

Gang Luo

Contact Information

Department of Biomedical Informatics and
Medical Education
University of Washington
UW Medicine South Lake Union
850 Republican Street, Bldg C, Box 358047
Seattle, WA 98195
USA

Phone: (206) 221-4596
luogang@uw.edu
<http://faculty.washington.edu/luogang/>

Personal Data

Place of birth: Hefei, Anhui Province, P.R. China
Citizenship: USA

Research Areas

Health/Clinical Informatics (software system design/development and data analytics), Machine Learning (computer algorithms that improve automatically through experience), Big Data (managing and analyzing data sets that are too large or too complex to be handled via traditional methods), Database Systems, Information Retrieval (search engine), and Data Mining (discovering patterns in large data sets) with a focus on health applications

Education

Shanghai Jiaotong University, Shanghai, P.R. China June 1994 - June 1998
B.S. in Computer Science
Highest Honors

University of Wisconsin-Madison, Madison, WI Aug. 1998 - June 2004
Ph.D. in Computer Science with a minor in Mathematics
Advisor: Jeffrey F. Naughton
Dissertation Title: *Techniques for Operational Data Warehousing*

Faculty Positions Held

University of Utah, Salt Lake City, UT
Assistant Professor, Department of Biomedical Informatics, School of Medicine Aug. 2012 – Sep. 2016
Adjunct faculty member (equivalent to affiliated faculty member at the University of Washington), Department of Biomedical Informatics, School of Medicine Sep. 2016 – present

Health Informatics, Big Data, Database, and Machine Learning

- (1) Developed the first method to automatically provide rule-based explanations for any black-box machine learning model's predictions on tabular data with no accuracy loss.
- (2) Developed a method that can automatically select machine learning algorithms, feature selection techniques, and hyper-parameter values one order of magnitude faster than existing methods.

University of Washington, Seattle, WA

Associate Professor, Department of Biomedical Informatics and Medical Education, School of Medicine
Sep. 2016 – Jun. 2021
Professor, Department of Biomedical Informatics and Medical Education, School of Medicine
Jul. 2021 – present

Health Informatics, Big Data, Database, and Machine Learning

- (1) Developing big data software to automate building machine learning predictive models with clinical big data.
- (2) Developing computational approaches to optimize care management, including building more accurate predictive models, automatically explaining prediction results, suggesting tailored interventions, and preventing care inequity.
- (3) Developed a model to predict appropriate admission of bronchiolitis patients in the emergency room.
- (4) Developing progress indicators for machine learning model building and data mining algorithm execution, which continuously estimate the remaining job execution time as well as the portion of the job that has been finished.

Research and Industrial Positions Held

Stanford Research Institute's Artificial Intelligence Center, Menlo Park, CA May 1999 - Aug. 1999
Research Intern.

NCR Advance Development Lab, Madison, WI May 2000 - Aug. 2000, May 2001 - Aug. 2001
Research Software Engineer.

University of Wisconsin-Madison, Madison, WI Aug. 2000 - June 2004
Research Assistant, with Professor Jeffrey F. Naughton.

Real-time Data Warehousing

Developed various techniques for SQL progress indicators (used in Microsoft SQL Server database management system), real-time materialized view maintenance, workload management, and non-blocking query processing in database systems.

IBM T.J. Watson Research Center, Hawthorne, NY July 2004 – Aug. 2012
Research Staff Member

Health Informatics, Big Data, and Web Search

- (1) Built an intelligent personal health record system and a questionnaire-guided intelligent medical Web search engine to assist ordinary Internet users to search for health information.
- (2) Built software to do automatic, online classification of sleep stages using electroencephalogram brain waves, and reached a classification accuracy that almost approaches the theoretical limit.
- (3) Built a Web search engine to discover relationships between two entities (e.g., the connections between different places or commonalities of people).
- (4) Participated in developing commercial big data software InfoSphere Streams for stream data processing.

Veterans Affairs Salt Lake City, Salt Lake City, UT 2013 - 2018
Research WOC (work without compensation)

Veterans Affairs Puget Sound, Seattle, WA 2018 - present
Research WOC (work without compensation)

Amazon.com Services LLC, Seattle, WA Sep. 2021 – present
Amazon Scholar

Machine Learning

Awards and Honors

- 23 awards in the Chinese Olympic Competitions of Mathematics, Physics, Mechanics, Chemistry, and Computer Sciences for middle school and high school students in China, in Anhui Province and in the city of Hefei. Including:
 - ◆ 1st grade prize of the Chinese Olympic Competition of Chemistry for middle school students (1991, Anhui Province).
 - ◆ 1st grade prize of the Chinese Olympic Competition of Mathematics for high school students (1993, Anhui Province).
 - ◆ 1st grade prize of the Chinese Olympic Competition of Mechanics for high school students (1993, Anhui Province).
 - ◆ 3rd grade prize of the Chinese Olympic Competition of Physics for high school students (1993, Anhui Province).
- Privilege to Enter Shanghai Jiaotong University (1994). Waived of the National College Entrance Examination.
- University Scholarship (1994 - 1996). Shanghai Jiaotong University (for students within the top 1%).
- Holison Scholarship (1994 - 1997). 99 students awarded in China.
- Excellent Student Award (1995, 1997). Shanghai Jiaotong University (for students within the top 1%).
- Dong's Orient Scholarship (1996). Shanghai Jiaotong University (for students within the top 0.5%).
- Dupont Scholarship (1997). Shanghai Jiaotong University (for students within the top 1%).
- Xue Wen Fang - Huang Bo Lin Scholarship (1997). Shanghai Jiaotong University (for students within the top 2%).
- Excellent Bachelor's Dissertation Award (1998). Shanghai Jiaotong University (for the top 10 dissertations in the Dept. of Computer Sciences & Engineering).
- Privilege to Enter the Graduate School (1998). Shanghai Jiaotong University. Waived of the National Graduate School Admission Examination.
- NCR Research Fellowship (Aug. 2000 – Dec. 2003).
- NCR Excellent Performance Award (2001).
- NCR Invention Award (3 times in 2000, 9 times in 2001, 3 times in 2002, 4 times in 2003).
- IBM Invention Achievement Award (Oct. 2006).
- Vice President Clinical and Translational (VPCAT) Research Scholar, University of Utah (2013-2014. Eight faculty members were selected.).
- Invitation to Microsoft Research Faculty Summit, Redmond, Washington (July 2017, for ~500 faculty members worldwide).
- Invitation to Microsoft Research Frontiers in Machine Learning virtual event (July 2020, for ~500 faculty members worldwide).

Professional Organizations

Steering and Organizing Committees

- Founding honorary general chair of ACM International Health Informatics Symposium (2010)
- Founding chair of ACM Special Interest Group on Health Informatics (2011 - 2012)
- Steering committee member of ACM SIGHIT International Health Informatics Symposium (2011 - 2012)
- General chair of ACM SIGHIT International Health Informatics Symposium (2012)
- Founding co-chair of International Workshop on Data Management and Analytics for Medicine and Healthcare (DMAH) (2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022)

Conference Officers

- Publicity co-chair of IEEE International Conference on Healthcare Informatics (ICHI 2013)

Professional Membership

- American Medical Informatics Association (AMIA, 2012-present)

- Healthcare Information and Management Systems Society (HIMSS, 2013-present)
- Association for Computing Machinery (ACM, 2019-present)

Teaching Responsibilities

University of Wisconsin-Madison

Sep. 1998 - May 2000

Teaching assistant (Fall 1998, Spring 1999) for “CS302 – Introduction to Programming”

Provided daily lab consulting. Graded assignments and projects.

Teaching assistant (Fall 1999) for “CS547 – Computer System Modeling Fundamentals”

Held weekly office hours. Graded assignments and projects.

Teaching assistant (Spring 2000) for “CS564 – Database Management Systems”

Held weekly office hours. Graded assignments and projects.

