‑driven Approach for Transgender and Gender Diverse Patient Identification in EHRs*. June 2023.

American Academy of Neurology Annual Meeting, Boston, MA. *Contemporary treatment and outcomes of myasthenia gravis in the United States*. April 2023.

AMIA Annual Symposium, Washington, D.C. *Identification of transgender and gender diverse individuals in electronic health records*. November 2022.

AMIA Annual Symposium, Washington, D.C. *Using Twitter to Understand Public Perceptions of COVID‑19 Drugs*. November 2022.

Asia‑Pacific Babylab Constellation Conference, Hong Kong. *Quantifying the bilingual (dis) advantage in vocabulary acquisition*. December 2021.

Teaching Services

EPI 288: Intro to ML and Risk Prediction	Harvard School of Public Health
Teaching Fellow	*Spring 2025*
PHS 2000A: Quant. Res. Methods Pop. Health Sci.	Harvard School of Public Health
Teaching Fellow	*Fall 2024*
BMI 707/EPI‑290: Deep Learning for Biomedical Data	Harvard Medical School
Teaching Fellow	*Spring 2023*
S‑043/Stat‑151: Multilevel and Longitudinal Models	Harvard School of Education
Teaching Fellow	*Summer 2021*
Machine Learning for Self‑Driving Cars	Harvard School of Public Health
Teaching Assistant	*Summer 2020*
PHY 215: Light, Relativity, and Quantum Physics	Smith College
Teaching Assistant	*Spring 2020*
PHY 210: Math Methods of Physical Sciences and Engineering	Smith College
Teaching Assistant	*Fall 2019*

Awards & Accolades

The 11th IEEE ICHI	2023
Best poster	
The 36th Conference on NeurIPS	2022
Spotlight long paper	
The AMIA Annual Symposium	2022
Distinguished poster	
The Sigma Xi honor society	2021
Nominated outstanding student researcher	

Fundings & Fellowships

Harvard T.H. Chan School of Public Health	2024
The Rose Traveling Fellowship	
Harvard T.H. Chan School of Public Health	2023 & 2024
The Brian and Heidi MacMahon Epidemiology Educational Fund	
The 37th Conference on NeurIPS	2023
Travel Fund	
The Grace Hopper Celebration of Women in Computing	2020
Student scholarship	

Smith College 2020
Project Coach fellowship

Smith College 2019
Praxis fellowship

Review Services

Nature Medicine 2024
IF: 58.7

Npj Digital Medicine 2024
IF: 15.357

JMIR Public Health and Surveillance 2024
IF: 14.56

JMIR Mental Health 2024
IF: 5.2

Journal of Medical Internet Research (JMIR) 2024
IF: 7.6

The Journal of American Medical Informatics Association (JAMIA) 2023, 2024
IF: 7.942

The Conference on Neural Information Processing Systems (NeurIPS) 2023, 2024

Machine Learning for Health (ML4H) Symposium 2023

The AMIA Informatics Summit 2023

The International Journal of Medical Informatics (IJMI) 2022, 2024

The 29th International Conference on Computational Linguistics (COLING) 2022

The AMIA Annual Symposium 2022, 2023