

Curriculum Vitae

NAME: HUA XU

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EDUCATION

Ph.D. in Biomedical Informatics Columbia University, New York, NY	2008
M.A. in Biomedical Informatics Columbia University, New York, NY	2004
M.S. in Computer Science New Jersey Institute of Technology, Newark, NJ	2001
B.S. in Biochemistry Nanjing University, Nanjing, P. R. China	1998

ACADEMIC APPOINTMENTS

2015 - present	Professor School of Biomedical Informatics, The University of Texas Health Science Center at Houston, Houston, TX
2012 – present	Director, Center for Computational Biomedicine Robert H. Graham Professorship in Entrepreneurial Biomedical Informatics and engineering CPRIT Scholar in Cancer Research School of Biomedical Informatics, The University of Texas Health Science Center at Houston, Houston, TX
2012 – 2015	Associate Professor School of Biomedical Informatics, The University of Texas Health Science Center at Houston, Houston, TX
2008 – 2012	Assistant Professor Department of Biomedical Informatics, School of Medicine, Vanderbilt University, Nashville, TN

PROFESSIONAL ORGANIZATIONS

- 2005 – Present American Medical Information Association (AMIA)
 2005 – Present The Association for Computational Linguistics (ACL)

PROFESSIONAL ACTIVITIES

Intramural Committees:

- 2014 – present Interfaculty Council, The University of Texas Health Science Center at Houston
 2014 - present Bylaw Committee, School of Biomedical Informatics, The University of Texas Health Science Center at Houston
 2013 - present Faculty Promotion Committee, School of Biomedical Informatics, The University of Texas Health Science Center at Houston
 2012 - present Faculty Search Committee, School of Biomedical Informatics, The University of Texas Health Science Center at Houston
 2012 - present Executive Committee, Innovation for Cancer Prevention Research (ICPR) Training Program, The University of Texas School of Public Health
 2012 BioVU (Vanderbilt's Biobank) Review Committee, Vanderbilt University
 2010 - 2012 Academic Program Committee of Biomedical Informatics, Vanderbilt University

Extramural Committees:

- Board of Scientific Counselors, Lister Hill Center, National Library of Medicine, NIH
 2014 – present Board member

AMIA Natural Language Processing (NLP) Working Group:

- 2013 – 2014 Chair
 2012 Chair-Elect

Conference Program Committee Chair/Track Chair:

- 2016 Medical Informatics Workshop, International Conference on Intelligent Biology and Medicine (ICIBM'16), Houston, TX, US
 2014 The ACM Eighth International Workshop on Data and Text Mining in Biomedical Informatics (DTMBIO'14), in conjunction with the ACM CIKM, Shanghai, China
 2014 American Medical Informatics Association (AMIA) NLP Working Group pre-symposium – a doctoral consortium and a workshop on interoperability, Washington DC, US
 2014 American Medical Informatics Association (AMIA) Translational Bioinformatics Summit, San Francisco, US, SPC Track-Chair
 2013 The ACM Seventh International Workshop on Data and Text Mining in Biomedical Informatics (DTMBIO'13), in conjunction with the ACM CIKM, San Francisco, US

- 2013 American Medical Informatics Association (AMIA) NLP Working Group pre-symposium – a doctoral consortium and a workshop on open source clinical NLP systems, Washington DC, US
- 2012 International Conference on Intelligent Biology and Medicine (ICIBM), Nashville, Tennessee, US
- 2012 The ACM Sixth International Workshop on Data and Text Mining in Biomedical Informatics (DTMBIO'12), in conjunction with the ACM CIKM, Hawaii, US
- 2012 American Medical Informatics Association (AMIA) NLP Working Group pre-symposium – a doctoral consortium and a data workshop, Washington DC, US

Conference Program Committee Member:

- 2016 The 5th International Conference on Health Information Science, Nanjing, China
- 2016 AMIA 2016 NLP WG Pre-symposium
- 2016 International Conference on Intelligent Biology and Medicine (ICIBM'16), Houston, TX, US
- 2016 IEEE International Conference on Healthcare Informatics (ICHI), Chicago, US
- 2015 Workshop on Data Management and Analytics for Medicine and Healthcare, Hawaii, US
- 2015 IEEE International Conference on Healthcare Informatics (ICHI), Dallas, US
- 2015 International Conference on Intelligent Biology and Medicine (ICIBM'15), Indianapolis, Indiana, US
- 2015 Biomedical Linked Annotation Hackathon (BLAH2015), Kashiwa-no-ha City, Japan
- 2015 American Medical Informatics Association (AMIA) Translational Bioinformatics Summit, San Francisco, US
- 2014 International Conference on Intelligent Biology and Medicine (ICIBM'14), San Antonio, Texas, US
- 2014 International Workshop on Biomedical and Health Informatics, IEEE BIBM, Belfast, UK
- 2014 IEEE International Conference on Healthcare Informatics (ICHI), Verona, Italy
- 2013 International Workshop on Biomedical and Health Informatics, IEEE BIBM, Beijing, China
- 2013 IEEE International Conference on Healthcare Informatics (ICHI), Philadelphia, PA, USA
- 2013 International Conference on Intelligent Computing (ICIC'13), Nanning, China
- 2013 International Conference on Intelligent Biology and Medicine (ICIBM'13), Nashville, Tennessee, US
- 2012 AMIA Annual Fall Symposium
- 2012 2nd ACM SIGHIT International Health Informatics Symposium, Miami, Florida, US
- 2012 IEEE Conference on Healthcare Informatics, Imaging, and System Biology (HISB), San Diego, US

- 2011 American Medical Informatics Association (AMIA) Translational Bioinformatics Summit, San Francisco, US
- 2011 IEEE Conference on Healthcare Informatics, Imaging, and System Biology (HISB), San Jose, US
- 2011 International Conference on Intelligent Computing (ICIC'12), Zhengzhou, China
- 2011 International Biomedical Informatics Summit at Peking University, Beijing, China
- 2011 International Workshop on Biomedical and Health Informatics, IEEE BIBM, Atlanta, Georgia, US

Grant Reviewer:

- 2016 VA Scientific Merit Review Meeting, HSR3 and HS3A
- 2014 The South African Medical Research Council
- 2014 Medical Research Council (MRC), UK
- 2014 Fragile X review, National Institute of Child Health and Human Development (NICHD), National Institutes of Health (NIH)
- 2013 Reviewer at Kentucky Science and Engineering Foundation
- 2013 Ad-hoc reviewer for GNOM-G Review Panel, National Human Genome Research Institute (NHGRI), National Institutes of Health (NIH)
- 2012 Genomic Medicine Pilot Demonstration Projects, RFA-HG-12-006, National Human Genome Research Institute (NHGRI), National Institutes of Health (NIH)
- 2012 Epidemiology and genetics of chronic diseases, PA-11-260, National Cancer Institute (NCI), National Institutes of Health (NIH)
- 2012 Mail reviewer, NIH Director's Early Independence Award (DP5), RFA-RM-11-007, National Institutes of Health (NIH)
- 2011 PFINDR: Phenotype Finder IN Data Resources: A Tool to Support Cross-study Data Discovery Among NHLBI Genomic Studies (UH2/UH3), RFA-HL-11-020, National Heart, Lung, and Blood Institute (NHLBI), National Institutes of Health (NIH)
- 2011 Conference Grant Applications (R13), PA-10-07, National Institute on Drug Abuse (NIDA), National Institutes of Health (NIH)

Editorial Activities:Editorial Board Member:

- 2013 – present Journal of American Medical Informatics Association (JAMIA)
- 2012 - present Journal of Biomedical Informatics (JBI)
- 2010 - present International Journal of Data Mining and Bioinformatics (IJDMB)

Guest Editor:

- 2012 BMC Systems Biology Supplement issue "Advances in Intelligent Biology and Medicine: Selected papers from 2012 ICIBM Conference". 6 (Suppl S2)
- 2012 BMC Genomics Supplement issue "Advances in Intelligent Biology and Medicine: Selected papers from 2012 ICIBM Conference". 13 (Suppl S7)

2012 International Journal of Computational Biology and Drug Design (IJCBD) special issue "Advances in Intelligent Biology and Medicine: Selected papers from 2012 ICIBM Conference". Volume 5, issue 4

Journal Reviewer:

Bioinformatics, Journal of American Medical Informatics Association, BMC Bioinformatics, BMC Medical Informatics and Decision Making, Journal of Biomedical Informatics, Journal of Biomedical Discovery and Collaboration, Methods of Information in Medicine, Transactions on Information Technology in BioMedicine, Journal of Medical Internet Research, PLoS ONE

Conference Reviewer:

2009 – 2014 AMIA TBI & CRI Summit
 2007 - 2014 AMIA Fall Symposium
 2012 2nd ACM SIGHIT International Health Informatics Symposium, Miami, Florida, US
 2011 International Workshop on Biomedical and Health Informatics, IEEE BIBM, Atlanta, Georgia, US
 2011 IEEE Conference on Healthcare Informatics, Imaging, and System Biology (HISB), San Jose, US
 2011 International Conference on Intelligent Computing, Zhengzhou, China
 2007 ACL BioNLP Workshop
 2007 Symposium on Languages in Biology and Medicine (LBM)