Guest lecture on natural language processing for medical doctors at IUPUI INFO I668 Seminar in Health Informatics (Feb. 9, 2012)

University of Utah

BMI 6803 – Research-in-Progress - Clinical Research / Translational Informatics (50% responsibility, co-taught with Lewis Frey, 1 credit, Fall 2012, Fall 2013)

Guest lecture on the topic of brain-computer interface for the FIRST Lego League Robotics program for elementary school students in Park City, UT (Sep. 27, 2012)

BMI 6470 – Biomedical Information Retrieval (2 credits, Fall 2013, Fall 2014, Fall 2015)

BMI 6471 – Biomedical Information Retrieval Lab (1 credit, Fall 2015)

BMI 6950 – Healthcare Quality Informatics (10% responsibility, co-taught with Jennifer Garvin, Katherine Sward, Ramkiran Gouripeddi, 3 credits, Spring 2014)

BMI 6950-007 – Independent Study (for computer science students) (3 credits, Spring 2015)

University of Washington

BIME 600A – Independent Study (9 credits, Fall 2016; 3 credits, Winter 2019; 2 credits, Summer 2019; 7 credits, Fall 2019; 7 credits, Winter 2020; 7 credits, Spring 2020; 2 credits, Summer 2020; 8 credits, Fall 2020; 10 credits, Winter 2021; 10 credits, Spring 2021; 3 credits, Summer 2021; 10 credits, Fall 2021; 9 credits, Winter 2022; 9 credits, Spring 2022; 5 credits, Summer 2022; 10 credits, Fall 2022)

BIME 700A – Informatics Master’s Thesis (6 credits, Fall 2019)

BIME 800A – Doctoral Dissertation (10 credits, Winter 2022; 10 credits, Spring 2022; 2 credits, Summer 2022; 10 credits, Fall 2022)

CSE 414 – Introduction to Database Systems (3 credits, Fall 2017)

Guest lecture on subject-adaptive real-time sleep stage classification based on conditional random field at BIME 591 Biomedical and Health Informatics Research Colloquium (Oct. 31, 2017)

Guest lecture on machine learning at BIME 550 Knowledge Representation and Applications (Feb. 7, 2018; Feb. 19, 2020)

BIME 499A – Undergraduate Research (6 credits, Winter 2018; 3 credits, Spring 2018; 2 credits, Autumn 2018; 2 credits, Winter 2019; 2 credits, Spring 2019; 3 credits, Fall 2019; 2 credits, Spring 2021)

Guest lecture on medical imaging informatics at BIME 530 Introduction to Biomedical and Health Informatics (co-taught with Qifei Dong, Dec. 7, 2022)

Student Advising (* represents serving as the primary advisor and/or thesis committee chair)

Ph.D. thesis committee:

1. Robert Angell (2012-2015, Department of Biomedical Informatics, University of Utah).
2. Valliammai Chidambaram (2013-2015, Department of Biomedical Informatics, University of Utah).
3. Philip J. Brewster (2014-2016, Department of Biomedical Informatics, University of Utah).
4. Lance Pflieger (2014-2016, Department of Biomedical Informatics, University of Utah).
5. Duy Bui (2014-2016, Department of Biomedical Informatics, University of Utah, graduated).
6. Doug F. Redd (2014-2016, Department of Biomedical Informatics, University of Utah, graduated).
7. Diane Walker* (2014-2016, Department of Biomedical Informatics, University of Utah; current position: Bio-Mathematician 2 at BioFire Defense).
8. Nancy Jo Thum-Thomas (2014-2019, College of Nursing, University of Utah, graduated).
9. Jiantao Bian (2015-2016, Department of Biomedical Informatics, University of Utah).
10. Jason Thomas (2019-2021, Department of Biomedical Informatics and Medical Education, University of Washington, graduated).
11. Jean Feng (2020, Department of Biostatistics, University of Washington, graduated).
12. Qifei Dong* (2018-, Department of Biomedical Informatics and Medical Education, University of Washington).
13. Haotian Zhu (2022-, Department of Linguistics, University of Washington).
14. Tucker R. Stewart (2022-, School of Engineering and Technology, University of Washington Tacoma).

Ph.D. student advising pre-committee formation:

1. Xiaoyi Zhang* (2020-, Department of Biomedical Informatics and Medical Education, University of Washington).
2. Siyang Zeng* (2020-, Department of Biomedical Informatics and Medical Education, University of Washington).

Medical resident:

1. Mohamed Seedahmed (2020-, Clinical Instructor, Department of Medicine, Clinical Research Informatics Postdoctoral Fellow, Department of Epidemiology and Biostatistics, University of California San Francisco)

Master's thesis committee:

1. Bret Heale (2014-2016, Department of Biomedical Informatics, University of Utah, graduated).
2. Jerry Westberg (non-thesis capstone project, 2014-2015, Department of Biomedical Informatics, University of Utah, graduated).
3. Nabanita Sen (non-thesis capstone project, 2015, Department of Biomedical Informatics, University of Utah, graduated).
4. Seth Russell (non-thesis capstone project, 2015-2016, Department of Biomedical Informatics, University of Utah, graduated).
5. Thanit Vinitchagoon (2016-2017, Department of Nutrition and Integrative Physiology, College of Health, University of Utah, non-voting member, graduated).
6. Krystal V. Slattery (2017-2018, Department of Biomedical Informatics and Medical Education, University of Washington, graduated).
7. Qiushui Zhang (2018, Department of Biomedical Informatics and Medical Education, University of Washington, graduated).
8. Yiqun Rong (2018, Department of Biomedical Informatics and Medical Education, University of Washington, graduated).
9. Amanda I. Messinger (2019-2020, School of Nursing CIPCT Program, University of Washington, graduated).

Postbaccalaureate certificate student:

1. Sashidhar Yerram* (2013-2014, Department of Biomedical Informatics, University of Utah, graduated; current position: Data Analyst at Safeway).

Undergraduate students:

1. Henry Jang* (2018, School of Computer Science & Engineering, University of Washington).
2. Michael Hart* (2018-2019, School of Computer Science & Engineering & Department of Mathematics, University of Washington).
3. William I. Bowers* (2018, School of Informatics, University of Washington).
4. Clifford Silfanus* (2018, University of Washington).
5. Melody Chou* (2019, School of Informatics, University of Washington).
6. Sylvia Dou* (2019, Department of Mathematics, University of Washington).
7. Nour El-Din Ayad* (2021, School of Computer Science & Engineering, University of Washington).

High school student:

1. Noah J. Rose Ledesma* (2018, Seattle Academy of Arts and Sciences; current position: Undergraduate student at University of California-Davis)

Visiting scholars

1. Xueqiang Zeng* (Associate Professor, Computer Center, Nanchang University, P.R. China) (2015-2016, Department of Biomedical Informatics, University of Utah)
2. Zhongmin Wang* (Associate Director, Information Technology Department, Jiangsu Province Hospital, P.R. China) (2015-2016, Department of Biomedical Informatics, University of Utah)
3. Hye-Eun Yoon* (Associate Professor, Division of Nephrology, Department of Internal Medicine, Catholic University of Korea, Incheon St. Mary's Hospital, Republic of Korea) (2020-2021, Department of Biomedical Informatics and Medical Education, University of Washington)

Visiting students**Medical resident:**

1. Zachary C. Liao* (Visiting student from Jackson Memorial Hospital/University of Miami) (2019, Department of Biomedical Informatics and Medical Education, University of Washington; current position: clinical informatics fellow at University of Washington)

PhD student:

1. Yao Tong* (Visiting student from Department of Software Engineering, Zhengzhou University, P.R. China) (2019-2021, Department of Biomedical Informatics and Medical Education, University of Washington)

Undergraduate students:

1. Friedrich Carrle* (Visiting student from Department of Medical Informatics, Heilbronn University, Germany) (2019-2020, Department of Biomedical Informatics and Medical Education, University of Washington).
2. Benedict Schilling* (Visiting student from Department of Medical Informatics, Heilbronn University, Germany) (2019-2020, Department of Biomedical Informatics and Medical Education, University of Washington).

