

# Gang Luo

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Medical Education  
University of Washington  
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## Research Areas

Health/Clinical Informatics (software system design/development and data analytics), Big Data, Database Systems, Information Retrieval, Data Mining, and Machine Learning with a focus on health applications

## Education

**University of Wisconsin-Madison** 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*

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

## Research and Industrial Experience

**University of Washington, Seattle, WA**  
Associate Professor, Department of Biomedical Informatics and Medical Education, School of Medicine  
Sep. 2016 – present

### *Health Informatics, Big Data, Database, and Machine Learning*

- (1) Developing big data software to automate building machine learning models with clinical big data.
- (2) Developing computational approaches to optimize care management, including building more accurate predictive models, automatically explaining prediction results, and suggesting tailored interventions.
- (3) Developing 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.

**University of Utah, Salt Lake City, UT**  
Assistant Professor, Department of Biomedical Informatics, School of Medicine Aug. 2012 – Sep. 2016

### *Health Informatics, Big Data, Database, and Machine Learning*

- (1) Developed the first method for automatically providing rule-based explanations for any machine learning model's prediction/classification results 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.

**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 an automatic, online sleep stager using EEG signal, whose classification accuracy 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.

**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), real-time materialized view maintenance, workload management, and non-blocking query processing.

**NCR Advance Development Lab**, Madison, WI

May 2000 - Aug. 2000, May 2001 - Aug. 2001

Research Software Engineer.

**Stanford Research Institute's Artificial Intelligence Center**, Menlo Park, CA

May 1999 - Aug. 1999

Research Intern.

## Teaching Experience

**University of Washington**

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

BIME 600A – Independent Study (9 credits, Fall 2016)

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)

**University of Utah**

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

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

BMI 6950 – Healthcare Quality Informatics (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)

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

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

**University of Wisconsin-Madison**

Sep. 1998 - May 2000

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

Held weekly office hours. Graded assignments and projects.

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

Held weekly office hours. Graded assignments and projects.

Teaching assistant (Fall 1998, Spring 1999) for “CS302 – Introduction to Programming”  
Provided daily lab consulting. Graded assignments and projects.

## Publications (\* represents corresponding author)

### Peer-Reviewed Journal Papers

#### Health Informatics, Machine Learning, Big Data

- [1] G. Luo\*. *Automatically Explaining Machine Learning Prediction Results: A Demonstration on Type 2 Diabetes Risk Prediction*. Health Information Science and Systems (HISS), Vol. 4, No. 2, Mar. 2016, pp. 1-9. PMID: PMC4782293. PMID: 26958341.
- [2] G. Luo\*, B.L. Stone, M.D. Johnson, P. Tarczy-Hornoch, A.B. Wilcox, S.D. Mooney, X. Sheng, P.J. Haug, and F.L. Nkoy. *Automating Construction of Machine Learning Models with Clinical Big Data: Proposal Rationale and Methods*. JMIR Research Protocols (JRP), Vol. 6, No. 8, e175, Aug. 2017, pp. 1-19. PMID: PMC5596298. PMID: 28851678.
- [3] X. Zeng, G. Luo\*. *Progressive Sampling-Based Bayesian Optimization for Efficient and Automatic Machine Learning Model Selection*. Health Information Science and Systems (HISS), Vol. 5, No. 1, Article 2, Sep. 2017, pp. 1-21. PMID: PMC5617811. PMID: 29038732.
- [4] G. Luo\*. *PredicT-ML: A Tool for Automating Machine Learning Model Building with Big Clinical Data*. Health Information Science and Systems (HISS), Vol. 4, No. 5, Jun. 2016, pp. 1-16. PMID: PMC4897944. PMID: 27280018.
- [5] G. Luo\*. *MLBCD: A Machine Learning Tool for Big Clinical Data*. Health Information Science and Systems (HISS), Vol. 3, No. 3, Sep. 2015, pp. 1-19. PMID: PMC4584489. PMID: 26417431.
- [6] G. Luo\*. *A Review of Automatic Selection Methods for Machine Learning Algorithms and Hyperparameter Values*. Network Modeling Analysis in Health Informatics and Bioinformatics (NetMAHIB), Vol. 5, No. 18, Dec. 2016, pp. 1-16.
- [7] G. Luo\*, B.L. Stone, F. Sakaguchi, X. Sheng, and M.A. Murtaugh. *Using Computational Approaches to Improve Risk-Stratified Patient Management: Rationale and Methods*. JMIR Research Protocols (JRP), Vol. 4, No. 4, e128, Oct. 2015, pp. 1-16. PMID: PMC4704915. PMID: 26503357.
- [8] G. Luo\*, K. Sward. *A Roadmap for Optimizing Asthma Care Management via Computational Approaches*. JMIR Medical Informatics (JMI), Vol. 5, No. 3, e32, Sep. 2017, pp. 1-12. PMID: PMC5635229. PMID: 28951380.
- [9] G. Luo\*, F.L. Nkoy, P.H. Gesteland, T.S. Glasgow, and B.L. Stone. *A Systematic Review of Predictive Modeling for Bronchiolitis*. International Journal of Medical Informatics (IJMI), Vol. 83, No. 10, Oct. 2014, pp. 691-714. PMID: 25106933.
- [10] G. Luo\*, B.L. Stone, B. Fassl, C.G. Maloney, P.H. Gesteland, S.R. Yerram, and F.L. Nkoy. *Predicting Asthma Control Deterioration in Children*. BMC Medical Informatics and Decision Making, Vol. 15, 84, Oct. 2015, pp. 1-8. PMID: PMC4607145. PMID: 26467091.
- [11] G. Luo\*, F.L. Nkoy, B.L. Stone, D. Schmick, and M.D. Johnson. *A Systematic Review of Predictive Models for Asthma Development in Children*. BMC Medical Informatics and Decision Making, Vol. 15, 99, Nov. 2015, pp. 1-16. PMID: 26615519.
- [12] G. Luo\*, B.L. Stone, M.D. Johnson, and F.L. Nkoy. *Predicting Appropriate Admission of Bronchiolitis Patients in the Emergency Department: Rationale and Methods*. JMIR Research Protocols (JRP), Vol. 5, No. 1, e41, Mar. 2016, pp. 1-9. PMID: PMC4802105. PMID: 26952700.