Honors/Awards:

2014 **Elected Fellow of American College of Medical Informatics (ACMI)**
 2014 Ranked #1, SemEval-2014 Task 7 – Analysis of Clinical Text
 2013 **IBM Faculty Award**
 2013 Top-scoring predictions for the NIEHS-NCATS-UNC DREAM Toxicogenetics Challenge leaderboard
 2013 Top ranked: Task 1a – 1st, Task 1b – 3rd, and Task 2 – 1st, at 2013 ShARe/CLEF eHealth Shared Tasks in Clinical NLP
 2012 Frist in Temporal Relation Extraction tasks, 2012 i2b2 Clinical NLP challenge
 2012 Best Paper of the Year by the International Medical Informatics Association, PMC3237759, 2012 Yearbook in Medical Informatics
 2012 Finalist of best paper award, AMIA Translational Bioinformatics Summit
 2011 Finalist of distinguished paper award, AMIA Fall Symposium
 2011 Best Paper of the Year by the International Medical Informatics Association, PMC2815478, 2011 Yearbook in Medical Informatics
 2010 2nd best system in Concept Extraction task, 2010 i2b2 Clinical NLP challenge
 2009 **Homer R. Warner Award, AMIA Fall Symposium**
 2009 Distinguished paper award (co-author), AMIA Fall Symposium
 2009 2nd best system, 2009 i2b2 Clinical NLP challenge
 2007-2008 National Library of Medicine Training Fellowship

Invited Talks/Presentations:Invited Talks:

- 2016 VA Nashville Field Meeting. "Improve transportability of clinical NLP systems using CLAMP"
- 2016 Zhongshang University, China. "Healthcare data analytics in US"
- 2015 Pennsylvania State University College of Medicine, "Studying drug outcomes using electronic health records and informatics approaches"
- 2015 University of Pittsburgh, Department of Biomedical Informatics, "Making sense of clinical text: methods, software, and applications"
- 2015 University of North Carolina, "Natural Language Processing: Methods, Software, and Applications in the Medical Domain"
- 2015 UTHealth Development Board Meeting, "Teaching an Old Drug New Tricks: using electronic health records and informatics"
- 2015 CHIMA annual conference, Xiamen, "Healthcare Analytics using EHR – Technologies and Applications"
- 2015 Xian Engineering University, Xian, "Informatics Approaches to Facilitating Secondary Use of EHRs for Drug Outcome Studies"
- 2015 Second Workshop of Translational Bioinformatics in China, Harbin, "Informatics Approaches to Facilitating Secondary Use of EHRs for Drug Outcome Studies"
- 2015 Annual Workshop of Translational Medical Informatics in China, Suzhou, "Healthcare Analytics using EHR – Technologies and Applications"
- 2014 JAMIA Journal Club, "*Validating drug repurposing signals using EHRs and informatics: a use case of metformin associated with reduced cancer mortality*"
- 2014 Wayne State University, Detroit, Department of Computer Science, "*Natural language processing in the medical domain: Methods and applications*"
- 2014 Suzhou University, China, Center for Systems Biology, "*An introduction to natural language processing in the medical domain*"
- 2014 Cancer Hospital, Shanghai, China, "*Cancer research using electronic health records.*"
- 2014 Harbin Institute of Technology, China, Department of Computer Science (Shenzhen), "*Methods and applications of natural language processing in the medical domain*"
- 2014 International Conference on Frontiers in Chronic Disease Research and Prevention, Shanghai, "*Electronic health records and informatics for epidemiological studies on chronic diseases*"
- 2013 The University of Texas Academia-Industry Partnership FreshAir Roundtable, "*The use of electronic health records for repurposing drugs for cancers*"
- 2013 The eMERGE consortium, "*MedEx-UIMA – an open source system for medication information extraction*".
- 2013 University of San Diego, Division of Biomedical Informatics, iDASH center, "*Medication information extraction from EHR – methods and applications.*"
- 2013 The Methodist Hospital Research Institute, Department of Systems Medicine and Bioengineering, "*Natural language processing: methods and applications in clinical research*"