Editorial Responsibilities

Editorial Positions – Journals

- Associate Editor: Network Modeling and Analysis in Health Informatics and Bioinformatics (NetMAHIB) journal (June 2011 - June 2017)
- Editorial board member: International Journal of Respiratory and Pulmonary Medicine (IJRPM) (January 2015 - present)
- Associate Editor: Health Information Science and Systems (HISS) journal (February 2017 - present)
- Guest Editor: Distributed and Parallel Databases (DAPD) journal, special issue on Data Management and Analytics for Healthcare (2018)
- Editorial board member: Global Transitions (July 2018 - present)

- Guest Editor: *Frontiers in Psychology* and *Frontiers in Computer Science*, special issue on mHealth tools for patient empowerment and chronic disease management (2021)
- Editorial board member: *JMIR AI* (April 2022 - present)

Editorial Positions – Book series

- Editorial board member: Springer Health Information Science book series (Apr. 2013 - present)

Program Committees

- 11th ACM International Workshop on Web Information and Data Management (WIDM 2009)
- American Medical Informatics Association Annual Symposium (AMIA 2013)
- International Symposium on Network Analysis and Mining for Health Informatics, Biomedicine and Bioinformatics (Net-HI-BI-BI 2013)
- International Symposium on Network Enabled Health Informatics, Bio-Medicine and Bioinformatics (HI-BI-BI 2013, 2014, 2015, 2016)
- Organizer of the selection of the awardee of the Homer R. Warner Award for the American Medical Informatics Association Annual Symposium (AMIA 2014, 2015)
- Workshop on Health Information Quality (HealthIQ 2015)
- SIGIR Medical Information Retrieval Workshop (MedIR 2014, 2016)
- International Workshop on Multi-Perspective Consumer Health Search (MPCHS 2016)
- International Workshop on Predictive Analytics for Critical Care (PACC 2016)
- IEEE International Conference on e-Science (eScience 2016, 2017, 2019, 2021, 2022)
- International Conference on Health and Social Care Information Systems and Technologies (HCist 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021)
- International Conference on Health Information Science (HIS 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022)
- IEEE International Symposium on Computer-Based Medical Systems (CBMS 2013, 2015, 2016, 2017, 2018)
- Intelligent Systems for Molecular Biology/European Conference on Computational Biology (ISMB/ECCB 2017, 2019)
- Workshop on Emerging Data Engineering Methods and Approaches for Precision Medicine (DEPM 2018)
- Pacific Symposium on Biocomputing (PSB 2017, 2018)
- International IFIP Cross Domain Conference for Machine Learning & Knowledge Extraction (CD-MAKE 2018)
- IMIA Yearbook of Medical Informatics (2018, 2019, 2020, 2021, 2022, 2023)
- Intelligent Systems for Molecular Biology (ISMB 2018)
- International Conference on eHealth, Telemedicine, and Social Medicine (eTELEMED 2019, 2020, 2021, 2022, 2023)
- International Workshop on (Population and Personalized) Health Intelligence (W3PHIAI 2019, 2020, 2021, 2022, 2023)
- Global Transitions (2019)
- ICML Workshop on Automatic Machine Learning (AutoML 2019)
- IEEE BIBM International Workshop on Biomedical and Health Informatics (BHI 2019, 2020, 2021)
- International Workshop on E-Health: P4-medicine & Digital Transformation (E-Health 2020)
- Artificial Intelligence in Medicine (AIME 2020, 2022)
- International Workshop on Semantic Web Meets Health Data Management (SWH 2020, 2021)
- International Conference on Health Informatics (HEALTHINF 2021, 2022, 2023)
- International Workshop on Health Data Management in the Era of AI (HeDAI 2023)

Special National Responsibilities

Review Panel - Proposals

- NSF Proposal (2013, 2012 (two panels))

- Hypothesis Development Awards and Translational Research Awards (HDA/TRA) of the Vision Research Program (VRP) of the 2013 Clinical and Rehabilitative Medicine Research Program (CRM RP) program and the U.S. Army (panel was held in 2014)
- 2014 Joint Warfighter Medical Research Program (JW MRP) of the Department of Defense Congressionally Directed Medical Research Programs (CDMRP)
- 2015 Defense Medical Research and Development Program (DMRDP) Joint Program Committee 1 (JPC-1)
- 2016 Defense Medical Research and Development Program (DMRDP) Joint Program Committee 1 (JPC-1)
- Peer review panel chair for 2017 U.S. Army Medical Research and Materiel Command (USAMRMC) of the Department of Defense Congressionally Directed Medical Research Programs (CDMRP)
- 2017 U.S. Army Medical Research and Materiel Command's (USAMRMC) Broad Agency Announcement (BAA) for extramural medical research
- 2018 Defense Medical Research and Development Program (DMRDP) (panel was held in 2019)
- 2020 Pennsylvania Department of Health final performance reviews for big data in health research grants
- 2021 U.S. Army Medical Research and Materiel Command (USAMRDC) Broad Agency Announcement
- 2022 Florida Department of Health's Alzheimer's Disease Research Program

Special National and International Responsibilities

Reviewer – Conferences

- IEEE Int. Conf. on Data Mining (ICDM 2005)
- Int. World Wide Web Conf. (WWW 2005)
- Int. Conf. on Very Large Databases (VLDB 2005, 2006)
- ACM-SIGMOD Int. Conf. on Management of Data (SIGMOD 2006)
- Int. Conf. on Data Engineering (ICDE 2006)
- ACM Conf. on Information and Knowledge Management (CIKM 2006)
- Pacific-Asia Conf. on Knowledge Discovery and Data Mining (PAKDD 2006)
- Int. Conf. of the European Federation for Medical Informatics (MIE 2009)
- EFMI Special Topic Conf. (STC 2010)
- ACM Conf. on Human Factors and Computing Systems (CHI 2011)
- American Medical Informatics Association Annual Symposium (AMIA 2012)
- Selection of the awardee of the Homer R. Warner Award for the American Medical Informatics Association Annual Symposium (AMIA 2017)

Reviewer – Proposals

- NSF Proposal 2007
- Portuguese Foundation for Science and Technology Proposal 2012 (<http://www.fct.pt/>)
- Vienna Science and Technology Fund Proposal 2012 (<http://www.wwtf.at>)
- United Kingdom Medical Research Council Proposal 2013: Expressions of interest for Medical Bioinformatics - building capability, capacity and infrastructure (<http://www.mrc.ac.uk/Fundingopportunities/Calls/MedicalBioinformatics/MRC009048>)
- French Inserm and CNRS ATIP-Avenir Proposal 2013 (<http://www.france-science.org/ATIP-AVENIR-Program-2013.html>)
- Wellcome Trust/DBT India Alliance Biomedical Research Fellowship Programme for India 2014 (<http://www.wellcomedbt.org/>)
- 2015 U.S. Army Medical Research and Materiel Command's (USAMRMC) Broad Agency Announcement (BAA) for extramural medical research
- United Kingdom Medical Research Council Proposal 2016
- 2016 U.S. Army Medical Research and Materiel Command's (USAMRMC) Broad Agency Announcement (BAA) for extramural medical research
- University of Washington Royalty Research Fund Proposal 2017, 2018

Reviewer – Books

- Springer book series

- Chapman & Hall/CRC book series
- Cambridge University Press book series

Special Local Responsibilities

Service to the Department of Biomedical Informatics at the University of Utah

- Member of Graduate Admissions Committee, Department of Biomedical Informatics, University of Utah, 2012-2016
- Member of Awards Committee, Department of Biomedical Informatics, University of Utah, 2018-present

Service to the University of Washington and the Department of Biomedical Informatics and Medical Education

- Member of Graduate Admissions Committee, Department of Biomedical Informatics and Medical Education, University of Washington, 2017-present

Research Funding

Grants

1. RRP 13-249, Linda Williams (PI) 3/1/2014 - 2/28/2015, 6/15/2015 - 9/30/2015
VA Health Services Research & Development (HSR&D QUERI)
e-Measurement of Meaningful Use Stroke Electronic Quality Indicators
Role: Co-Investigator.
Goal: This project's goal is to use machine learning and natural language processing to enhance four stroke quality indicators.
Role: In recognition of my national reputation on and expertise in machine learning, I led a PhD student to do the entire machine learning part of this project.
Amount: \$96,177
2. University of Utah 9/1/2014 - 8/31/2015
Enhanced Financial Analytic Tools for the UUHC Charge Description Master
Role: PI.
Goal/Role: This is a single-person project to enhance the financial analytic tools to support the Charge Description Master management process of University of Utah Health Care. I handled everything in this project.
Amount: \$61,088
3. Michael Rubin (PI) 8/3/2015 - 9/30/2016
U.S. Department of Homeland Security
Data Integration for Biosurveillance Demonstration
Role: Co-Investigator.
Goal: This project's goal is to improve early detection systems for the surveillance of dengue and carbapenem-resistant Enterobacteriaceae. A key component of this project is to build a machine learning-based natural language processing tool to facilitate the surveillance.
Role: In recognition of my expertise in machine learning and natural language processing, I was in charge of this key component and led a graduate student to implement this tool.
Amount: \$719,000
4. 200-2011-42039, Matthew H. Samore (PI) 8/11/2015 - 8/10/2018
Centers for Disease Control and Prevention
SHEPheRD: Assessment of Patient-Stratified Transmission Risk and Development of Innovative Barrier Precaution Strategies
Role: Co-Investigator.
Goal: This project's goal is to develop and implement novel methods to increase the adherence of healthcare professionals to barrier precautions. A key component of this project is to build a machine learning-based natural language processing tool to extract symptoms from VA clinical notes.

