2018 IEEE International Conference on Healthcare Informatics (ICHI 2018)

New York City, New York, USA 4 – 7 June 2018



IEEE Catalog Number: CFP1844U-POD **ISBN:**

978-1-5386-5378-4

Copyright © 2018 by the Institute of Electrical and Electronics Engineers, Inc. All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

*** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.

IEEE Catalog Number:	(
ISBN (Print-On-Demand):	ç
ISBN (Online):	9
ISSN:	2

CFP1844U-POD 978-1-5386-5378-4 978-1-5386-5377-7 2575-2626

Additional Copies of This Publication Are Available From:

Curran Associates, Inc 57 Morehouse Lane Red Hook, NY 12571 USA Phone: (845) 758-0400 Fax: (845) 758-2633 E-mail: curran@proceedings.com Web: www.proceedings.com



2018 IEEE International Conference on Healthcare Informatics ICHI 2018

Table of Contents

Welcome Message from the General Co-Chairs xviii
Organizing Committee xix
Program Committees xxi

Paper Session 1: EHR Mining

A Process Mining and Text Analysis Approach to Analyse the Extent of Polypharmacy in Medical Prescribing .1. Philip Weber (University of Birmingham, UK), Ruth Backman (University	
of Birmingham, UK), Ian Litchfield (University of Birmingham, UK), and Mark Lee (University of Birmingham, UK)	
A Data Quality Framework for Process Mining of Electronic Health Record Data .12 Frank Fox (University of Leeds), Vishal R. Aggarwal (University of	••
Leeds), Helen Whelton (University College Cork), and Owen Johnson (University of Leeds)	
Exploiting OHC Data with Tensor Decomposition for Off-Label Drug Use Detection .22 Mengnan Zhao (Drexel University) and Christopher C. Yang (Drexel University)	
Process Mining the Trauma Resuscitation Patient Cohorts 29 Sen Yang (Rutgers University), Fei Tao (Rutgers University), Jingyuan Li (Rutgers University), Dawei Wang (Rutgers University), Shuhong Chen (Rutgers University), Omar Z. Ahmed (Children's National Medical Center), Ivan Marsic (Rutgers University), and Randall S. Burd (Children's National Medical Center)	••
Intention Mining in Medical Process: A Case Study in Trauma Resuscitation .36 Sen Yang (Rutgers University), Weiqing Ni (Rutgers University), Xin Dong (Rutgers University), Shuhong Chen (Rutgers University), Richard A. Farneth (Children's National Medical Center), Aleksandra Sarcevic (Drexel University), Ivan Marsic (Rutgers University), and Randall S. Burd (Children's National Medical Center)	

Using Clinical Narratives and Structured Data to Identify Distant Recurrences in Breast Cancer .44...... Zeng Zexian (Northwestern University Feinberg School of Medicine), Roy Ankita (Northwestern University Feinberg School of Medicine), Li Xiaoyu (Harvard T.H. Chan School of Public Health), Espino Sasa (Northwestern University Feinberg School of Medicine), Clare Susan (Northwestern University Feinberg School of Medicine), Khan Seema (Northwestern University Feinberg School of Medicine), and Luo Yuan (Northwestern University Feinberg School of Medicine)

Paper Session 2: Understanding Patients, Understanding Providers

Gamification and Serious Games in a Healthcare Informatics Context .53 Robin De Croon (KU Leuven), Davina Wildemeersch (Antwerp University Hospital), Joris Wille (BeWell Innovations), Katrien Verbert (KU Leuven), and Vero Vanden Abeele (KU Leuven)
Towards Precision Behavioral Medicine with IoT: Iterative Design and Optimization of a Self-Management Tool for Type 1 Diabetes .64 Peng Zhang (Vanderbilt University), Douglas Schmidt (Vanderbilt University), Jules White (Vanderbilt University), and Shelagh Mulvaney (Vanderbilt University)
A Study Using the In-Depth Interview Approach to Understand Current Practices in the Management of Personal Health Information and Privacy Compliance .75
Towards a Method for Enterprise Mobility Management (EMM) in Healthcare .87 Mike Krey (Zurich University of Applied Sciences)
Defining the Functional Requirements for the NFC-Based Medication Administration and Clinical Communication System .98
Maali Alabdulhafith (Dalhousie University, Canada) and Srinivas Sampalli (Dalhousie University, Canada)
Opportunistic Discovery of Personal Places Using Smartphone and Fitness Tracker Data .103 Sudip Vhaduri (University of Notre Dame) and Christian Poellabauer (University of Notre Dame)

