

Curriculum Vitae

Juan Zhao, PhD

Address:

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Education

- | | |
|-----------------|---|
| 8/2002 – 7/2006 | B.S. in Computer Science and Technology
Shandong University, Shandong, China |
| 8/2006 – 7/2012 | Ph.D. in Computer Science
University of Chinese Academy of Sciences, Beijing, China
Successive master-doctor program |

Research Interests

My research interests include leveraging artificial intelligence (AI), machine learning, data mining, natural language processing (NLP), and blockchain to enhance precision medicine, with an emphasis on developing new algorithms on large biomedical data to improve deep phenotyping, uncover the knowledge, and improve the accuracy, fairness for disease prediction.

Academic Appointments

Current position:

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| 3/2020 – present | Research Assistant Professor
Department of Biomedical Informatics, School of Medicine
Vanderbilt University Medical Center (VUMC), Nashville, TN, USA |
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Past position:

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| 9/2015 – 9/2017 | Research Scientist
Electrical and Computer Engineering Department, Tennessee State
University (TSU). |
| 1/2017 – 9/2017 | Adjunct Faculty |

Electrical and Computer Engineering Department, Tennessee State University

9/2017 – 2/2020 **Postdoctoral Fellow**
Department of Biomedical Informatics,
Vanderbilt University Medical Center

Non-Academic Appointments

12/2010 – 2/2011 **Data scientist** (Intern)
Sina Corporation (Sina.com), Beijing, China

7/2012 –9/2015 **Senior Engineer, Program Manager**
Chinese Computer Network Information Center (CNIC), Chinese
Academy of Sciences, Beijing, China

Professional activities

National Committee:

2018 - present AAAI Conference on Artificial Intelligence (AAAI)
2018 - present IEEE BigData Program Committee
2019 - present Spring Simulation Conference
06/2020 American Heart Association COVID-19 Data Challenge Competition.
Reviewer and Judge.
06/2021 Inaugural Dr. Nanette K. Wenger Research Goes Red® Award for Best
Scientific Article on Cardiovascular Disease and Stroke in Women.
Reviewer and Judge.
2021 - present **Associate Editor:** Journal of Network Modeling Analysis in Health
Informatics and Bioinformatics
2021 - present **Guest Associate Editor:** Frontiers in Big data. Frontiers in Artificial
Intelligence, "The Promise of Revolutionizing Healthcare with Artificial
Intelligence and Blockchain Technology"

Peer Review Activities

- **Grant review:** NCI SBIR Contract Proposals Technical Evaluation Panel (Topic 433, Developing Unbiased Medical Technologies to Reduce Disparities in Cancer Outcomes).
- **Journals:** Journal of the American Heart Association (JAHA), Scientific Reports, JAMIA Open, Applied Clinical Informatics, BMC Medical Informatics and Decision Making, ChemMedChem, IEEE/ACM Transactions on Computational Biology and Bioinformatics, IEEE transactions on dependable and secure computing, Mobile Networks and Applications.
- **Conference:** AAAI, IEEE BigData, Spring Simulation Conference, 2nd International Workshop on Blockchain Technologies and Systems (BCTS 2018) -ICPADS 2018. AMIA Annual symposium 2019, 2020, 2021.

Professional Organization Member:

- | | |
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| 2015 - present | American Medical Informatics Association (AMIA) |
| 2016 - present | American Heart Association (AHA) |

Research Experience

Research assistant, Chinese Academy of Sciences, Beijing, China, 07/ 2007- 07/2012

- Developed NLP methods to extract structured information of scholars from the unstructured text.
- Notably proposed and developed a graph network-based algorithms to recommend funding collaborators.
- Developed and built a knowledge base and search engines for national scholars.

Senior Engineer, CNIC, Chinese Academy of Sciences, Beijing, China, 07/2012- 09/2015

- Led the development of national cloud-based toolkit, to provide scientists with secure and efficient solution in the retrieval, access, and management of data and collaboration. The platform had supported 100,000 scientific researchers and 9000+ organizations.
- Awarded Youth Research Funding \$15,000.
- Achieved five software copyrights.