Role: In recognition of my national reputation on and expertise in machine learning, I was in charge of the machine learning part and led a VA staff member to build this tool using the automatic machine learning model selection software developed by me.
Amount: \$3,099,998

5. 7R21HL128875, NIH/NHLBI R21 8/8/2016 - 6/30/2018
Predicting Appropriate Admission of Bronchiolitis Patients in the Emergency Room
Role: PI.
Goal: This project's goal is to develop a new machine learning model to predict appropriate hospital admission for a bronchiolitis patient in the emergency department.
Role: As PI, I initiated the project, led the execution of all of the aims, coordinated the three sites involved in the project, led a staff member to pull medical data from Intermountain Healthcare, and built the machine learning model by myself.
Amount: \$243,973

6. 1P30 AR072572, Jeffrey G. Jarvik (PI) 9/21/2017 - 7/31/2022
NIH/NIAMS
UW Core Center for Clinical Research of Musculoskeletal Conditions
Role: CLEAR Center Co-Director of Deep Learning and Co-Director of Informatics with a sub budget of \$569,696. (David R. Haynor and Nathan M. Cross, two clinicians, are the other two Co-Directors of Deep Learning. Sean Mooney, an informatician, is the other Co-Director of Informatics.)
Goal: This project intends to develop deep learning models for medical imaging and natural language processing tools, both related to musculoskeletal conditions.
Role: In recognition of my national reputation on and expertise in machine learning and health informatics, I was chosen as a Co-Director and led a PhD student to develop deep learning models for medical imaging.
Amount: \$3,711,003

7. 5R01HL142503, NIH/NHLBI R01 8/1/2018 - 6/30/2023
Using Computational Approaches to Optimize Asthma Care Management
Role: PI.
Goal: This project's goal is to develop new machine learning models to predict asthma hospital encounters, as well as a new method to automatically explain the machine learning models' prediction results.
Role: As PI, I initiated the project, led the execution of all of the aims, coordinated the four sites involved in the project, led several staff members to pull medical data from Intermountain Healthcare, Kaiser Permanente Southern California, and University of Washington Medicine, and built the machine learning models and automatic explanation method by myself.
Amount: \$3,259,133

8. SDR 19-235, Paul L. Hebert (PI) 10/1/2019 - 3/31/2021
VA Health Services Research & Development
Patient Incentives for Reducing No-Shows, Accommodating Walk-in Visits, and Improving Primary Care Work Flow
Role: Director of Machine Learning with a sub budget of \$45,000 (the VA subcontract covering this grant and some other activities totally provided \$197,459 to me).
Goal: This project's goal is to develop deep learning models to predict the daily number of no-shows and the daily number of walk-in visits at various VA sites.
Role: In recognition of my national reputation on and expertise in machine learning, I was in charge of model building and led a PhD student to build these models.
Amount: \$199,197

9. INV-016910, Adam B. Wilcox (PI) 4/15/2020 - 10/14/2020
Bill & Melinda Gates Foundation
COVID-19: Data Analytics on Cases in the Pacific Northwest
Role: Co-Investigator.
Goal: This project's goal is to develop a COVID-19 data set at UW Medicine.

Role: In recognition of my national reputation on and expertise in health informatics and database, I participated in creating and double checking this data set.
Amount: \$320,000

10. PEC-16-354, Steven B. Zeliadt/Stephanie L. Taylor (Co-Directors) 10/2018 - 12/2024
VA HSR&D
VA QUERI Complementary and Integrative Health Evaluation Center (CIHEC)
Role: Director of Machine Learning and Medical Informatics with a sub budget of \$534,478.
Goal: This QUERI partnered-evaluation project will increase our understanding of VHA's implementation of evidence-based complementary and integrative health approaches (CIH), and help the Office of Patient Centered Care and Cultural Transformation develop strategies for integrating CIH to improve healthcare delivery.
Role: In recognition of my national reputation on and expertise in database, machine learning, and health informatics, I led a PhD student to do data processing and analysis.
Amount: \$2,068,085
11. Amy Hagopian (PI) 9/15/2021 - 4/30/2022
Urban@UW Research Spark Grants
Improving the Enumeration of Individuals Experiencing Homelessness in the U.S. Using Anonymous Cell Phone Location Data
Role: Co-Investigator with the full budget of this grant allocated to my lab.
Goal: This project's goal is to innovate a new homeless enumeration strategy.
Role: In recognition of my national reputation on and expertise in health informatics and big data, I led a PhD student to do data processing and analysis.
Amount: \$19,299
12. IIR 19-450, Paul L. Hebert (PI) 8/1/2020 - 10/31/2023
VA Health Services Research & Development
Multiphase Optimization Trial of Incentives for Veterans to Encourage Walking
Role: Director of Computer Science and Medical Informatics with a sub budget of \$65,139.
Goal: The goal of the study is to conduct the screening phase trial in 128 Veterans to identify the optimal components of incentives for increasing walking among physically inactive Veterans. All Veterans in this phase will be given various components of incentives for increasing average steps per day over a 12-week habit-building period, and then maintaining the increase through a 12-week habit maintenance period.
Role: In recognition of my national reputation on and expertise in computer science and medical informatics, I led a PhD student to do software development.
Amount: \$789,282
13. Amy Hagopian (PI) 6/1/2022 - 5/31/2023
UW Population Health Initiative's Tier 2 Pilot Grant
Innovating Better Methods to Enumerate Individuals Experiencing Homelessness
Role: Co-Investigator with a sub budget of \$39,598.
Goal: This project's goal is to innovate a new method to enumerate homeless people.
Role: In recognition of my national reputation on and expertise in health informatics and big data, I led a PhD student to do data processing and analysis.
Amount: \$106,822
14. P30 AR072572, Jeffrey G. Jarvik (PI) 8/1/2022 - 7/31/2027
NIH/NIAMS
UW Core Center for Clinical Research of Musculoskeletal Conditions
Role: CLEAR Center Co-Director of Deep Learning and Co-Director of Informatics with a sub budget of \$528,801. (David R. Haynor and Nathan M. Cross, two clinicians, are the other two Co-Directors of Deep Learning. Sean Mooney, an informatician, is the other Co-Director of Informatics.)
Goal: This project intends to develop deep learning models for medical imaging and natural language processing tools, both related to musculoskeletal conditions.

Role: In recognition of my national reputation on and expertise in machine learning and health informatics, I was chosen as a Co-Director and led a PhD student to develop deep learning models for medical imaging.
Amount: \$3,910,463

Contracts

1. Brian C. Sauer, Ahmad Halwani (PIs) 9/1/2014 - 6/30/2015
Amgen Inc.
Validation of Methods to Identify Hospitalizations for ESRD Patients Requiring RBC Transfusions
Role: Co-Investigator.
Goal: This project's goal is to develop and validate algorithms that use administrative data to identify Transfusion Related Admissions in patients with End Stage Renal Disease.
Role: In recognition of my national reputation on and expertise in health informatics, I provided informatics expertise to this project.
Amount: \$200,000

Gifts

1. Starmerx International Inc. 5/20/2022
Role: PI.
Amount: \$30,000

Bibliography

Note: + represents corresponding author.

Note: # represents co-senior author.

Note: ☼ represents comprehensive paper that is ≥ 10 pages (often 15-20 pages) long and has about or over 10,000 words.