[13] G. Luo\*. *A Roadmap for Designing a Personalized Search Tool for Individual Healthcare Providers*. Journal of Medical Systems (JMS), Vol. 38, No. 2, Jan. 2014, pp. 1-19. PMID: 24424432.

[14] J. Bian, M.A. Morid, S. Jonnalagadda, G. Luo, and G. Del Fiol. *Automatic Identification of High Impact Articles in PubMed to Support Clinical Decision Making*. Journal of Biomedical Informatics (JBI), Vol. 73, Sep. 2017, pp. 95-103. PMCID: PMC5583030. PMID: 28756159.

#### **Health Informatics, Database**

[15] G. Luo\*, L.J. Frey. *Efficient Execution Methods of Pivoting for Bulk Extraction of Entity-Attribute-Value-Modeled Data*. IEEE Journal of Biomedical and Health Informatics (J-BHI), Vol. 20, No. 2, Mar. 2016, pp. 644-654. PMID: 25608318.

#### **Health Informatics, Information Retrieval, Natural Language Processing**

[16] G. Luo\*. *Open Issues in Intelligent Personal Health Record - An Updated Status Report for 2012*. Journal of Medical Systems (JMS), Vol. 37, No. 3, Jun. 2013, pp. 1-29. PMID: 23584758.

[17] G. Luo\*. *Triggers and Monitoring in Intelligent Personal Health Record*. Journal of Medical Systems (JMS), Vol. 36, No. 5, Oct. 2012, pp. 2993-3009. PMID: 21947798.

[18] G. Luo\*, C. Tang, and S.B. Thomas. *Intelligent Personal Health Record: Experience and Open Issues*. Journal of Medical Systems (JMS), Vol. 36, No. 4, Aug. 2012, pp. 2111-2128. PMID: 21399913.

[19] G. Luo\*, S.B. Thomas, and C. Tang. *Automatic Home Medical Product Recommendation*. Journal of Medical Systems (JMS), Vol. 36, No. 2, Apr. 2012, pp. 383-398. PMID: 20703712.

[20] G. Luo\*. *Navigation Interface for Recommending Home Medical Products*. Journal of Medical Systems (JMS), Vol. 36, No. 2, Apr. 2012, pp. 699-705. PMID: 20703660.