Research Scientist, Cybersecurity Lab, Electrical and Computer Engineering Department, Tennessee State University, TN. USA. 09/2015 –09/2017

- Awarded two grants as Co-PI – Boeing subcontract and National Institute of Food and Agriculture. \$950,000 in total.
- Developed a transfer learning method to solve zero-shot attack. Published paper in IEEE Milcom 2017, EURASIP 2019.
- Proposed a framework of Blockchain to enhance the data management and privacy in healthcare and Internet of Things application. 4 published paper and 1 book Chapter. Paper IEEE PIMRC 2017 (**341 citations**) and IEEE Milcom 2017 (**138 citations**) are among **top 0.1%** most-cited articles in Computer Science in 2017.

Postdoctoral Fellow, Wei-Lab, Center for Precision Medicine, Department of Biomedical Informatics, VUMC, 09/ 2017 –02/2020

- Awarded American Heart Association AI grants (\$100,000)
- Applied machine learning and deep learning to model longitudinal EHR data and combine with genetic data to improve the prediction of 10-year cardiovascular disease. The paper Zhao et al. Sci Rep 2019 (**65 citations**) was **0.1%** most-cited articles in Computer Science in 2019.
- Developed unsupervised machine learning models to automate deep phenotyping. The study identified a new association between LPA and a lung cancer topic, which was not reported in the previous PheWAS (Zhao et al., PLOS One, 2019,). Developed a tensor decomposition approach to model longitudinal EHR and identify novel subphenotypes of cardiovascular disease (Zhao et al. JBI, 2019).

Research Assistant Professor, Center for Precision Medicine, Department of Biomedical Informatics, VUMC, 03/2020 – Present

- Lead development of NLP tools to process and extract information from EHR clinical notes; development of toolkit called concept wide association study (ConceptWAS) to enable identifying clinical concepts associated with certain disease. Applied the NLP pipelines and the ConceptWAS to identify the phenotypic characteristics and symptoms for COVID19. Published a journal paper in JBI, 2021. The abstract was accepted for AMIA 2021 Annual Symposium.
- Key role in phenotyping core (director, Wei-Qi), in which collaborate with clinicians by providing machine learning expertise to support grant application and research, e.g., collaborated with Brian Lindman.MD, Justin Godown.MD to develop machine learning models in clinical trials data to predict the adverse outcome.
- Validate phenotyping algorithms from eMERGE Networks.
- Lead research of evaluating and addressing the bias and fairness of machine learning.
- Lead research of combining EHR clinical data, genetic data, and social determinates of health to improve the prediction of complex disease.

Honors and Awards

- 1st Scholarship, Shandong University, 2003-2005
- 2nd Prize at the National Mathematics Modeling Competition, China, 2008
- Winner of Software Innovation Contest of BEA Systems, Inc. Dec. 2008
- Dean Scholarship (1%), University of Chinese Academy of Sciences, 2011
- Outstanding Students Award, University of Chinese Academy of Sciences, 2009, 2010, 2011
- Outstanding Graduate Student Award (1%), University of Chinese Academy of Sciences, 2012
- Outstanding Staff Award, CNIC, Chinese Academy of Sciences, 2014- 2015

Awarded Grants

- Boeing Data Analytics Contract, “Distributed machine learning for anomaly detection in massive datasets” (\$450,000), Co-PI. 1/1/2016 - 12/31/2018
- National Institute of Food and Agriculture, “Transgenerational adaptation of plants to acidic pH and toxic metals in soil” (\$500,000) Co-PI, 2017 awarded.
- American Heart Association Artificial Intelligence Training Grant: “Leveraging machine learning and deep learning with longitudinal EHR and genetic data to better predict 10-year stroke”, (\$100,000), PI, 07/01/2018 – 03/01/2020

Teaching Experience

Lecturer: Engineering programming with C++. ENGR 2230, Department of Electrical and Computer Engineering, Tennessee State University, Nashville, TN, Spring in 2017.

- *Undergraduate – level.*

Research Supervision and mentorship

I have mentored 3 MS students, 5 senior designs of undergraduate students in TSU, and 7 undergraduate students' research in VUMC.