Note: Refereed archival conference papers are marked with **. In computer science, conference papers have the same length as journal papers, are peer-reviewed using similar standards as journal papers, and typically have an acceptance rate of around 15-25%.

Note: Mentored authors (graduate students and faculty mentees) are underlined.

Note: BD = Big Data, BI = Biostatistics, C = Compiler, DB = Database, DM = Data Mining, HCI = Human-Computer Interaction, HI = Health Informatics, IR = Information Retrieval, MI = Medical Imaging, ML = Machine Learning, NLP = Natural Language Processing, NU = Nutrition, SE = Software Engineering

Manuscripts in Refereed Journals and Refereed Conference Proceedings

- [1] **G. Luo**⁺, J.F. Naughton, and C.J. Ellmann. *A Non-blocking Parallel Spatial Join Algorithm*. Proc. 2002 Int. Conf. on Data Engineering (ICDE'02)** , San Jose, CA, Feb. 2002, pp. 697-705. (acceptance rate: 19%) (DB)
- [2] **G. Luo**⁺, J.F. Naughton, C.J. Ellmann, and M.W. Watzke. *Auxiliary Relations for Join View Maintenance in Parallel RDBMS*. Poster at 2002 Int. Conf. on Data Engineering (ICDE'02)** , San Jose, CA, Feb. 2002. (DB)
- [3]☼**G. Luo**⁺, C.J. Ellmann, P.J. Haas, and J.F. Naughton. *A Scalable Hash Ripple Join Algorithm*. Proc. 2002 ACM-SIGMOD Int. Conf. on Management of Data (SIGMOD'02)** , Madison, WI, June 2002, pp. 252-262. (acceptance rate: 18%) (DB)
- [4]☼**G. Luo**⁺, J.F. Naughton, C.J. Ellmann, and M.W. Watzke. *A Comparison of Three Methods for Join View Maintenance in Parallel RDBMS*. Proc. 2003 Int. Conf. on Data Engineering (ICDE'03)** , Bangalore, India, Mar. 2003, pp. 177-188. (acceptance rate: 13%) (DB)
- [5]☼**G. Luo**⁺, J.F. Naughton, C.J. Ellmann, and M.W. Watzke. *Locking Protocols for Materialized Aggregate Join Views*. Proc. 2003 Int. Conf. on Very Large Databases (VLDB'03)** , Berlin, Germany, Sep. 2003, pp. 596-607. (acceptance rate: 18%) (DB)

- [6]✱**G. Luo**⁺, J.F. Naughton, C.J. Ellmann, and M.W. Watzke. *Toward a Progress Indicator for Database Queries*. Proc. 2004 ACM-SIGMOD Int. Conf. on Management of Data (SIGMOD'04)** , Paris, France, June 2004, pp. 791-802. (acceptance rate: 16%) (DB, HCI)
- [7]✱**G. Luo**⁺, J.F. Naughton, C.J. Ellmann, and M.W. Watzke. *Increasing the Accuracy and Coverage of SQL Progress Indicators*. Proc. 2005 Int. Conf. on Data Engineering (ICDE'05)** , Tokyo, Japan, Apr. 2005, pp. 853-864. (acceptance rate: 13%) (DB, HCI)
- [8]✱**G. Luo**⁺, J.F. Naughton, C.J. Ellmann, and M.W. Watzke. *Locking Protocols for Materialized Aggregate Join Views*. IEEE Transactions on Knowledge & Data Engineering (TKDE), Vol. 17, No. 6, June 2005, pp. 796-807. (DB)
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- [11] **G. Luo**⁺, J.F. Naughton, C.J. Ellmann, and M.W. Watzke. *Transaction Reordering and Grouping for Continuous Data Loading*. First Int. Workshop on Business Intelligence for the Real Time Enterprise (BIRTE'06)** , Seoul, Korea, Sep. 2006, pp. 34-49. Springer Lecture Notes in Computer Science 4365. (DB)
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- [13] **G. Luo**⁺, K. Wu, and P.S. Yu. *SAO: A Stream Index for Answering Linear Optimization Queries*. Proc. 2007 Int. Conf. on Data Engineering (ICDE'07)** , short paper, Istanbul, Turkey, Apr. 2007, pp. 1302-1306. (acceptance rate: 27%) (DB, BD)
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- [17]✱ **G. Luo**⁺, T. Chen, and H. Yu. *Toward a Progress Indicator for Program Compilation*. Software: Practice and Experience (SPE), Vol. 37, No. 9, July 2007, pp. 909-933. (C, HCI, SE)
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- [81] **G. Luo**⁺, C.L. Nau, W.W. Crawford, M. Schatz, R.S. Zeiger, and C. Koebnick. *Generalizability of an Automatic Explanation Method for Machine Learning Prediction Results on Asthma-Related Hospital Visits in Patients with Asthma: Quantitative Analysis*. Journal of Medical Internet Research (JMIR), Vol. 23, No. 4, e24153, Apr. 2021, pp. 1-14. PMCID: PMC8085752. PMID: 33856359. (HI, ML)
- [82][✱] **G. Luo**⁺. *A Roadmap for Automating Lineage Tracing to Aid Automatically Explaining Machine Learning Predictions for Clinical Decision Support*. JMIR Medical Informatics (JMI), Vol. 9, No. 5, e27778, May 2021, pp. 1-20. PMCID: PMC8193496. PMID: 34042600. (DB, HI, ML)
- [83][✱] **G. Luo**⁺, B.L. Stone, X. Sheng, S. He, C. Koebnick, and F.L. Nkoy. *Using Computational Methods to Improve Integrated Disease Management for Asthma and Chronic Obstructive Pulmonary Disease: Protocol for a Secondary Analysis*. JMIR Research Protocols (JRP), Vol. 10, No. 5, e27065, May 2021, pp. 1-19. PMCID: PMC8170556. PMID: 34003134. (HI, ML)
- [84][✱] **X. Zhang**, **G. Luo**⁺. *Ranking Rule-Based Automatic Explanations for Machine Learning Predictions on Asthma Hospital Encounters in Patients with Asthma: Retrospective Cohort Study*. JMIR Medical Informatics (JMI), Vol. 9, No. 8, e28287, Aug. 2021, pp. 1-22. PMCID: PMC8387888. PMID: 34383673. (HI, ML)

- [85] Y. Tong, Z.C. Liao, P. Tarczy-Hornoch, and **G. Luo**⁺. *Using a Constraint-Based Method to Identify Chronic Disease Patients Who are Apt to Obtain Care Mostly within a Given Health Care System: Retrospective Cohort Study*. JMIR Formative Research (JFR), Vol. 5, No. 10, e26314, Oct. 2021, pp. 1-12. PMID: PMC8532011. PMID: 34617906. (HI)
- [86][✱] S. Zeng, M. Arjomandi, Y. Tong, Z.C. Liao, and **G. Luo**⁺. *Developing a Machine Learning Model to Predict Severe Chronic Obstructive Pulmonary Disease Exacerbations: Retrospective Cohort Study*. Journal of Medical Internet Research (JMIR), Vol. 24, No. 1, e28953, Jan. 2022, pp. 1-23. PMID: PMC8778560. PMID: 34989686. (HI, ML)
- [87][✱] S. Zeng, M. Arjomandi, and **G. Luo**⁺. *Automatically Explaining Machine Learning Predictions on Severe Chronic Obstructive Pulmonary Disease Exacerbations: Retrospective Cohort Study*. JMIR Medical Informatics (JMI), Vol. 10, No. 2, e33043, Feb. 2022, pp. 1-23. PMID: PMC8917430. PMID: 35212634. (HI, ML)
- [88] **G. Luo**⁺. *A Roadmap for Boosting Model Generalizability for Predicting Hospital Encounters for Asthma*. JMIR Medical Informatics (JMI), Vol. 10, No. 3, e33044, Mar. 2022, pp. 1-9. PMID: PMC8924785. PMID: 35230246. (HI, ML)
- [89] M.I. Seedahmed, I. Mogilnicka, S. Zeng, **G. Luo**, M.A. Whooley, C.E. McCulloch, L. Koth, and M. Arjomandi. *Performance of a Computational Phenotyping Algorithm for Sarcoidosis Using Diagnostic Codes in Electronic Medical Records: Case Validation Study from 2 Veterans Affairs Medical Centers*. JMIR Formative Research (JFR), Vol. 6, No. 3, e31615, Mar. 2022, pp. 1-13. PMID: PMC8928044. PMID: 35081036. (HI)
- [90] Q. Dong, **G. Luo**[#], N.E. Lane, L. Lui, L.M. Marshall, D.M. Kado, P. Cawthon, J. Perry, S.K. Johnston, D. Haynor, J.G. Jarvik, and N.M. Cross. *Deep Learning Classification of Spinal Osteoporotic Compression Fractures on Radiographs Using an Adaptation of the Genant Semiquantitative Criteria*. Academic Radiology, Vol. 29, No. 12, Dec. 2022, pp. 1819-1832. PMID: . PMID: 35351363. (MI, ML)
- [91] X. Zhang, **G. Luo**⁺. *Error and Timeliness Analysis for Using Machine Learning to Predict Asthma Hospital Visits: Retrospective Cohort Study*. JMIR Medical Informatics (JMI), Vol. 10, No. 6, e38220, Jun. 2022, pp. 1-9. PMID: PMC9218884. PMID: 35675129. (HI, ML)
- [92][✱] Q. Dong, X. Zhang, and **G. Luo**⁺. *Improving the Accuracy of Progress Indication for Constructing Deep Learning Models*. IEEE Access, Vol. 10, 2022, pp. 63754-63781. PMID: PMC9302923. PMID: 35873900. (ML, HCI)