#### **Health Informatics, Biostatistics**

[21] G. Luo\*, W. Min. *Distance-Constrained Orthogonal Latin Squares for Brain-Computer Interface*. Journal of Medical Systems (JMS), Vol. 36, No. 1, Feb. 2012, pp. 159-166. PMID: 20703739.

#### **Compiler, HCI, Software Engineering**

[22] 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.

#### **Database**

[23] 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.

[24] G. Luo\*, K. Wu, and P.S. Yu. *Answering Linear Optimization Queries with an Approximate Stream Index*. Knowledge and Information Systems (KAIS), Vol. 20, No. 1, July 2009, pp. 95-121.

[25] G. Luo\*, J.F. Naughton, C.J. Ellmann, and M.W. Watzke. *Transaction Reordering*. Data and Knowledge Engineering (DKE, invited), Vol. 69, No. 1, Jan. 2010, pp. 29-49.

#### **Health Informatics, Pediatrics**

[26] C. Koebnick, Y. Mohan, X. Li, A.H. Porter, M.F. Daley, G. Luo, and B.D. Kuizon. *Failure to Confirm High Blood Pressures in Pediatric Care - Quantifying the Risks of Misclassification*. Journal of Clinical Hypertension, Vol. 20, No. 1, Jan. 2018, pp. 174-182. PMCID: . PMID: 29329492.

#### **Machine Learning, Data Mining, HCI**

- [27] G. Luo\*. *Toward a Progress Indicator for Machine Learning Model Building and Data Mining Algorithm Execution: A Position Paper*. SIGKDD Explorations, Vol. 19, No. 2, Dec. 2017, pp. 13-24. PMID: PMC5699516. PMID: 29177022.

#### **Under review - Health Informatics, Pediatrics, Machine Learning**

- [28] G. Luo\*, M.D. Johnson, F.L. Nkoy, S. He, and B.L. Stone. *Appropriateness of Hospital Admission for Emergency Department Patients with Bronchiolitis*. Under review.
- [29] G. Luo\*, P. Tarczy-Hornoch, A.B. Wilcox, and E.S. Lee. *Identifying Patients Likely to Receive Most of Their Care from a Specific Healthcare System: A Demonstration Using Data at University of Washington Medicine*. Under review.
- [30] G. Luo\*, B.L. Stone, F.L. Nkoy, S. He, and M.D. Johnson. *Predicting Appropriate Hospital Admission of Emergency Department Patients with Bronchiolitis*. Under review.

#### **Peer-Reviewed Archival Conference Papers**

##### **Health Informatics, Information Retrieval**

- [31] G. Luo\*, C. Tang, and S.B. Thomas. *Intelligent Personal Health Record: Experience and Open Issues*. Proc. 2010 ACM Int. Health Informatics Symposium (IHI'10), Arlington, VA, Nov. 2010, pp. 326-335.
- [32] G. Luo\*, C. Tang. *On Iterative Intelligent Medical Search*. Proc. 2008 Int. ACM SIGIR Conf. on Research and Development in Information Retrieval (SIGIR'08), Singapore, July 2008, pp. 3-10.
- [33] G. Luo\*. *Design and Evaluation of the iMed Intelligent Medical Search Engine*. Proc. 2009 Int. Conf. on Data Engineering (ICDE'09), Shanghai, China, Apr. 2009, pp. 1379-1390.
- [34] G. Luo\*. *Intelligent Output Interface for Intelligent Medical Search Engine*. Proc. 2008 AAI Conf. on Artificial Intelligence (AAAI'08), Chicago, IL, July 2008, pp. 1201-1206.
- [35] G. Luo\*. *Lessons Learned from Building the iMed Intelligent Medical Search Engine*. Proc. 2009 Annual Int. Conf. of the IEEE Engineering in Medicine and Biology Society (EMBC'09), Minneapolis, MN, Sep. 2009, pp. 5138-5142. PMID: 19965039.
- [36] G. Luo\*, C. Tang. *Challenging Issues in Iterative Intelligent Medical Search*. Proc. 2008 Int. Conf. on Pattern Recognition (ICPR'08), Tampa, FL, Dec. 2008, pp. 1-4.
- [37] G. Luo\*, S.B. Thomas, and C. Tang. *Intelligent Consumer-Centric Electronic Medical Record*. Proc. 2009 Int. Conf. of the European Federation for Medical Informatics (MIE'09), Sarajevo, Bosnia and Herzegovina, Sep. 2009, pp. 120-124. PMID: 19745280.
- [38] G. Luo\*, C. Tang. *Automatic Home Nursing Activity Recommendation*. Proc. 2009 American Medical Informatics Association Annual Symposium (AMIA'09), San Francisco, CA, Nov. 2009, pp. 401-405. PMID: PMC2815373. PMID: 20351888.
- [39] G. Luo\*. *On Search Guide Phrase Compilation for Recommending Home Medical Products*. Proc. 2010 Annual Int. Conf. of the IEEE Engineering in Medicine and Biology Society (EMBC'10), Buenos Aires, Argentina, Sep. 2010, pp. 2167-2171. PMID: 21096155.
- [40] G. Luo\*, C. Tang, H. Yang, and X. Wei. *MedSearch: A Specialized Search Engine for Medical Information Retrieval*. Proc. 2008 ACM Conf. on Information and Knowledge Management (CIKM'08), Napa Valley, CA, Oct. 2008, pp. 143-152.
- [41] G. Luo\*, C. Tang, H. Yang, and X. Wei. *MedSearch: A Specialized Search Engine for Medical Information*. Poster at 2007 Int. World Wide Web Conf. (WWW'07), Banff, Canada, May 2007, pp. 1175-1176.