- 2012 University of Wisconsin - Milwaukee, Center for Biomedical Data and Language Processing, *"Studying drug outcomes using electronic medical records and informatics approaches"*
- 2012 Pharmacogenomics Research Network (PGRN), Research-In-Progress Seminar, *"Pharmacogenomic discovery and replication using EHR, biobank, and informatics - the PGPop resource"*
- 2012 University of Michigan, Ann Arbor, Department of Computational Medicine and Bioinformatics, *"Studying drug outcomes using electronic medical records and informatics approaches"*
- 2012 The Ohio State University, Columbus, Department of Biomedical Informatics, *"Studying drug outcomes using electronic medical records, biobanks, and informatics"*
- 2012 Indiana University, School of Medicine, Center for Computational Biology and Bioinformatics, *"Pharmacogenomic studies using EHR, Biobank, and Informatics"*
- 2011 University of Alabama at Birmingham, Section on Statistical Genetics, *"Pharmacogenetic studies using electronic medical records, biobank, and informatics"*
- 2011 International Biomedical Informatics Summit at Peking University, Beijing, China, *"Linking EHR to DNA biobank for genomic research: an informatics perspective."*
- 2011 University of Texas Health Center at Houston, School of Biomedical Informatics, *"Pharmacogenomic discovery using electronic medical records, biobank, and informatics"*
- 2011 Vanderbilt University, Department of Medicine, "Dinner and Data" Seminars, *"Informatics approaches for EHR-based pharmacogenomics studies"*
- 2010 Peking University, China, Center of Medical Informatics, *"Research and Education in Medical Informatics at Vanderbilt University"*
- 2010 Shanghai Center for Bioinformation Technology, China, *"Research and Education in Medical Informatics at Vanderbilt University"*
- 2010 Medical University of South Carolina, Department of Biochemistry, *"Facilitating EMR-based Pharmacogenetic Studies using Informatics Methods"*
- 2010 George Town University, CTSA informatics division, *"Electronic Medical Records, Informatics, and Clinical Research"*
- 2009 eMERGE network meeting, *"Medication extraction from clinical text"*
- 2008 University of Kansas, Department of Electrical Engineering and Computer Science, *"Natural Language Processing in the Biomedical Domain"*
- 2008 Arizona State University, Department of Biomedical Informatics, *"A Framework for Handling Biomedical Abbreviations"*
- 2008 Ohio State University, Department of Biomedical Informatics, *"A Framework for Handling Biomedical Abbreviations"*
- Presentations:
- 2014 AMIA Fall Symposium, *"Mining electronic health records to detect drug repurposing signals for cancers"*
- 2014 AMIA Clinical Research Summit, *"Extracting and standardizing medication information in clinical text - the MedEx-UIMA system"*
- 2013 Medinfo. *"Analyzing differences between Chinese and English clinical"*

- text: a cross-institution comparison of discharge summaries in two languages*"
- 2013 ACM Sixth International Workshop on Data and Text Mining in Biomedical Informatics (DTMBIO), "Clinical Entity Recognition using Structural Support Vector Machines with Rich Features"
- 2013 AMIA Annu Symp Proc. "Combining corpus-derived sense profiles with estimated frequency information to disambiguate clinical abbreviations"
- 2012 Pac Symp Biocomput, "Ranking gene-drug relationships in biomedical literature using latent dirichlet allocation"
- 2011 AMIA Translational Bioinformatics Summit, "Facilitating Electronic Health Records based Pharmacogenetic Studies using Natural Language Processing: a case study of warfarin."
- 2011 AMIA Clinical Research Informatics, "A Framework to Determine Patient Drug Exposure from EMR: an Application to warfarin."
- 2011 International Workshop on Biomedical and Health Informatics, IEEE Conference of Bioinformatics and Biomedicine (BIBM), "An Initial Study of Full Parsing of Clinical Text using the Stanford Parser."
- 2010 Workshop of i2b2 NLP Challenge, "Hybrid Approaches to Concept Extraction and Assertion Classification – Vanderbilt's systems for 2010 i2b2 NLP challenge"
- 2009 Workshop of i2b2 NLP Challenge, "Vanderbilt's System for Medication Extraction".
- 2009 AMIA Fall Symposium, "MedEx – A Medication Information Extraction System for Clinical Narratives"
- 2008 AMIA Fall Symposium, "Methods for Building Sense Inventories of Abbreviations in Clinical Notes"
- 2007 AMIA Fall Symposium, "A Study of Abbreviations in Clinical Notes"

Tutorials:

- 2013 MedInfo 2013, "Clinical Natural Language Processing"
- 2013 AMIA Annual Symposium, "Using Electronic Health Records to facilitate clinical, genomic, and pharmacogenomic research: Experiences from the eMERGE and PGRN Networks"
- 2012 AMIA Translational Bioinformatics Summit, "Reusing EHRs for Clinical, Genomic, and Pharmacogenomic Discovery at Vanderbilt and within the eMerge Network"
- 2011 AMIA Now, "NLP 101: Making sense of EMR text"