Book Chapters

- [1] **G. Luo**⁺, S.B. Thomas, and C. Tang. *Intelligent Personal Health Record*. (invited) In Arvin Agah (Ed.), *Medical Applications of Artificial Intelligence*, CRC Press, Taylor & Francis, Boca Raton, Florida, 2013, pp. 397-405. (HI, IR, NLP)
- [2] T.O. Staiger, P.A. Kritek, **G. Luo**, and P. Tarczy-Hornoch. *Anticipation in Medicine and Healthcare: Implications for Improving Safety and Quality*. In Roberto Poli (Ed.), *Handbook of Anticipation*, Springer, New York, New York, 2017, pp. 1-21. (HI, ML)

General Magazine Articles

- [1] **G. Luo**⁺, J. Schroeter. *Automatic and Transparent Machine Learning*. Popular Electronics (invited), Vol. 1, No. 1, Dec. 2017, pp. 198-206. (ML)

Edited Refereed Journal Special Issues

- [1] F. Wang, **G. Luo** (Eds.). Distributed and Parallel Databases (DAPD) journal, special issue on Data Management and Analytics for Healthcare (2018). (HI)
- [2] P. Sousa, R. Martinho, P. Parreira, and **G. Luo** (Eds.). Frontiers in Psychology and Frontiers in Computer Science, special issue on mHealth tools for patient empowerment and chronic disease management (2022). Under preparation. (HI)

Edited Refereed Archival Conference Proceedings

- [1] U.V. Catalyurek, **G. Luo**, H. Andrade, and N.R. Smalheiser (Eds.). Proceedings of the 2010 ACM International Health Informatics Symposium (IHI'10). ACM Press, 2010. (HI)
- [2] **G. Luo**, J. Liu, and C.C. Yang (Eds.). Proceedings of the 2012 ACM SIGHIT International Health Informatics Symposium (IHI'12). ACM Press, 2012. (HI)

Edited Refereed Archival Workshop Proceedings

- [1] F. Wang, **G. Luo**, and C. Weng (Eds.). Proceedings of the 2015 International Workshop on Data Management and Analytics for Medicine and Healthcare (DMAH'15). Springer Lecture Notes in Computer Science 9579, 2016. (HI)
- [2] F. Wang, L. Yao, and **G. Luo** (Eds.). Proceedings of the 2016 International Workshop on Data Management and Analytics for Medicine and Healthcare (DMAH'16). Springer Lecture Notes in Computer Science 10186, 2017. (HI)
- [3] E. Begoli, F. Wang, and **G. Luo** (Eds.). Proceedings of the 2017 International Workshop on Data Management and Analytics for Medicine and Healthcare (DMAH'17). Springer Lecture Notes in Computer Science 10494, 2017. (HI)
- [4] F. Wang, **G. Luo**, and G. Teodoro (Eds.). Proceedings of the 2018 International Workshop on Data Management and Analytics for Medicine and Healthcare (DMAH'18). Springer Lecture Notes in Computer Science 11470, 2019. (HI)
- [5] F. Wang, **G. Luo**, Y. Liang, and A. Dubovitskaya (Eds.). Proceedings of the 2019 International Workshop on Data Management and Analytics for Medicine and Healthcare (DMAH'19). Springer Lecture Notes in Computer Science 11721, 2019. (HI)
- [6] F. Wang, **G. Luo**, A. Dubovitskaya, and J. Kong (Eds.). Proceedings of the 2020 International Workshop on Data Management and Analytics for Medicine and Healthcare (DMAH'20). Springer Lecture Notes in Computer Science 12633, 2021. (HI)
- [7] F. Wang, **G. Luo**, A. Dubovitskaya, and J. Kong (Eds.). Proceedings of the 2021 International Workshop on Data Management and Analytics for Medicine and Healthcare (DMAH'21). Springer Lecture Notes in Computer Science 12921, 2022. (HI)
- [8] J. Kong, **G. Luo**, D. Teng, and F. Wang (Eds.). Proceedings of the 2022 International Workshop on Data Management and Analytics for Medicine and Healthcare (DMAH'22). Springer Lecture Notes in Computer Science ?, 2022. Under preparation. (HI)

Refereed Journal Papers under Review

- [1] N.M. Cross, J. Perry, Q. Dong, **G. Luo**, N.E. Lane, L. Lui, L. Marshall, S.K. Johnston, D. Haynor, J.G. Jarvik, and P.J. Heagerty. *Subject-Level Osteoporotic Compression Fracture Prediction Using Deep Learning Radiograph Predictions and Ancillary Data*. Under review. PMID: ?. (MI, ML)

- [2] Q. Dong, **G. Luo**, N.E. Lane, L. Lui, L.M. Marshall, S.K. Johnston, H. Dabbous, M. O'Reilly, K. Linnau, J. Perry, D. Haynor, J.G. Jarvik, B.C. Chang, J. Renslo, and N.M. Cross. *Generalizability of Deep Learning Classification of Spinal Osteoporotic Compression Fractures on Radiographs Using an Adaptation of the Modified-2 Algorithm-Based Qualitative Criteria*. Under review. PMCID: ?. PMID: ?. (MI, ML)
- [3] C. Nau, R.K. Butler, C. Huang, V.K. Khang, A. Chen, B. Creekmur, B. Broder, C. Subject, A.L. Sharp, L.M. Moreta-sainz, J.S. Park, A.J. Manek, R.M. Cooper, S.M. Mendoza, **G. Luo**, M.K. Gould. *Development and Internal Validation of a Model to Predict Clinical Deterioration in Hospitalized Patients with COVID-19: the COVID-19 Hospital Early Deterioration Index (COVID-HDI)*. Under review. PMCID: ?. PMID: ?. (HI, ML)
- [4] C.B. Davis, Q. Dong, B. Akinpelu, H. Dabbous, M. O'Reilly, K.F. Linnau, T. Eggert, J.R. Mason, K. Cunniff, **G. Luo**, J. Perry, S.K. Johnston, D. Haynor, J.G. Jarvik, N.M. Cross. *Deep Learning Classification of Spinal Radiograph Sidedness*. Under review. PMCID: ?. PMID: ?. (HI, ML)
- [5] S. Zeng, **G. Luo**, D.A. Lynch, R.P. Bowler, and M. Arjomandi. *Lung Volumes Differentiate Emphysema Versus Airway Disease Phenotypes in Pre-COPD*. Under review. PMCID: ?. PMID: ?. (HI)
- [6] B.C. Chang, J. Renslo, Q. Dong, S.K. Johnston, J. Perry, D. Haynor, **G. Luo**, J.G. Jarvik, and N.M. Cross. *An ensemble method of segmentation models to detect vertebral bodies on radiographs*. Under review. PMCID: ?. PMID: ?. (HI, ML)