- [42] X. Chen, M.A. Murtaugh, C. Koebnick, S. Beddhu, J. Garvin, M. Conway, Y. Lee, R. Gouripeddi, and G. Luo\*. *Dietary Management Software for Chronic Kidney Disease: Current Status and Open Issues*. Proc. 2016 Annual Int. Conf. on Health Information Science (HIS'16), Shanghai, China, Nov. 2016, pp. 62-72. Springer Lecture Notes in Computer Science 10038.

#### **Health Informatics, Machine Learning**

- [43] G. Luo\*, W. Min. *Subject-Adaptive Real-Time Sleep Stage Classification Based on Conditional Random Field*. Proc. 2007 American Medical Informatics Association Annual Symposium (AMIA'07), Chicago, IL, Nov. 2007, pp. 488-492. PMID: PMC2655818. PMID: 18693884.

#### **Health Informatics, Natural Language Processing, Machine Learning**

- [44] G. Divita, G. Luo, L.T. Tran, T.E. Workman, A.V. Gundlapalli, and M.H. Samore. *General Symptom Extraction from VA Electronic Medical Notes*. Proc. 2017 World Congress on Medical and Health Informatics (MedInfo'17), Hangzhou, China, Aug. 2017, pp. 356-360. Studies in Health Technology and Informatics 245. PMID: 29295115.

#### **Health Informatics in General**

- [45] D.M. Walker, M.A. Murtaugh, and G. Luo. *Characterizing Common Features of Recipe Management and Recommender Systems in Mobile Applications*. Poster at 2015 American Medical Informatics Association Annual Summit on Clinical Research Informatics (CRI), San Francisco, CA, Mar. 2015, pp. 413.
- [46] D.M. Sow, J.M. Schmidt, D.J. Albers, A. Beygelzimer, A. Biem, G. Luo, and D. Turaga. *Developing and Deploying Clinical Models for the Early Detection of Clinical Complications in Neurological Intensive Care Units*. Poster at 2011 American Medical Informatics Association Annual Summit on Clinical Research Informatics (CRI), San Francisco, CA, Mar. 2011, pp. 122.

#### **Database, HCI**

- [47] 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.
- [48] 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.
- [49] G. Luo\*, J.F. Naughton, and P.S. Yu. *Multi-query SQL Progress Indicators*. Proc. 2006 Int. Conf. on Extending Database Technology (EDBT'06), Munich, Germany, Mar. 2006, pp. 921-941.

#### **Homeland Security Informatics, Information Retrieval, Big Data**

- [50] G. Luo\*, C. Tang, and Y. Tian. *Answering Relationship Queries on the Web*. Proc. 2007 Int. World Wide Web Conf. (WWW'07), Banff, Canada, May 2007, pp. 561-570.
- [51] G. Luo\*, C. Tang, and P.S. Yu. *Resource-Adaptive Real-Time New Event Detection*. Proc. 2007 ACM-SIGMOD Int. Conf. on Management of Data (SIGMOD'07), Beijing, China, June 2007, pp. 497-508.
- [52] G. Luo\*, R. Yan, and P.S. Yu. *Real-Time New Event Detection for Video Streams*. Proc. 2008 ACM Conf. on Information and Knowledge Management (CIKM'08), Napa Valley, CA, Oct. 2008, pp. 379-388.