M.S. Graduates

2009 –2010	Wentao Yang – University of Chinese Academic Science. <i>Search and Sharing System for Literature Metadata.</i>
2012 – 2013	Qiao Wang – University of Chinese Academic Science. <i>Mobile application of document synchronization</i>
2016 – 2017	Asma Muallem – Tennessee State University <i>Distributed machine learning</i>

Undergraduate students

01/2017- 08/ 2017	Mentor of five undergraduate students in Senior Design. Tennessee State University
Summer, 2018	Matthew P Hancock – Vanderbilt University, Vanderbilt Biomedical Informatics Summer Program (VBISP) Co-mentor; <i>Applying machine learning to predict cardiovascular disease risk.</i>
Summer, 2019	Nicholas Patty , Vanderbilt University. VBISP, Co-mentor. <i>Unsupervised machine learning method to identify subphenotypes of strokes.</i>
Summer, 2020	Bradley Eli D , Washington and Lee University. VBISP. <i>A data visualization tool of Electrical Health Record</i>
Summer, 2021	Kathleen Katchis . Vanderbilt University, Department of Computer Science. Summer intern. <i>Using deep learning on genome for disease prediction.</i>
06/2021- Present	Nicholas Wan . Vanderbilt University. Dept. of Biomedical Engineering
06/2021- Present	Yanwei Li . Vanderbilt University, Department of Computer Science. Summer intern.
06/2021- Present	Fuchen Li , Vanderbilt University, Summer intern. 2021 Fall, 2022 Spring. Primary mentor for Lab research BSCI 3861. <i>Presenting poster of "Evaluating the Bias and Fairness of Machine Learning-based Clinical Prediction Models" on AMIA 2022 Informatics Summit, <u>AMIA LEAD AWARD 2022.</u></i>

Scientific Presentations/Seminars:

1. 2009 IEEE Youth Conference on Information, Computing and Telecommunication, YC-ICT2009, Beijing, China. "E-Scholar: Improving Academic Search through Combining Meta search with Entity Extraction". 9/2009
2. 6th International Conference on Signal Image Technology and Internet-Based Systems, e-SITIS, Kuala Lumpur, Malaysia, "Cross-disciplinary Collaborative Research Platform - Study on Qinghai Lake Joint Research Environment," 11/2010.
3. Workshop on Computational Aspects of Social and Information Networks (Casin'11), Microsoft Research Asia, Beijing, China. "Recommendation on scholar networks." 7/2011.

4. 2013 IEEE 9th International Conference on e-Science (e-Science), Beijing, China, “DSN: A Knowledge-based Scholar Networking Practice Towards Research Community, in 2013 IEEE 9th International Conference on e-Science (e-Science)”. 11/2013.
5. Graduate students Seminar, Tennessee State University, Nashville, TN, USA, “Transfer learning in Cyber Security”, 7/ 2017
6. DBMI Seminar, Department of Biomedical Informatics, VUMC, Nashville, TN, USA, “Learning from Longitudinal Electronic Health Record and Genetic Data to Improve Cardiovascular Event Prediction.” 12/ 2018,
7. eMERGE Steering Committee, Washington D.C, “Learning from Longitudinal Electronic Health Record and Genetic Data to Improve Cardiovascular Event Prediction”, 01/2019
8. DBMI Seminar. VUMC. Nashville. TN. “Detecting time-evolving phenotypes topics via tensor-factorization”. 03/2019
9. DBMI Seminar. VUMC. Nashville. TN. Deep phenotyping and prediction using machine learning on EHR and genetic data”. 02/2020

Research Program

Research Support (Current)

R01 HL133786-02 (Wei) 04/01/2017 – 02/28/2021

“Exploring Statin Pleiotropic Effects within a Very Large EHR Cohort”

Grant Source: NIH/NHLBI

Role: Co-Investigator

Total Award Amount: \$1,662,082

Salary Support: 41%

R01 GM139891-01 (Wei) 01/01/2021 – 11/30/2024

“PheMAP: Measured, Automated Profile to Facilitate High Throughput Phenotyping”