Refereed Abstracts and Conference Presentations

- [1] **G. Luo**⁺, W. Min. *Subject-Adaptive Real-Time Sleep Stage Classification Based on Conditional Random Field*. 2007 Joint Statistical Meetings (JSM'07), Salt Lake City, UT, July 2007. (BI, HI, ML)
- [2] **G. Luo**⁺, W. Min. *Distance-Constrained Orthogonal Latin Squares for Brain-Computer Interface*. 2010 Joint Statistical Meetings (JSM'10), Vancouver, Canada, Aug. 2010. (BI, HI)
- [3] T. Vinitchagoon, M. Murtaugh, J. Metos, **G. Luo**, and K. Jordan. *The Development of an Objective Scoring System for Evaluating Mediterranean Diet Recipes*. Utah Academy of Nutrition and Dietetics Annual Conference, Sandy, UT, Mar. 2017. (NU)
- [4] X. Liu, **G. Luo**. *Can Feature Engineering with Clinical Input Improve Machine Learning Model Accuracy and Interpretability?* AIMed: Artificial Intelligence in Medicine (AIMed'17), Laguna Niguel, CA, Dec. 2017. (HI, ML)
- [5] X. Zhang, **G. Luo**. *Error Analysis of Machine Learning Predictions on Asthma Hospital Encounters*. American Academy of Allergy, Asthma & Immunology Annual Meeting (AAAAI'22), Phoenix, AZ, Feb. 2022. Journal of Allergy and Clinical Immunology (JACI), Vol. 149, No. 2, supplement, AB47, Feb. 2022. (HI, ML)
- [6] S. Zeng, M. Arjomandi, and **G. Luo**. *Automatically Explaining Machine Learning Predictions on Severe Chronic Obstructive Pulmonary Disease Exacerbations: Retrospective Cohort Study*. American Thoracic Society (ATS) International Conference (ATS'22), San Francisco, CA, May 2022. American Journal of Respiratory and Critical Care Medicine (AJRCCM), Vol. 205, A1296, 2022. (HI, ML)
- [7] X. Zhang, J. Toyama, **G. Luo**, S.L. Taylor, and S.B. Zeliadt. *How Many Patients Starting CIH Therapies Have Chronic Musculoskeletal Pain and How to Identify Such Pain in Electronic Health Records?* 2022 International Congress on Integrative Medicine and Health, Phoenix, AZ, May, 2022. Global Advances in Health and Medicine, Vol. 11, 101, 2022. (HI)

- [8] S. Zeng, R. Bowler, **G. Luo**, D. Lynch, and M. Arjomandi. *Lung Volumes Differentiate the Predominance of Emphysema versus Airway Disease Phenotype in Early COPD*. European Respiratory Society (ERS) International Congress (ERS'22), Barcelona, Spain, Sep. 2022. (HI)

Refereed Abstracts under review

- [1] J.L. Renslo, B. Chang, Q. Dong, D.R. Haynor, S.K. Johnston, **G. Luo**, J. Perry, S. Shubber, N.E. Lane, L. Marshall, J.G. Jarvik, and N.M. Cross. *U-Net for Spine Segmentation - Towards Fracture Detection*. Radiological Society of North America 2022 Annual Meeting (RSNA'22), Chicago, IL, Nov. 27 – Dec. 1, 2022. Under review. (MI, ML)
- [2] Q. Dong, **G. Luo**, N.E. Lane, L. Lui, L.M. Marshall, S.K. Johnston, H. Dabbous, M. O'Reilly, K. Linnau, J. Perry, D. Haynor, J.G. Jarvik, B.C. Chang, J. Renslo, and N.M. Cross. *Generalizability of Deep Learning Classification of Spinal Osteoporotic Compression Fractures on Radiographs Using an Adaptation of the Modified-2 Algorithm-Based Qualitative Criteria*. Radiological Society of North America 2022 Annual Meeting (RSNA'22), Chicago, IL, Nov. 27 – Dec. 1, 2022. Under review. (MI, ML)
- [3] X. Zhang, S.B. Zeliadt, M. Walker, M.R. Levitt, B. Ng, and **G. Luo**. *Assessing the Robustness of a Machine Learning Model for Predicting Asthma Hospital Encounters during the COVID-19 Pandemic*. American Thoracic Society (ATS) International Conference (ATS'22), Washington, DC, May, 2023. Under review. (HI, ML)
- [4] C. Nau, S. Wang, L. Viveros, A. Rich, M. Sidell, A. Padilla, J. Briganti, C. Gandhi, J. Ngo, T. Dao, P. Vila, **G. Luo**, and H. Nguyen. *An Intuitive Introduction to Predictive Models for Palliative Care – How Smart is Artificial Intelligence?* National Symposium for Academic Palliative Care Education and Research, Long Beach, CA, Mar. 2023. Under review. (HI, ML)

Patents

1. **G. Luo**, M.W. Watzke, C.J. Ellmann, and J.F. Naughton. *Locking Mechanism for a Materialized View That Does Not Employ Locks on the Materialized View*. 2002.
2. **G. Luo**, C.J. Ellmann, J.F. Naughton, and M.W. Watzke. *Transaction Grouping and Rescheduling in a Database System*. 2002.
3. **G. Luo**, C.J. Ellmann, and J.F. Naughton. *Spatial Join Method and Apparatus*. U.S. serial 6,732,107, 2004.
4. **G. Luo**, C.J. Ellmann, and J.F. Naughton. *Non-blocking Parallel Band Join Algorithm*. U.S. serial 6,804,678, 2004.
5. **G. Luo**, C.J. Ellmann, and J.F. Naughton. *Parallel Spatial Join Index*. U.S. serial 6,745,198, 2004.
6. **G. Luo** and A. Shatdal. *Parallel Random Sampling*. U.S. serial 6,889,221, 2005.
7. **G. Luo**, C.J. Ellmann, and J.F. Naughton. *Method and Apparatus for Performing Hash Join*. U.S. serial 7,085,769, 2006.
8. **G. Luo**, C.J. Ellmann, J.F. Naughton, and M.W. Watzke. *Locking Mechanism Employing a Name Lock for Materialized Views*. U.S. serial 7,155,434, 2006.
9. **G. Luo**, C.J. Ellmann, J.F. Naughton, and M.W. Watzke. *Rescheduling Transactions in a Database System*. U.S. serial 6,990,503, 2006.
10. **G. Luo**, M.W. Watzke, C.J. Ellmann, and J.F. Naughton. *Locking Mechanism Using a Predefined Lock for Materialized Views in a Database System*. U.S. serial 7,149,737, 2006.
11. **G. Luo**, C.J. Ellmann, and J.F. Naughton. *Auxiliary Relation for Materialized View*. U.S. serial 7,092,951, 2006.
12. **G. Luo** and A. Shatdal. *Parallel Moving Aggregate Computation*. U.S. serial 7,051,021, 2006.
13. **G. Luo**, M.W. Watzke, C.J. Ellmann, and J.F. Naughton. *Locking Mechanism for Views Associated with B-tree Indexes*. U.S. serial 7,174,331, 2007.
14. **G. Luo**, C.J. Ellmann, and M.W. Watzke. *Locking Mechanism Using Predefined Locks for Aggregate Materialized Views in a Database System*. U.S. serial 7,181,452, 2007.