#### **Database, Big Data**

- [53] 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.

- [54] 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.
- [55] 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.
- [56] 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.
- [57] G. Luo\*. *Partial Materialized Views*. Proc. 2007 Int. Conf. on Data Engineering (ICDE'07), Istanbul, Turkey, Apr. 2007, pp. 756-765.
- [58] G. Luo\*, P.S. Yu. *Content-Based Filtering for Efficient Online Materialized View Maintenance*. Proc. 2008 ACM Conf. on Information and Knowledge Management (CIKM'08), Napa Valley, CA, Oct. 2008, pp. 163-172.
- [59] 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.
- [60] K. Wu, P.S. Yu, B. Gedik, K.W. Hildrum, C.C. Aggarwal, E. Bouillet, W. Fan, D.A. George, X. Gu, G. Luo, and H. Wang. *Challenges and Experience in Prototyping a Multi-Modal Stream Analytic and Monitoring Application on System S*. Proc. 2007 Int. Conf. on Very Large Databases (VLDB'07), Vienna, Austria, Sep. 2007, pp. 1185-1196.
- [61] G. Luo\*. *Efficient Detection of Empty Result Queries*. Proc. 2006 Int. Conf. on Very Large Databases (VLDB'06), Seoul, Korea, Sep. 2006, pp. 1015-1025.
- [62] G. Luo\*. *V Locking Protocol for Materialized Aggregate Join Views on B-tree Indices*. Proc. 2010 Int. Conf. on Web-Age Information Management (WAIM'10), Jiuzhaigou, China, July 2010, pp. 768-780. Springer Lecture Notes in Computer Science 6184.
- [63] G. Luo\*, J.F. Naughton, C.J. Ellmann, and M.W. Watzke. *Transaction Reordering with Application to Synchronized Scans*. Poster at 2008 ACM Conf. on Information and Knowledge Management (CIKM'08), Napa Valley, CA, Oct. 2008, pp. 1335-1336.
- [64] 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.

## Peer-Reviewed Archival Workshop Papers

### Database

- [65] 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.
- [66] G. Luo\*, J.F. Naughton, C.J. Ellmann, and M.W. Watzke. *Transaction Reordering with Application to Synchronized Scans*. ACM Eleventh Int. Workshop on Data Warehousing and OLAP (DOLAP'08), Napa Valley, CA, Oct. 2008, pp. 17-23.

## Peer-Reviewed Magazine Articles

### **Health Informatics, Machine Learning, Biostatistics**

- [67] W. Min, G. Luo\*. *Medical Applications of EEG Wave Classification*. Chance (invited), Vol. 22, No. 4, Dec. 2009, pp. 14-20.

### **General Magazine Articles**

#### **Machine Learning**

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

### **Book Chapters**

#### **Health Informatics, Information Retrieval, Natural Language Processing**

- [69] 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.
- [70] 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.

### **Edited Journal Special Issues**

#### **Health Informatics**

- [71] F. Wang, G. Luo (Eds.). *Distributed and Parallel Databases (DAPD) journal, special issue on Data Management and Analytics for Healthcare (2018)*. Under preparation.

### **Edited Peer-Reviewed Archival Conference Proceedings**

#### **Health Informatics**

- [72] G. Luo, J. Liu, and C.C. Yang (Eds.). *Proceedings of the 2012 ACM SIGHIT International Health Informatics Symposium (IHI'12)*. ACM Press, 2012.
- [73] 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.

### **Edited Peer-Reviewed Archival Workshop Proceedings**

#### **Health Informatics**

- [74] 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.
- [75] 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.
- [76] 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.
- [77] 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 ?, 2018. Under preparation.



## Presentations

### Biostatistics, Health Informatics, Machine Learning

- [78] 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.
- [79] G. Luo, W. Min. *Distance-Constrained Orthogonal Latin Squares for Brain-Computer Interface*. 2010 Joint Statistical Meetings (JSM'10), Vancouver, Canada, Aug. 2010.

### Nutrition

- [80] 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.