Panels:

- 2014 iDASH annual conference, San Diego, "Making biomedical data discoverable"
- 2013 AMIA Fall Symposium, "Informatics to enable routine personalized cancer therapy"
- 2012 Academy Health Annual Research Meeting, "Squeezing Blood from a Stone: Principles and Practice of Using Narrative Data in Health Services Research"
- 2012 NIH workshop on "Natural Language Processing: State of the Art, Future Directions and Applications for Enhancing Clinical Decision-Making", Session Chair of "Linguistics-based methods" panel.

- 2012 AMIA Clinical Research Informatics Summit, "*Natural Language Processing for Clinical and Translational Research*"
- 2012 Academy Health Annual Research Meeting, Health IT Interest Group, "*HIT Quality of Care and Reporting Panel*"
- 2011 AMIA Clinical Research Informatics Summit, "*Cross-Institutional Systems to Support Phenotyping in Biomedical Research – Experience from the emerge network*"

TEACHING ACTIVITIES

Courses:

- 2013 - present HI6330 Biomedical Natural Language Processing: Methods and Applications, instructor
- 2014 - present HI 6323 Data Mining in Biomedical Informatics, instructor
- 2010 - 2012 BMIF 300 Introduction to Biomedical Informatics, lecturer
- 2009 - 2012 BMIF-315 Methodological Foundations of Biomedical Informatics, lecturer
- 2009 BMIF-330 Machine Learning for Biomedicine, co-instructor

Research Advisor:

Postdoctoral Fellow:

- 2014 – present Hee-jin Lee, Ph.D.
- 2014 – present Jun Xu, Ph.D.
- 2013 – 2015 Yaoyun Zhang, Ph.D.
- 2013 – 2015 Sungrim Moon, Ph.D.
- 2013 – 2015 Ergin Soysal, M.D., Ph.D.
- 2013 – 2014 Guocai Chen, Ph.D.
- 2011 - 2013 Buzhou Tang, Ph.D.
- 2010 - 2014 Yonghui Wu, Ph.D.
- 2009 - 2012 Mei Liu, Ph.D.
- 2010 - 2011 Samir AbdelRahman, Ph.D.
- 2009 - 2010 Son Doan, Ph.D.

PhD Student:

- 2016 – present Lingyi Tang, PhD student
- 2015 – present Xiao Dong, PhD student
- 2014 – present Qiang Wei, PhD student
- 2013 – present Lian Hu, PhD Candidate
- 2013 – present Jun Li, PhD Candidate
- 2012 - present, Min Jiang, PhD Candidate,
- 2011 - 2015 Yukun Chen, PhD
- 2012 – 2014 Jianbo Lei, PhD (Dissertation title: Named entity recognition in Chinese clinical text)

MS Student:

2014 – present	Michelle Scerbo, MS Candidate
2014 – present	Ginger Schirmer, MS Candidate
2014 – present	James Schlebus, MS Candidate
2013 – 2014	Anupama E. Gururaj, MS Candidate,
2013 – 2014	Ruiling Liu, MS Candidate
2013 – 2014	Heidi Jones, MS Candidate

Summer Intern:

2015 Summer	Manu Prakasam, High school student
2014 Summer	Kevin Zhu, BS
2013 Summer	Bonnie Nortz, Undergraduate student
2010 Summer	Oluwatoyin Arije, MPharm Candidate
2010 Summer	Kamilah McKinnon, MPharm Candidate

Visiting Student/Scholar:

2015-2016	Hui Chen, PhD
2014-2015	Yubo Zhou, PhD
2011-2012	Hongxin Cao, MS
2009-2010	Yanxin Lu, PhD Candidate

Thesis/Dissertation Committee Member for:

2014 - present	Qiang Wei, PhD student, University of Texas Health Science Center at Houston
2014 - present	Muhammad Amith, PhD student, University of Texas Health Science Center at Houston
2014 - present	Jun Li, PhD student, University of Texas Health Science Center at Houston
2013 - present	Melissa Resnick, PhD candidate, University of Texas Health Science Center at Houston
2013 - present	Frank Manion, PhD student, University of Texas Health Science Center at Houston
2013 - 2014	Safa Fathiamini, PhD student, University of Texas Health Science Center at Houston
2013 - 2014	Ning Shang, PhD, University of Texas Health Science Center at Houston
2012 - 2013	Sina Madani, PhD, University of Texas Health Science Center at Houston
2012 - 2013	Ravi V. Atreya, MS, Vanderbilt University
2011 - 2014	Robert Carroll, PhD candidate, Vanderbilt University
2009 - 2011	Firas Wehbe, PhD, Vanderbilt University
2010	Jerome Jourquin, MS, Vanderbilt University
2009	Xinxin Zhu, PhD, Columbia University