Grant Source: NIH/NIGMS

Role: Co-Investigator

Salary Support: 0%

P50HD106446-01 (Van Driest/Wei) 09/10/2021 – 07/31/2026

“VICE Maternal and Pediatric Precision in Therapeutics (VICE-MPRINT) – Phenotyping Support Core”

Grant Source: NIH/NICHD

Role: Co-Investigator

Total Award Amount: \$6,250,000

Salary Support: 10%

R01 GM120523-04 (Feng, Q) 07/01/2016 – 05/31/2022

“Pleiotropy of PCSK9 Inhibition”

Grant Source: NIH/NIGMS

Total Award Amount: \$1,704,101

Salary Support: 10%

R01 AR076516-01 (Kawai, V.K.)

04/14/2020 – 03/31/2024

“Genome and Phenome to Define Disease Risk with Antinuclear Antibodies”

Grant Source: NIH/NIAMS

Role: Co-Investigator

Total Award Amount: \$2,776,670

Salary Support: 10%

Work Order #WO2010 (Reeves, R)

08/01/2021- 07/31/2022

“Representation of Unstructured Data Across Common Data Models (DI2)”

Contract Source: Brigham and Women’s Hospital/FDA

Role: Co-Investigator

Total Award Amount (including Indirect Costs): \$146,210

Salary Support: 20%

Project Heart Award (Godown, J.)

01/2021 – 12/2022

“Machine Learning to Improve Interstage Risk Prediction Following Stage I Single Ventricle Palliation”

Grant Source: Project Heart

Role: Co-Investigator

Total Award Amount: \$42,010

Salary Support: 7%

Research Support (Pending)

Title: Development and Validation of a Diagnostic Algorithm for Alcohol Use Disorder in the Electronic Health Records

Grant Source: NIH/NIAAA

Role: Co-Investigator

Project Period: 04/2022 – 03/2024

Title: Collaborative Research: SCH: Towards Fair and Trustworthy Federated Learning for Precision Medicine

Source of Support: National Science Foundation

Project Number: NSF8176133

Role: Primary Investigator

Project Period: 05/2022 – 04/2026

Title: Examine and mitigate the bias to ensure fairness in machine learning-based clinical prediction models (Zhao, J.)

Grant Source: Amazon Research Awards

Role: Primary Investigator

Project Period: 06/2022 – 05/2023

2 R01 HL133786-06 (Wei, W; Feng, Q)

Title: Targeting Residual ASCVD Risk by Integrating Genetics and Clinical Data

Grant source: NIH/NHLBI

Role: Co-Investigator

Project Period: 07/2022 – 06/2027

Title: Learning Precision Medicine Empowered by Knowledge-driven Data Mining Liu, H. (Mayo)
Grant source: Mayo Clinic Hospital/NIH
Role: Co-Investigator
Project Period: 02/2023 – 01/2028

Completed Research Support

18AMTG34280063 (Zhao) 07/01/2018 – 03/01/2020

American Heart Association

“Leveraging machine learning and deep learning with longitudinal EHR and genetic data to better predict 10-year stroke”

Role: **Principal Investigator**

Total Award Amount: \$100,000

Period: 2018-07-01 to 2020-03-1

1 P50 GM115305-01 (Roden/Denny/Phillips) 07/01/2015 – 06/30/2020

NIH/NIGMS

“Improving Prediction of Drug Action”

U01 HG007253-04 (Denny/Levy) 09/19/2018 - 04/30/2019

“The Integrated, Individualized, and Intelligent Prescribing (I3P)”

Role: Co-Investigator

BRT- L1015-0006 (TSU) 01/1/2016 – 12/31/2016

Boeing Data Analytics agreement

“Distributed machine learning for anomaly detection in massive datasets”

Role: Co-Principal Investigator

Air Force Research Laboratory (TSU) 09/15/2015 – 09/01/2017

“Center of Excellence in Cyber security”

Publications / Presentations / Abstracts

Google Scholar Page: <https://scholar.google.com/citations?hl=en&user=7wKBycMAAAAJ>

Journal Articles

1. Yang L, Zhao J, Nan K. Design and Implementation of a Literature, Vertical Search Engine. *Application Research of Computers*, Suppl, 2010.
2. Yang W, **Zhao J**, Nan K. A Literature Metadata Search and Sharing System. *Computer Engineering*, vol 37(23):37-39, 2011.
3. **Zhao J**, Dong K, Yu J, Nan K, Yan B. Social Network Analysis Technologies in e-Science, *e-Science Technology Application*, vol 4(3):3-15, 2013.