## Patents

1. 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.
2. G. Luo, W. Min. *Method and System for Subject-Adaptive Real-Time Sleep Stage Classification*. U.S. serial 7,509,163, 2009.
3. 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.
4. 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.
5. 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.
6. G. Luo, P.S. Yu. *System and Method for Real-time Materialized View Maintenance*. YOR820050223, 2005.
7. G. Luo, P.S. Yu. *Systems and Methods for Resource Adaptive Workload Management*. U.S. serial 7,379,953, 2008.
8. 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.
9. 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.
10. 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.
11. G. Luo, M.W. Watzke, and C.J. Ellmann. *Grouping Database Queries and/or Transactions*. U.S. serial 7,814,080, 2010.
12. 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.
13. G. Luo, J.F. Naughton, C.J. Ellmann, and M.W. Watzke. *Rescheduling Table Scan Transactions*. U.S. serial 7,418,706, 2008.
14. 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.
15. 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.
16. G. Luo, C.J. Ellmann, J.F. Naughton, and M.W. Watzke. *Transaction Grouping and Rescheduling in a Database System*. 2002.
17. 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.
18. 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.
19. 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.

20. G. Luo, C.J. Ellmann, and J.F. Naughton. *Method and Apparatus for Performing Hash Join*. U.S. serial 7,085,769, 2006.
21. G. Luo, C.J. Ellmann, and J.F. Naughton. *Spatial Join Method and Apparatus*. U.S. serial 6,732,107, 2004.
22. G. Luo, C.J. Ellmann, and J.F. Naughton. *Non-blocking Parallel Band Join Algorithm*. U.S. serial 6,804,678, 2004.
23. G. Luo, C.J. Ellmann, and J.F. Naughton. *Parallel Spatial Join Index*. U.S. serial 6,745,198, 2004.
24. G. Luo, C.J. Ellmann, and J.F. Naughton. *Auxiliary Relation for Materialized View*. U.S. serial 7,092,951, 2006.
25. G. Luo and A. Shatdal. *Parallel Moving Aggregate Computation*. U.S. serial 7,051,021, 2006.
26. G. Luo and A. Shatdal. *Parallel Random Sampling*. U.S. serial 6,889,221, 2005.

## 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  
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  
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  
Amount: \$719,000
4. 7R21HL128875, NIH/NHLBI R21 8/8/2016 - 6/30/2018  
Predicting Appropriate Admission of Bronchiolitis Patients in the Emergency Room  
Role: PI  
Amount: \$243,973
5. 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  
Amount: \$3,099,998
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: Co-Investigator  
Amount: \$3,711,003
7. Pending (score is within payline): 1R01HL142503, NIH/NHLBI R01 7/1/2018 - 6/30/2023  
Using Computational Approaches to Optimize Asthma Care Management  
Role: PI  
Amount: \$4,182,009

## 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  
Amount: \$200,000

## Professional Activities

### 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 Positions – Book series

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

### Steering and Organizing Committees

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

### Conference Officers

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

### Program Committees

- IMIA Yearbook of Medical Informatics (2018)
- Pacific Symposium on Biocomputing (PSB 2017, 2018)
- Intelligent Systems for Molecular Biology (ISMB 2018)
- Intelligent Systems for Molecular Biology/European Conference on Computational Biology (ISMB/ECCB 2017)
- IEEE International Conference on e-Science (eScience 2016, 2017)
- International Conference on Health and Social Care Information Systems and Technologies (HCist 2014, 2015, 2016, 2017, 2018)
- International Conference on Health Information Science (HIS 2014, 2015, 2016, 2017)
- International IFIP Cross Domain Conference for Machine Learning & Knowledge Extraction (CD-MAKE 2018)
- SIGIR Medical Information Retrieval Workshop (MedIR 2014, 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)
- American Medical Informatics Association Annual Symposium (AMIA 2013)
- IEEE International Symposium on Computer-Based Medical Systems (CBMS 2013, 2015, 2016, 2017, 2018)
- International Symposium on Network Enabled Health Informatics, Bio-Medicine and Bioinformatics (HI-BI-BI 2013, 2014, 2015, 2016)
- International Symposium on Network Analysis and Mining for Health Informatics, Biomedicine and Bioinformatics (Net-HI-BI-BI 2013)
- Workshop on Emerging Data Engineering Methods and Approaches for Precision Medicine (DEPM 2018)
- Workshop on Health Information Quality (HealthIQ 2015)

- International Workshop on Multi-Perspective Consumer Health Search (MPCHS 2016)
- International Workshop on Predictive Analytics for Critical Care (PACC 2016)
- 11th ACM International Workshop on Web Information and Data Management (WIDM 2009)