RESEARCH PROGRAM

Current Grants:Advancing Cancer Pharmacoepidemiology Research through EHRs and Informatics

NCI U24 CA194215 01A1 (MPI - Xu, Denny, Yang)

09/01/2016-08/31/2021

Total costs: \$3,125,128

Role: Contact PI

This project proposes to integrate and extend previously developed tools to build an informatics infrastructure for electronic health records (EHR) data extraction, interpretation, management, and analysis, to advance cancer pharmacoepidemiology research.

Partnership in Learning around Engagement, Data, Genomics, and Environment - Precision Medicine Initiative Data and Research Support Core

NIH U2C OD023196 01 (PI - Denny)

07/01/2016-06/30/2021

UTHealth subcontract total costs: \$893,322

Role: Site PI

This is the Data and Research Support Center (DRSC) for the Precision Medicine Initiative Cohort Program. The center will not only manage acquisition and organization of diverse datasets for the program but also provide research support and analysis tools for data mining.

Interactive machine learning methods for clinical natural language processing

NLM 2R01LM010681-05 (PI – Hua Xu)

09/29/2014 – 09/28/2018

Total direct costs: \$1,396,822

Role: PI

In this study, we propose to investigate interactive machine learning (IML) methods to address the challenges in clinical NLP about building annotated corpora and combining domain knowledge and statistical learning methods. We will conduct IML studies to three NLP related tasks including word sense disambiguation, named entity recognition, and clinical phenotyping.

Informatics Tools for Pharmacogenomic Discovery using Practice-based Data

NIGMS 1 R01 GM103859-01 (PI: Denny, Pathak, and Xu)

09/18/2014 – 5/31/2018

Total direct costs: \$1,588,692

Role: PI

In this study, we will develop natural language processing (NLP) and ontology tools to facilitate pharmacogenomics studies using EHR-linked biobanks.

BioCADDIE: Biomedical and healthCAre Data Discovery and Indexing Engine center

NIH 1U24HL126126-01 (PI – Lucila Ohno-Machado)

09/29/2014 – 09/38/2017

Total direct costs: \$6,000,000 (UTHealth \$1,025,558)

Role: Subcontract PI, co-investigator

BioCADDIE is a consortium of data producers, curators, publishers, and consumers who will work together to develop practical, sustainable solutions to the problem of biomedical and healthcare data discovery. This project is to develop an NIH BD2K Data Discovery Index Coordination Consortium.

Natural language processing for clinical and translational research

NIGMS 1R01GM102282 (MPI – Hongfang Liu, Serguel Pakhomov, and Hua Xu)

04/01/2013 – 03/31/2017

Total direct costs: \$1,345,476 (UTHealth \$524,560)

Role: PI

Natural Language Processing (NLP) has played a critical role in enabling secondary use of EHRs data for clinical and translational research. This study will facilitate efficient adoption of NLP to large-scale clinical studies by developing an open source framework that will enable semantic level interoperability among different NLP systems through defined standards and provide user-centric tools for clinical information extraction.

CPRIT Rising Stars Award - Repurposing Existing Drugs for Cancer Treatment using Electronic Health Records

Cancer Prevention & Research Institute of Texas, R1307 (PI – Hua Xu)

03/01/2013 – 02/28/2018

Total direct costs: \$2,806,000

Role: PI

This study is to develop novel informatics approaches to facilitate large-scale drug-repurposing studies for identifying potential cancer therapeutic agents by using Electronic Health Records (EHRs) data. The hypothesis is that EHRs can be used to detect new indications of existing drugs for cancer therapy in a very efficient way, with the help of advanced informatics methods.

Metadata applications on informed content to facilitate biorepository data regulation and sharing

NHGRI U01 HG009454 (PI - Cui Tao)

9/28 /2016-7/31/2019

Total Budget: \$1,359,655

Role – co-Investigator

This proposed study will focus on (1) developing a standard conforming metadata ontology to formally represent the informed consent domain; and (2) an automatic tool to semantically annotate informed consent documents to facilitate biorepository data regulation, sharing, and decision support.