4. Muallem A, Shetty S, Wei Pan J, **Zhao J**, Biswal B. Hoeffding Tree Algorithms for Anomaly Detection in Streaming Datasets: A Survey. *Journal of Information Security*. 2017;08:339–361.
5. Liang X, Shetty S, Tosh DK, **Zhao J**, Li D, Liu J. A Reliable Data Provenance and Privacy Preservation Architecture for Business-Driven Cyber-Physical Systems Using Blockchain. *International Journal of Information Security and Privacy (IJISP)*. 2018;12:68–81
6. **Zhao J**, Shetty S, Pan JW, Kamhoua C, Kwiat K. Transfer learning for detecting unknown network attacks. *EURASIP Journal on Information Security*. 2019;2019:1.
7. Wu P, Gifford A, Meng X, Li X, Campbell H, Varley T, **Zhao J**, Carroll R, Bastarache L, Denny JC, Theodoratou E, Wei W-Q. Mapping ICD-10 and ICD-10-CM Codes to Phecodes: Workflow Development and Initial Evaluation. *JMIR Med Inform*. 2019;7:e14325.
8. **Zhao J**, Feng Q, Wu P, Warner JL, Denny JC, Wei W-Q. Using topic modeling via non-negative matrix factorization to identify relationships between genetic variants and disease phenotypes: A case study of Lipoprotein(a) (LPA). *PLoS ONE*. 2019;14:e0212112.
9. **Zhao J**, Feng Q, Wu P, Lupu RA, Wilke RA, Wells QS, Denny JC, Wei W-Q. Learning from Longitudinal Data in Electronic Health Record and Genetic Data to Improve Cardiovascular Event Prediction. *Sci Rep*. 2019;9:717.
10. **Zhao J**, Zhang Y, Schlueter DJ, Wu P, Eric Kerchberger V, Trent Rosenbloom S, Wells QS, Feng Q, Denny JC, Wei W-Q. Detecting time-evolving phenotypic topics via tensor factorization on electronic health records: cardiovascular disease case study. *J Biomed Inform*. 2019;98:103270.
11. Zheng NS, Feng Q, Kerchberger VE, **Zhao J**, Edwards TL, Cox NJ, Stein CM, Roden DM, Denny JC, Wei W-Q. PheMap: a multi-resource knowledge base for high-throughput phenotyping within electronic health records. *Journal of the American Medical Informatics Association*. 2020;27:1675–1687.
12. Johnson KB, Wei W-Q, Weeraratne D, Frisse ME, Misulis K, Rhee K, **Zhao J**, Snowdon JL. Precision Medicine, AI, and the Future of Personalized Health Care. *Clin Transl Sci*. 2021;14:86–93.
13. Wu P, Nelson SD, **Zhao J**, Stone CA, Feng Q, Chen Q, Larson EA, Li B, Cox NJ, Stein CM, Phillips EJ, Roden DM, Denny JC, Wei W-Q. DDIWAS: High-throughput electronic health record-based screening of drug-drug interactions. *J Am Med Inform Assoc*. 2021;28:1421–1430.
14. **Zhao J**, Grabowska ME, Kerchberger VE, Smith JC, Eken HN, Feng Q, Peterson JF, Trent Rosenbloom S, Johnson KB, Wei W-Q. ConceptWAS: A high-throughput method for early identification of COVID-19 presenting symptoms and characteristics from clinical notes. *Journal of Biomedical Informatics*. 2021;117:103748.
15. Wei W-Q, **Zhao J**, Roden DM, Peterson JF. Machine Learning Challenges in Pharmacogenomic Research. *Clin Pharmacol Ther*. 2021;110:552–554.