15. **G. Luo**, P.S. Yu. *Systems and Methods for Resource Adaptive Workload Management*. U.S. serial 7,379,953, 2008.
16. **G. Luo**, M.W. Watzke, C.J. Ellmann, and J.F. Naughton. *Locking Mechanism for Materialized Views in a Database System*. U.S. serial 7,321,898, 2008.
17. **G. Luo**, J.F. Naughton, C.J. Ellmann, and M.W. Watzke. *Rescheduling Table Scan Transactions*. U.S. serial 7,418,706, 2008.
18. **G. Luo**, W. Min. *Method and System for Subject-Adaptive Real-Time Sleep Stage Classification*. U.S. serial 7,509,163, 2009.
19. **G. Luo**, M.W. Watzke, and C.J. Ellmann. *Grouping Database Queries and/or Transactions*. U.S. serial 7,814,080, 2010.
20. **G. Luo**, K. Wu, and P.S. Yu. *System and Method for Indexing a Data Stream*. U.S. serial 7,552,099, 2009. U.S. serial 8,271,409, 2012.
21. **G. Luo**, M.W. Watzke, C.J. Ellmann, and J.F. Naughton. *Rescheduling of Modification Operations for Loading Data into a Database System*. U.S. serial 8,156,110, 2012.
22. **G. Luo**, J.F. Naughton, C.J. Ellmann, and M.W. Watzke. *Providing a Progress Indicator in a Database System*. U.S. serial 8,255,388, 2012.
23. **G. Luo**, R. Yan, and P.S. Yu. *System and Method for Real-Time New Event Detection on Video Streams*. U.S. serial 8,428,360, 2013. U.S. serial 9,215,479, 2015.
24. **G. Luo**, C. Tang, and P.S. Yu. *System and Method for Resource-Adaptive, Real-Time New Event Detection*. U.S. serial 9,015,569, 2015. U.S. serial 9,984,143, 2018.
25. **G. Luo**, A. Biem, T. Dinger, N. Halim, D.M. Sow, and D.S. Turaga. *Hypothesis-driven, Real-Time Analysis of Physiological Data Streams Using Textual Representations*. U.S. serial 9,292,576, 2016. U.S. serial 10,395,004, 2019.
26. **G. Luo**, P.S. Yu. *System and Method for Real-time Materialized View Maintenance*. U.S. serial 9,984,119, 2018.

Invited Talks

International/national

1. Intelligent Personal Health Record. School of Computer Science, Florida International University (Jan. 31, 2012)
2. Intelligent Personal Health Record. School of Informatics, Indiana University-Purdue University Indianapolis (Feb. 10, 2012)
3. Intelligent Personal Health Record. Department of Biomedical Informatics, School of Medicine, University of Utah (Feb. 23, 2012)
4. Intelligent Personal Health Record. Department of Biostatistics & Medical Informatics, School of Medicine and Public Health, University of Wisconsin-Madison (Mar. 6, 2012)
5. Intelligent Personal Health Record. Department of Health Informatics & Administration, College of Health Sciences, University of Wisconsin-Milwaukee (Apr. 17, 2012)
6. Intelligent Medical Search. Elsevier, Philadelphia, PA. (March 4, 2015)
7. How can Data Science be Used to Help Children. United Nations Children's Fund (UNICEF)/Bloomberg, New York City, NY. (Sep. 28, 2015)
8. Automating Machine Learning Model Building with Big Clinical Data. School of Biomedical Informatics, University of Texas Health Science Center at Houston (Feb. 8, 2016)
9. Automating Machine Learning Model Building with Big Clinical Data. Department of Biomedical Informatics and Medical Education, School of Medicine, University of Washington (Apr. 13, 2016)
10. Automating Machine Learning Model Building with Big Clinical Data. Kaiser Permanente Research Southern California, Pasadena, CA (Jun. 29, 2016)
11. Automating Machine Learning Model Building with Big Clinical Data. 24th Chinese Association for Science and Technology (CAST-USA) Annual Conference, Salt Lake City, UT (Oct. 15, 2016)
12. Automating Machine Learning Model Building with Big Clinical Data. Jiangsu Province Hospital, P.R. China (Nov. 8, 2016)
13. Automatically Explaining Machine Learning Prediction Results: A Demonstration on Type 2 Diabetes Risk Prediction. Panelist. AcademyHealth's Annual Research Meeting, Seattle, WA (Jun. 25, 2018)

14. Automating Machine Learning Model Building with Big Clinical Data. University of Massachusetts-Lowell, Lowell, MA (Sep. 19, 2018)
15. Automatically Explaining Machine Learning Prediction Results: A Demonstration on Type 2 Diabetes Risk Prediction. CLIC Un-Meeting: Machine Learning & AI Applications in Translational Science, Rochester, NY (Jun. 1, 2019)
16. Automatically Explaining Machine Learning Prediction Results: A Demonstration on Type 2 Diabetes Risk Prediction. Kaiser Permanente Research Southern California, Pasadena, CA (Oct. 29, 2019)
17. Automatically Explaining Machine Learning Prediction Results: A Demonstration on Type 2 Diabetes Risk Prediction. Department of Biomedical Informatics, Stony Brook University, Stony Brook, NY (Jun. 12, 2020)
18. Using Computational Approaches to Optimize Asthma Care Management. Keynote speech at International Conference on Intelligent Medicine and Big Data, Zhongshan, Guangdong Province, P.R. China (May 27, 2021)
19. Making Machine Learning Accessible to Citizen Data Scientists. Amazon, Seattle, WA (Jul. 15, 2021)

Regional

1. Intelligent Personal Health Record. Veterans Affairs Salt Lake City Research Division (Aug. 20, 2013)
2. Enabling Machine Learning on Big Clinical Data for Healthcare Researchers. Veterans Affairs Salt Lake City Research Division (Jun. 9, 2015)
3. Automating Machine Learning Model Building with Big Clinical Data. Fred Hutchinson Cancer Research Center (Apr. 18, 2017)
4. Automating Machine Learning Model Building with Big Clinical Data. Kaiser Permanente Washington Health Research Institute, Seattle, WA (Oct. 10, 2017)
5. Identifying Future High-Cost Patients for Care Management. Veterans Affairs Seattle-Denver Center of Innovation, Seattle, WA (Oct. 5, 2018)
6. Using Computational Approaches to Optimize Asthma Care Management. Veterans Affairs Seattle-Denver Center of Innovation, Seattle, WA (Feb. 12, 2021)

Local

1. Automating Machine Learning Model Building with Big Clinical Data. Database group, Department of Computer Science & Engineering, University of Washington (Jan. 27, 2017)
2. Intelligent Personal Health Record. Department of Biomedical Informatics and Medical Education, School of Medicine, University of Washington (May 11, 2017)
3. Automating Machine Learning Model Building with Big Clinical Data. eScience Institute, University of Washington (May 23, 2017)
4. Automating Machine Learning Model Building with Big Clinical Data. Department of Industrial and Systems Engineering, University of Washington (Mar. 28, 2017)
5. Identifying Future High-Cost Patients for Care Management. Center for Scholarship in Patient Safety and Quality, School of Medicine, University of Washington (Feb. 5, 2018)
6. Identifying Future High-Cost Patients for Care Management. Program in Health Economics and Outcomes Methodology, Department of Health Services, School of Medicine, University of Washington (Feb. 7, 2018)
7. Identifying Future High-Cost Patients for Care Management. Emergency Medicine Research Faculty Seminar, Department of Emergency Medicine, School of Medicine, University of Washington (Jan. 9, 2019)
8. Predicting Appropriate Hospital Admission of Emergency Department Patients with Bronchiolitis. Department of Biomedical Informatics and Medical Education, School of Medicine, University of Washington (Jan. 17, 2019)
9. Predicting Hospital Use for Asthma in Asthma Patients. Omics and Symptom Science Seminar, School of Nursing, University of Washington (Dec. 6, 2019)
10. Predicting Hospital Use for Asthma in Asthma Patients. Department of Biomedical Informatics and Medical Education, School of Medicine, University of Washington (Feb. 6, 2020)
11. Automatically Explaining Machine Learning Prediction Results on Asthma Hospital Visits in Asthmatic Patients. Department of Biomedical Informatics and Medical Education, School of Medicine, University of Washington (Apr. 22, 2021)

12. Deep Learning Classification of Spinal Osteoporotic Compression Fractures on Radiographs Using an Adaptation of the Genant Semiquantitative Criteria. Department of Biomedical Informatics and Medical Education, School of Medicine, University of Washington (Joint talk with Qifei Dong, Jun. 2, 2022)
13. Using Computational Approaches to Optimize Asthma Care Management. Monthly Meeting for the Stroke and Applied Neuroscience Center, School of Medicine, University of Washington (Jun. 27, 2022)

Media Coverage of Research

1. “Enhancing Machine Learning Prediction to Improve Asthma Care Management.” By Keith D’Oria, Physician’s Weekly, Mar. 11, 2021. References 2021 published work. Available at <https://www.physiciansweekly.com/enhancing-machine-learning-prediction-to-improve-asthma-care-management>.