

Yining Hua

Boston, MA

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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
<i>Advisors: Profs. Lori B. Chibnik, Marzyeh Ghassemi, and John Torous</i>	<i>Expected May 2028</i>
Harvard Medical School, Biomedical Informatics (MSc.)	Boston, MA
<i>Advisors: Profs. Li Zhou and David W. Bates</i>	<i>Sep 2021 - March 2023</i>
Harvard College, Undergraduate Visiting Program	Cambridge, MA
<i>Advisor: Dr. Chris Tanner</i>	<i>Sep 2020 - May 2021</i>
Smith College, Computer Science (B.A.)	Northampton, MA
<i>Advisor: Profs. Joseph O'Rourke and Jamie Macbeth</i>	<i>Sep 2017 - May 2021</i>

Research Experience

Division of Internal Medicine, Brigham and Women's Hospital	Boston, MA
<i>Research Assistant (I and II)</i>	<i>Oct. 2021 - Present</i>
<ul style="list-style-type: none"> 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
<i>Research Assistant II</i>	<i>Feb. 2023 - Aug. 2023</i>
<ul style="list-style-type: none"> 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
<i>Research Trainee</i>	<i>Nov. 2021 - May 2022</i>
<ul style="list-style-type: none"> 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
<i>Clinical Research Assistant II</i>	<i>Jun. - Sep. 2022</i>
<ul style="list-style-type: none"> 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
<i>Research Intern</i>	<i>May - Dec. 2021</i>
<ul style="list-style-type: none"> 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)*

- **Hua Y**, Beam A, Chibnik L, Torous J. From statistics to deep learning: Using large language models in psychiatric research. In press at the *International Journal of Methods in Psychiatric Research* (Issue of Jan 2025).
- **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. doi: 10.48550/arXiv.2408.11288. In revision at *Npj Digital Health*.
- Chen J, Zhou P, **Hua Y**, Loh Y, Chen K, Li Z, Zhu B, Liang J. FinTextQA: A Dataset for Long-form Financial Question Answering. In *proceedings of the 62nd Annual Meeting of the Association for Computational Linguistics (ACL 2024)*.
- Chen J, Zhou P, **Hua Y**, Chong D, Cao M, Li Y, Yuan Z, Zhu B, Liang J. Vision-Language Models Meet Meteorology: Developing Models for Extreme Weather Events Detection with Heatmaps. arXiv:2406.09838. Under review at *Nature Machine Intelligence*.
- He G., ..., **Hua Y**, et al. PM2.5 constituents associated with mortality and kidney failure in childhood-onset lupus nephritis: A 19-year cohort study. *Sci Total Environ*. 2024 Nov 1;949:175333.
- **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. Standardizing and Scaffolding Healthcare AI-Chatbot Evaluation. doi: 10.1101/2024.07.21.24310774. Under review at [undisclosed].
- Ma J, Na H, Wang Z, **Hua Y**, Liu Y, Wang W, Chen L. Detecting Conversational Mental Manipulation with Intent-Aware Prompting. Accepted to the 31st *International Conference on Computational Linguistics (COLING 2025)*.
- 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.

- Liu F, ..., **Hua Y**, et al. Large Language Models Are Poor Clinical Decision-Makers: A Comprehensive Benchmark. *Proceedings of the 2024 Conference on Empirical Methods in Natural Language Processing (EMNLP 2024)*.
- **Hua Y**, Blackley S, Shinn A, Skinner J, Moran L, Zhou L. Identifying Psychosis Episodes in Psychiatric Admission Notes via Rule-based Methods, Machine Learning, and Pre-Trained Language Models. *doi: 10.21203/rs.3.rs-4126574/v1*. In revision at *Translational Psychiatry - Nature*.
- **Hua Y**, Mukkamala A, Estrada C, Li M, Wang H (2024). High-performing Multi-task Model of Urinary Tract Dilation (UTD) Classification for Neonatal Ultrasound Reports Through Natural Language Processing. *doi: 10.1101/2024.01.23.24301680*. In revision at [undisclosed].
- **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
- **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. *arXiv: 2401.02984*. In revision at [undisclosed].
- Zhou H, Gu B, Zou X, Li Y, Chen S S, Zhou P, Liu J, **Hua Y**, Mao C, Wu X, Li Z, Liu F (2023). A Survey of Large Language Models in Medicine: Progress, Application, and Challenge. *arXiv: 2311.05112*. Accepted to *Nature reviews bioengineering*.
- Liu J*, Zhou P*, **Hua Y***, et al. Benchmarking Large Language Models on CMExam—A Comprehensive Chinese Medical Exam Dataset. *Proceedings of the 37th International Conference on Neural Information Processing Systems (NeurIPS 2023)*.
- 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)*.
- **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.
- 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: Inveillance Study. *J Med Internet Res*. 2023 Mar 14;25:e45419.
- 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*.
- 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*
- 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. *Proceedings of the 36th International Conference on Neural Information Processing Systems (NeurIPS 2022)*.

- 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.
- **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.
- Wan G, ..., **Hua Y**, et al. Prediction of early-stage melanoma recurrence using clinical and histopathologic features. *Npj Precis Oncol*. 2022 Oct 31;6(1):79.

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

Awards & Accolades

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

Fundings & Fellowships

Harvard T.H. Chan School of Public Health	2024
<i>The Rose Traveling Fellowship</i>	
Harvard T.H. Chan School of Public Health	2023 & 2024
<i>The Brian and Heidi MacMahon Epidemiology Educational Fund</i>	
The 37th Conference on NeurIPS	2023
<i>Travel Fund</i>	
The Grace Hopper Celebration of Women in Computing	2020
<i>Student scholarship</i>	
Smith College	2020
<i>Project Coach fellowship</i>	
Smith College	2019
<i>Praxis fellowship</i>	

Review Services

Nature Medicine	2024
<i>IF: 58.7</i>	
Npj Digital Medicine	2024
<i>IF: 15.357</i>	
JMIR Public Health and Surveillance	2024
<i>IF: 14.56</i>	
JMIR Mental Health	2024
<i>IF: 5.2</i>	

Journal of Medical Internet Research (JMIR)	2024
<i>IF: 7.6</i>	
The Journal of American Medical Informatics Association (JAMIA)	2023, 2024
<i>IF: 7.942</i>	
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