16. Stevens LM, de Lemos JA, Das SR, Rutan C, Alger HM, Elkind MSV, **Zhao J**, Iyer K, Figueroa CA, Hall JL. American Heart Association Precision Medicine Platform Addresses Challenges in Data Sharing. *Circ Cardiovasc Qual Outcomes*. 2021;14:e007949.
17. Zanussi JT, Zhao J, Dorn CA, Liu G, Feng Q, Wei W, Mosley JD, Stein CM, Kawai VK. Identifying Potential Therapeutic Applications and Diagnostic Harms of Increased Bilirubin Concentrations: A Clinical and Genetic Approach. *Clin Pharmacol Ther*. 2022;111:435–443.

Book Chapters:

1. Shetty S, Liang X, Bowden D, **Zhao J**, Zhang L. Blockchain-Based Decentralized Accountability and Self-Sovereignty in Healthcare Systems. In: Treiblmaier H, Beck R, eds. *Business Transformation through Blockchain: Volume II*. Cham: Springer International Publishing; 2019: 119–149.
2. **Zhao J**, Feng Q, Wei W-Q. Integration of omics and phenotypic data for precision medicine. In: *Systems Medicine. Methods Mol Biol*. 2022; 2486:19–35.
3. Liang X, Bandara E, **Zhao J**, Shetty S, A Blockchain-Empowered Federated Learning System and the Promising Use in Drug Discovery, *Blockchain in Life Sciences: Technology that Accelerates Scientific Advancements*. Springer. *In press*.

Peer-reviewed Conference Full Paper:

1. **Zhao J**, Li S, Yu J, Dong K, Yan B, Study on Knowledge Sharing- Oriented Research Collaboration Model on Qinghai Lake Joint Research Environment. In *Proceedings of 7th Information Technology and Applications Workshop by Chinese Academy of Sciences*, pp 158-162, 2009.
2. **Zhao J**, Yang L, Dong K, Nan K, Yan B, E-Scholar: Improving Academic Search through Combining Metasearch with Entity Extraction. In *Proceedings - 2009 IEEE Youth Conference on Information, Computing and Telecommunication*, pp 247-250, 2009.
3. **Zhao J**, Li S, Yu J, Dong K, Nan K, Yan B. A Cross-disciplinary Collaborative Research Platform-Study on Qinghai Lake Joint Research Environment. In: *2010 Sixth International Conference on Signal-Image Technology and Internet Based Systems*. IEEE; 2010: 211–216.
4. **Zhao J**, Dong K, Yu J, Hu W. DSN: A Knowledge-Based Scholar Networking Practice Towards Research Community. In: *2013 IEEE 9th International Conference on e-Science; eScience 2013*: 238–244.
5. **Zhao J**, Dong K, Yu J. Recommending funding collaborators with scholar social networks. In: *2014 International Conference on Data Science and Advanced Analytics (DSAA)*. IEEE; 2014: 122–127 (Accepted rate 10.4%).
6. Shen Y, Yu J, Dong K, **Zhao J**, Nan K. An Influence Field Perspective on Predicting User's Retweeting Behavior. In: *International Conference on Web-Age Information Management (WAIM'15)*. Springer; 2015. p. 3–16.

7. Liang X, Shetty S, **Zhao J**, Bowden D, Li D, Liu J. Towards Decentralized Accountability and Self-sovereignty in Healthcare Systems. In: International Conference on Information and Communications Security. Springer, 2017. p. 387–398.
8. Liang X, **Zhao J**, Shetty S, Liu J, Li D. Integrating blockchain for data sharing and collaboration in mobile healthcare applications. In: 2017 IEEE 28th Annual International Symposium on Personal, Indoor, and Mobile Radio Communications (PIMRC). IEEE; 2017. p. 1–5.
9. Liang X, **Zhao J**, Shetty S, Li D. Towards data assurance and resilience in IoT using blockchain. In: MILCOM 2017-2017 IEEE Military Communications Conference (MILCOM). IEEE; 2017. p. 261–266.
10. **Zhao J**, Shetty S, Pan JW. Feature-based transfer learning for network security. In: MILCOM 2017-2017 MILCOM. IEEE; 2017. p. 17–22.
11. Bandara E, Shetty S, Rahman A, Mukkamala R, **Zhao J**, Liang X. Bassa-ML — A Blockchain and Model Card Integrated Federated Learning Provenance Platform. In: 2022 IEEE 19th Annual Consumer Communications Networking Conference (CCNC). 2022. p. 753–9.