Paper Session 3: Applied Data Science

Camera-Based Peripheral Edema Measurement Using Machine Learning .115 Junbo Chen (Columbia University), Tingyu Mao (Columbia University), Yunlei Qiu (Columbia University), Duoying Zhou (Columbia University), and Zoran Kostic (Columbia University)
Quantifying Subjective Well-Being Using Trends in Weekend Activity .123
Louis Faust (University of Notre Dame), David Hachen (University of
Notre Dame), Omar Lizardo (University of Notre Dame), and Nitesh V.
Chawla (University of Notre Dame)

A Multilevel Predictive Model for Detecting Social Network Users with Depression .130
Akkapon Wongkoblap (King's College London), Miguel A. Vadillo
(Universidad Autónoma de Madrid, Spain), and Vasa Curcin (King's
College London)

Variable Selection for Chronic Disease Outcome Prediction Using a Causal Inference Technique: A Preliminary Study 136..... John Richard Lee (Cornell University), Bilal Chughtai (Cornell University), and Rema Padman (Carnegie Mellon University)

Predicting and Understanding Unexpected Respiratory Decompensation in Critical Care Using Sparse and

Heterogeneous Clinical Data .144

Oliver Ren (MIT), Alistair E. W. Johnson (MIT), Eric P. Lehman (Northeastern University), Matthieu Komorowski (Imperial College London), Jerome Aboab (MIT), Fengyi Tang (MIT), Zach Shahn (Center for Comp. Health, IBM Research), Daby Sow (Center for Comp. Health, IBM Research), Roger Mark (MIT), and Li-wei Lehman (MIT)

. . .

Paper Session 4: Multimethod Analysis of Medical Data, Images, and Sensor Data

Explaining Therapy Predictions with Layer-Wise Relevance Propagation in Neural Networks .152 Yinchong Yang (Siemens AG), Volker Tresp (Siemens AG), Marius Wunderle (Department of Gynecology and Obstetrics, University Hospital Erlangen, Germany), and Peter A. Fasching (Department of Gynecology and Obstetrics, University Hospital Erlangen, Germany)
Learning a Dynamic-Based Representation for Multivariate Biomarker Time Series Classifications .163 Xi Hang Cao (Temple University), Chao Han (Temple University), and Zoran Obradovic (Temple University)
Motion Sensor-Based Assessment on Fall Risk and Parkinson's Disease Severity: A Deep Multi-Source Multi-Task Learning (DMML) Approach .1.7.4 Shuo Yu (University of Arizona), Hsinchun Chen (University of Arizona), Randall Brown (Southern Arizona VA Health Care System), and Scott Sherman (University of Arizona)
 Human Action Understanding and Movement Error Identification for the Treatment of Patients with Parkinson's Disease .180. Wenchuan Wei (University of California, San Diego), Carter McElroy (University of California, San Diego), and Sujit Dey (University of California, San Diego)
A Dual-Tree Complex Wavelet Transform Based Convolutional Neural Network for Human Thyroid Medical Image Segmentation .191 Hongya Lu (State University of New York at Binghamton), Haifeng Wang (State University of New York at Binghamton), Qianqian Zhang (State University of New York at Binghamton), Daehan Won (State University of New York at Binghamton), and Sang Won Yoon (State University of New York at Binghamton)

Medical Image Synthesis with Generative Adversarial Networks for Tissue Recognition .199..... Qianqian Zhang (State University of New York at Binghamton), Haifeng Wang (State University of New York at Binghamton), Hongya Lu (State University of New York at Binghamton), Daehan Won (State University of New York at Binghamton), and Sang Won Yoon (State University of New York at Binghamton)