#### **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 (JWMRP) 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

#### **Reviewer – Journals**

- Information Retrieval Journal
- Information Processing & Management
- ACM Transactions on Information Systems
- Computer Methods and Programs in Biomedicine
- BMC Medical Informatics and Decision Making
- Journal of Medical Internet Research
- Health Information Science and Systems
- Journal of Medical Systems
- IEEE Transactions on Neural Systems & Rehabilitation Engineering
- IEEE Transactions on Computers
- IEEE Transactions on Knowledge and Data Engineering
- ACM Transactions on Database Systems
- VLDB Journal
- Electronic Commerce Research and Applications
- Journal of Imaging
- ClinicoEconomics and Outcomes Research
- Journal of Biomedical Informatics
- PLOS ONE
- Annals of the New York Academy of Sciences
- BMC Medical Research Methodology
- IMIA Yearbook of Medical Informatics
- Environmental Monitoring and Assessment
- Briefings in Bioinformatics
- PeerJ

#### **Reviewer – Conferences**

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

#### **Reviewer – Proposals**

- University of Washington Royalty Research Fund Proposal 2017, 2018
- 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
- 2015 U.S. Army Medical Research and Materiel Command's (USAMRMC) Broad Agency Announcement (BAA) for extramural medical research
- Wellcome Trust/DBT India Alliance Biomedical Research Fellowship Programme for India 2014 (<http://www.wellcomedbt.org/>)
- 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>)
- Portuguese Foundation for Science and Technology Proposal 2012 (<http://www.fct.pt/>)
- Vienna Science and Technology Fund Proposal 2012 (<http://www.wwtf.at>)
- NSF Proposal 2007

#### **Reviewer – Books**

- Springer book series

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

- Member of Graduate Admissions Committee, Department of Biomedical Informatics and Medical Education, University of Washington, 2017-2019

#### **Service to the University of Utah and Department of Biomedical Informatics**

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

#### **Student Advising**

##### **Ph.D. student:**

- Diane Walker (2014-2016, Department of Biomedical Informatics, University of Utah).

##### **Ph.D. thesis committee (not as primary advisor):**

- Nancy Jo Thum-Thomas (2014-, College of Nursing, University of Utah).
- Duy Bui (2014-2016, Department of Biomedical Informatics, University of Utah, graduated).
- Doug F. Redd (2014-2016, Department of Biomedical Informatics, University of Utah, graduated).
- Robert Angell (2012-2015, Department of Biomedical Informatics, University of Utah).
- Valliammai Chidambaram (2013-2015, Department of Biomedical Informatics, University of Utah).
- Jiantao Bian (2015-2016, Department of Biomedical Informatics, University of Utah).
- Philip J. Brewster (2014-2016, Department of Biomedical Informatics, University of Utah).
- Lance Pflieger (2014-2016, Department of Biomedical Informatics, University of Utah).

##### **Master thesis committee (not as primary advisor):**

- Krystal V. Slattery (2017-2018, Department of Biomedical Informatics and Medical Education, University of Washington).

- Qiushui Zhang (2018, Department of Biomedical Informatics and Medical Education, University of Washington).
- Yiqun Rong (2018, Department of Biomedical Informatics and Medical Education, University of Washington).
- Thanit Vinitchagoon (2016-2017, Department of Nutrition and Integrative Physiology, College of Health, University of Utah, non-voting member, graduated).
- Bret Heale (2014-2016, Department of Biomedical Informatics, University of Utah, graduated).
- Nabanita Sen (non-thesis capstone project, 2015-2015, Department of Biomedical Informatics, University of Utah, graduated).
- Jerry Westberg (non-thesis capstone project, 2014-2015, Department of Biomedical Informatics, University of Utah, graduated).
- Seth Russell (non-thesis capstone project, 2015-2016, Department of Biomedical Informatics, University of Utah, graduated).

**Postbaccalaureate certificate student:**

- Sashidhar Yerram (2013-2014, Department of Biomedical Informatics, University of Utah, graduated).

**Undergraduate students:**

- Henry Jang (2018, School of Computer Science & Engineering, University of Washington).
- Michael Hart (2018-, Department of Mathematics, University of Washington).
- William I. Bowers (2018-, University of Washington).