Patient Medical History Representation, Extraction, and Inference from EHR Data

NLM 1R01LM011829 (PI – Cui Tao)

09/01/2014 – 08/31/2018

Total budget: \$1,358,868

Role: co-investigator

This proposed project fills in the current gaps among ontologies, Natural Language Processing (NLP), and EHR-based clinical research for temporal data representation, normalization, extractions, and reasoning. We propose to develop novel approaches for automatic temporal data representation, normalization and reasoning for large, diverse, and heterogeneous EHR data and prepare the integrated data for further analysis.

Learning from patient safety events: a case-based toolkit

AHRQ 1 R01 (PI: Yang Gong)

09/01/2014 – 8/31/2019

Total direct budget: \$ 1,246,715

Role: co-investigator

Timely reporting and effective learning from medical incidents is considered an effective way in developing strategies for reducing medical errors. Utilizing an innovative user-centered, learning-supportive, and ontological approach combining with case-based reasoning and natural language processing techniques, we propose to develop a knowledgebase and learning toolkit that can systematically collect and analyze incident reports, linking historical reports with WebM&M, the highest quality of voluntary reports and expert reviews on patient safety. We envision that the innovative approach will facilitate timely, quality reporting and learning from the incidents and ultimately cultivating a just and learning culture of patient safety.

Completed Grants:

An In-silico Method for Epidemiological Studies Using Electronic Medical Records

NCI R01CA141307 (PI – Hua Xu)

09/03/2009 – 07/31/2014

Total direct costs: \$762,738

Role: PI

The specific aim of this study is to develop an automated informatics approach to extract both fine-grained cancer findings and general clinical information from electronic medical records and use them to conduct cancer related epidemiological studies. It is an EUREKA award (Exceptional, Unconventional Research Enabling Knowledge Acceleration) funded by NCI.

Real-time Disambiguation of Abbreviations in Clinical Notes

NLM R01LM010681 (PI – Hua Xu)

05/31/2010 – 5/30/2014

Total direct costs: \$730,000

Role: PI

This project will develop, evaluate, and share a systematic approach to Clinical Abbreviation Recognition and Disambiguation (CARD), and in doing so substantially aims to improve existing NLP systems and computer-based documentation system by reducing ambiguities in electronic records in real-time.

An Informatics-based Approach to Pharmacogenetic Studies of Warfarin

NIH UL1 RR024975-KL2 Scholar Award (PI – Hua Xu)

07/01/2009 – 06/30/2010

Total direct costs: \$130,000

Role: PI (70%)

This project is to develop informatics approaches to extract phenotypic data for pharmacogenomics research from EHRs, using natural language processing and machine learning technologies. It was a three-year K Award, but terminated early due to the R01 award.

Using Biomedical Knowledge to Identify Plausible Signals for Pharmacovigilance

NLM 1R01LM011563 (PI - Trevor Cohen)

09/01/2013-08/31/2016

Total budget: \$611,718

Role: co-investigator

This project will develop novel informatics methods to mine electronic health records and biomedical literature to automatically identify adverse drug events, thus to provide a generalizable approach that can be used to apply knowledge derived from the biomedical literature to interpret clinical data.

Informatics to support routine personalized cancer therapy

NCI 1U01CA180964-01(PI - Elmer Bernstam)

09/01/2013 – 8/31/2016

Total direct budget: \$622,500

Role: co-investigator

This project aims to develop an informatics framework to support personalized cancer therapy, which includes tools to 1) implement a bioinformatics pipeline for processing molecular data into actionable profiles, 2) create and maintain a database of therapeutic implications of common genomic aberrations using automated processing of publically-available sources, and 3) develop tools to summarize clinically-relevant genomic alterations encountered in a patient's tumor and genotype-relevant therapies.

Pharmacovigilance Methods: Leveraging Heterogeneous Adverse Drug Reaction Data

NLM R01 LM010016-05 (PI – Carol Friedman)

7/01/2013 – 6/30/2017

Total direct costs: \$1,158,496 (UTHealth subcontract \$138,000)

Role: Subcontract PI, co-investigator

This project will integrate heterogeneous sources including drug chemical structure, literature, and electronic health records (EHRs) to detect new adverse drug reactions.

Bridging Genomics and Medicine by Ontology Fingerprints

NLM 1R56LM010680 – 01A1 (PI – Jim Zheng)

09/01/2012 – 08/31/2014

Total direct costs: \$202,898

Role: Co-investigator

This study is to develop an ontology fingerprint - a set of ontology terms overrepresented in the PubMed abstracts linked to a gene or a disease along with the terms' corresponding enrichment p-value, to characterize genes and diseases. The ontology fingerprints are then used to quantify the relationship between a gene and a disease.