Letters, Abstracts, Posters and Non-Peer Reviewed Papers:

1. **Zhao J**, Feng Q, Wei W-Q, Denny JC. Using Topic Modeling to Identify Relationship between LPA Variant and Disease Phenotypes, presented at Vanderbilt Genetics Institute 2017 Fall Symposium. 11/ 2017, poster presentation
2. **Zhao J**, Feng Q, Wei W-Q, Denny JC. Learning from Longitudinal Electronic Health Record and Genetic Data to Improve Cardiovascular Event Prediction. Advances in Genome Biology and Technology AGBT. 9/2018, poster presentation.
3. **Zhao J**, Feng Q, Wei W-Q, Denny JC. Using Topic Modeling to Identify Relationship between LPA Variant and Disease Phenotypes, AMIA Symp. 2018, poster presentation.
4. **Zhao J**, Feng Q, Wei W-Q, Denny JC. Deep learning using EHR and genetic data to predict cardiovascular diseases, AMIA Symp. 2019, poster presentation.
5. **Zhao J**, Zhang Y, Feng Q, Wei W-Q. Using Machine Learning to Identify sub-phenotypes of cardiovascular disease for genetic association, AHA Science Sessions, Philadelphia, 2019, poster presentation.
6. **Zhao J**, Zhang Y, Feng Q, Wei W-Q. 2019. Abstract 14831: Using Machine Learning to Identify Sub-Phenotypes of Cardiovascular Disease for Genetic Association. *Circulation* 140 (Suppl_1): A14831–A14831.
7. **Zhao J**, Wang Y, Feng Q, Wei W-Q. Detecting National Institutes of Health's funding interests and trends using Machine Learning. AMIA Symp. 2020, poster presentation.
8. Deng Y, Pacheco JA, Chung A, MS, Mao C, Smith J, **Zhao J**, Wei W-Q, Barnado A, Weng C, Liu C, Cordon A, Yu J, Tedla Y, Kho A, Goldman RR, Walunas T, Luo Y. Natural

Language Processing to Identify Lupus Nephritis Phenotype in Electronic Health Records. American College of Rheumatology Convergence 2021, abstract.

9. **Zhao J**, Grabowska ME, Kerchberger VE, Smith JC, Eken HN, Feng Q, Peterson JF, Trent Rosenbloom S, Johnson KB, Wei W-Q. Early Detect COVID-19 Presenting Symptoms and Characteristics Using Natural Language Processing on Electronic Health Records. AMIA Symp. 2021, podium abstract accepted.
10. Li F, Wu P, Peterson JF, Wei W-Q, **Zhao J**. Evaluating the Bias and Fairness of Machine Learning-based Clinical Prediction Models. AMIA 2022 Informatics Summit.

Manuscripts under review

1. Deng Y, Pacheco JA, Chung A, Mao C, Smith JC, Zhao J, Wei W-Q, Barnado A, Weng C, Liu C, Cordon A, Yu J, Tedla Y, Kho A, Ramsey-Goldman R, Walunas T, Luo Y. Natural language processing to identify lupus nephritis phenotype in electronic health records. *arXiv:2112.10821 [cs]*. 2021. Available at <http://arxiv.org/abs/2112.10821>. Accessed January 16, 2022.
2. Zanussy J, Zhao J, Wei W-Q, Feng Q, Olsen NJ, Stein CM, Kawai VK. Clinical diagnoses associated with a positive antinuclear antibody test in patients with and without autoimmune disease. Submitted.