**High school students:**

- Noah J. Rose-Ledesma (2018, Seattle Academy of Arts and Sciences)

**Visiting scholars**

- Xueqiang Zeng (Associate Professor, Computer Center, Nanchang University, P.R. China) (2015-2016, Department of Biomedical Informatics, University of Utah)
- Zhongmin Wang (Associate Director, Information Technology Department, Jiangsu Province Hospital, P.R. China) (2015-2016, Department of Biomedical Informatics, University of Utah)

## Invited Talks

- Automating Machine Learning Model Building with Big Clinical Data.
  - Kaiser Permanente Washington Health Research Institute, Seattle, WA (Oct. 10, 2017)
  - eScience Institute, University of Washington (May 23, 2017)
  - Fred Hutchinson Cancer Research Center (Apr. 18, 2017)
  - Department of Industrial and Systems Engineering, University of Washington (Mar. 28, 2017)
  - Database group, Department of Computer Science & Engineering, University of Washington (Jan. 27, 2017)
  - Jiangsu Province Hospital, P.R. China (Nov. 8, 2016)
  - 24th Chinese Association for Science and Technology (CAST-USA) Annual Conference, Salt Lake City, UT (Oct. 15, 2016)
  - Kaiser Permanente Research Southern California, Pasadena, CA (Jun. 29, 2016)
  - Department of Biomedical Informatics and Medical Education, School of Medicine, University of Washington (Apr. 13, 2016)
  - School of Biomedical Informatics, University of Texas Health Science Center at Houston (Feb. 8, 2016)
- 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)
  - Center for Scholarship in Patient Safety and Quality, School of Medicine, University of Washington (Feb. 5, 2018)
- How can Data Science be Used to Help Children. United Nations Children's Fund (UNICEF)/Bloomberg, New York City, NY. (Sep. 28, 2015)

- Enabling Machine Learning on Big Clinical Data for Healthcare Researchers. Veterans Affairs Salt Lake City Research Division (Jun. 9, 2015)
- Intelligent Medical Search. Elsevier, Philadelphia, PA. (March 4, 2015)
- Intelligent Personal Health Record.
  - Department of Biomedical Informatics and Medical Education, School of Medicine, University of Washington (May. 11, 2017)
  - Veterans Affairs Salt Lake City Research Division (Aug. 20, 2013)
  - Department of Health Informatics & Administration, College of Health Sciences, University of Wisconsin-Milwaukee (Apr. 17, 2012)
  - Department of Biostatistics & Medical Informatics, School of Medicine and Public Health, University of Wisconsin-Madison (Mar. 6, 2012)
  - Department of Biomedical Informatics, School of Medicine, University of Utah (Feb. 23, 2012)
  - School of Informatics, Indiana University-Purdue University Indianapolis (Feb. 10, 2012)
  - School of Computer Science, Florida International University (Jan. 31, 2012)

## Awards and Honors

- Invitation to Microsoft Research Faculty Summit, Redmond, Washington (July 2017).
- Vice President Clinical and Translational (VPCAT) Research Scholar, University of Utah (2013-2014).
- IBM Invention Achievement Award (Oct. 2006).
- NCR Research Fellowship (Aug. 2000 – Dec. 2003).
- NCR Invention Award (3 times in 2000, 9 times in 2001, 3 times in 2002, 4 times in 2003).
- NCR Excellent Performance Award (2001).
- 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.
- Holison Scholarship (1994 - 1997). 99 students awarded in China.
- Excellent Student Award (1995, 1997). Shanghai Jiaotong University (for students within top 1%).
- Dupont Scholarship (1997). Shanghai Jiaotong University (for students within top 1%).
- Xue Wen Fang - Huang Bo Lin Scholarship (1997). Shanghai Jiaotong University (for students within top 2%).
- Dong's Orient Scholarship (1996). Shanghai Jiaotong University (for students within top 0.5%).
- University Scholarship (1994 - 1996). Shanghai Jiaotong University (for students within top 1%).
- Privilege to Enter Shanghai Jiaotong University (1994). Waived of the National College Entrance Examination.
- 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 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).
  - ◆ 1st grade prize of the Chinese Olympic Competition of Chemistry for middle school students (1991, Anhui Province).

## Professional Membership

- Association for Computing Machinery (ACM)
- American Medical Informatics Association (AMIA)
- Healthcare Information and Management Systems Society (HIMSS)

**Citizenship:** USA