National Center for Cognitive Informatics and Decision Making in Healthcare SHARP

ONC 90TR000401 (PI – Jiajie Zhang)

04/10/10-03/31/2014

Total direct costs: \$15,000,000

Role: Co-investigator

SHARPC project 3 is to develop informatics methods to automatically create clinical summaries of patients.

Autonomic Cardiovascular Regulation

NHLBI P01HL056693 (PI - David Robertson)

05/01/2012 – 4/30/2017, Participated between 2012-2015

Total direct costs: \$5,907,583

Role: Co-investigator

This is a Program Project that is tightly coordinated testing of hypotheses addressing autonomic modulation of cardiovascular function in health and disease. We will use the EMR-linked DNA biobank to study associations between *ADRA2A* genetic variation and increased risk of stress-induced hyperglycemia in patients with myocardial infarction, as well as increased risk of gestational diabetes.

MOMENT (Monitoring for Outpatient Medication Effects and New Toxicities) in TIME

NLM R01 LM007995 (PI - Randy Miller)

02/01/2004 – 06/14/2010

Total direct costs: \$697,237

Role: Co-Investigator (10%)

The MOMENT project involves developing sophisticated text-mining and data extraction tools to examine adverse drug effects in patients presenting for emergency and hospital care.

VGER – Vanderbilt Genomic Electronic Medical Records (eMERGE-I)

NHGRI U01 HG004603 (PI - Dan Roden)

09/28/2007 – 07/31/2011

Total direct costs: \$6,466,499

Role: Co-Investigator (10%)

The VGER project promotes personalized medicine by conducting genome-phenome association studies using EMR data.

VESPA - Vanderbilt Electronic Systems for Pharmacogenomic Assessment

NIH RC2GM092618 (PI - Dan Masys & Dan Roden)

09/30/2009 – 08/31/2011

Total direct costs: \$6,406,203

Role: Co-Investigator (20%)

The VESPA project was a two-year GO grant, which aims to conduct pharmacogenomics studies using electronic health records and DNA biobank.

VGER – Vanderbilt Genomic Electronic Records Project (eMERGE-II)

NHGRI U01 HG006378 (PI - Dan Roden)

08/15/2011 – 07/31/2015

Total direct costs: \$4,237,100

Role: Co-investigator (5%), Participated between 2011-2012

The VGER-II project promotes personalized medicine by conducting genome-phenome association studies using EMR data and integrating genomic data into clinical settings.

Pharmacogenomics of Arrhythmia Therapy (PAT)

NHLBI U19HL065962 (PI - Dan Roden)

09/01/2010 – 06/30/2015

Total direct costs: \$13,986,828

Role: Co-investigator (30%), Participated between 2010-2012

PAT is one of the sites of Pharmacogenomics Research Network (PGRN). The aim of this project is to understand genetic associations for drugs in arrhythmia therapy. One of the particular projects is to investigate genetic variations associated with warfarin-caused bleedings by using electronic medical records (EMRs) and DNA biobank. We also support PGPop, a network resource for using EMRs and biobanks for pharmacogenomic research.

Evidence-based diagnostic tools for translational and clinical research (eTfor2)

NLM R01LM010828 (PI – Randy Miller)

9/30/2010-9/29/2013

Total direct costs: \$730,000

Role: Co-investigator (10%), Participated between 2010-2012

The eTfor2 project develops and evaluates open-source programs and knowledge representations to better characterize patients for translational and clinical research studies.

From GWAS to PheWAS: Scanning the EMR Phenome for Gene-Disease Associations

NLM R01LM010685 (PI - Josh Denny)

09/01/2011 – 8/31/2014

Total direct costs: \$652,500

Role: Co-investigator (5%), Participated between 2011-2012

The PheWAS project develops novel NLP and data analysis methods for gene-disease associations based on EMRs. For a given SNP, it scans hundreds of diseases to quickly identify possible associations.

PUBLICATIONS

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14. Liu Z, Yefei Zhang Y, Franzin L, Cormier JN, Chan W, **Xu H**, Du XL. Trends and variations in breast and colorectal cancer incidence from 1995 to 2011: A comparative study between Texas Cancer Registry and National Cancer Institute's Surveillance, Epidemiology and End Results data. *International Journal of Oncology*. 2015, 1819-1826

15. Wu Y, Denny JC, Rosenbloom ST, Miller RA, Giuse DA, Song M, **Xu H**. A Preliminary Study of Clinical Abbreviation Disambiguation in Real Time. *Appl Clin Inform* 6.2 (2015): 364-374.
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