Paper Session 5: Text Analytics

 Virtual Patient Model: An Approach for Generating Synthetic Healthcare Time Series Data .208 Rittika Shamsuddin (University of Texas at Dallas), Barbara M. Maweu (University of Texas at Dallas), Ming Li (California State University, Fresno,), and Balakrishnan Prabhakaran (University of Texas at Dallas)
Early Diagnosis and Prediction of Sepsis Shock by Combining Static and Dynamic Information Using Convolutional-LSTM 219 Chen Lin (North Carolina State University), Yuan Zhangy (North Carolina State University), Julie Ivy (North Carolina State University), Muge Capan (Drexel University), Ryan Arnold (Drexel University), Jeanne M. Huddleston (Mayo Clinic), and Min Chi (North Carolina State University)
Recent Temporal Pattern Mining for Septic Shock Early Prediction .229 Farzaneh Khoshnevisan (North Carolina State University), Julie Ivy (North Carolina State University), Muge Capan (Drexel University's LeBow College of Business), Ryan Arnold (Drexel College of Medicine), Jeanne Huddleston (Mayo Clinic), and Min Chi (North Carolina State University)
Expanding Consumer Health Vocabularies with Frequency-Conserving Internal Context Models .241 Munif Ishad Mujib (Drexel University), Christopher C. Yang (Drexel University), Mengnan Zhao (Drexel University), and Jake Ryland Williams (Drexel University)
A Publication-Based Popularity Index (PPI) for Healthcare Dataset Ranking .247 Jingyi Shi (University of North Carolina at Charlotte), Mingna Zheng (University of North Carolina at Charlotte), Lixia Yao (Mayo Clinic), and Yaorong Ge (University of North Carolina at Charlotte)
Public Health Surveillance with Incomplete Data – Spatio-Temporal Imputation for Inferring Infectious Disease Dynamics .255 <i>Qi Tan (Hong Kong Baptist University, Hong Kong SAR, P.R. China),</i> <i>Jiming Liu (Hong Kong Baptist University, Hong Kong SAR, P.R. China;</i> <i>HKBU Shenzhen Institute of Research and Continuing Education,</i>
Shenzhen, P.R. China), Benyun Shi (Hangzhou Dianzi University, P.R. China), Yang Liu (Hong Kong Baptist University, Hong Kong SAR, P.R. China; HKBU Shenzhen Institute of Research and Continuing Education, Shenzhen, P.R. China), and Xiao-Nong Zhou (Chinese Center for Disease Control and Prevention, Shanghai, P.R. China; Key Laboratory of Parasite and Vector Biology, MOH, Shanghai, P.R. China; WHO
Collaborating Center for Malaria, Schistosomiasis and Filariasis, Shanghai, P.R. China)

Paper Session 6: Health Informatics for Vulnerable Populations

Integrating Patient-Generated Observations of Daily Living into Pediatric Cancer Care: A Formative User Interface Design Study .265. Udaya Lakshmi (Georgia Institute of Technology), Matthew Hong (Georgia Institute of Technology), and Lauren Wilcox (Georgia Institute of Technology)
zCare: Designing a Mobile Application to Support Caregivers of Patients with Congenital Zika Syndrome 276
Niloofar Kalantari (George Mason University) and Vivian Genaro Motti (George Mason University)
Analyzing Abusive Text Messages to Detect Digital Dating Abuse .284 Tania Roy (Clemson University), Jerome McClendon (Clemson University), and Larry Hodges (Clemson University)
Barriers to the Access and use of Health Information by Individuals with Intellectual and Developmental Disability IDD: A Review of the Literature .294 <i>Muneef Alshammari (Lero-The Irish Software Research Centre, University</i> <i>of Limerick, Ireland), Owen Doody (University of Limerick, Ireland),</i> <i>and Ita Richardson (Lero – The Irish Sotware Research Centre, Health</i> <i>Research Institure, University of Limerick, Ireland)</i>
 Virtual Reality Course Based on the SAT Counseling Method for Self-Guided Mental Healthcare .299

Paper Session 7: Software and Algorithms

A Novel Kinect-Based Algorithm for Inferring the Position of the Lower Body Joints Using Human Gait
Pattern .307
Sagda E. K. Osman (Michigan Technological University), Guy Hembroff
(Michigan Technological University), and Marcos Almeida Matos (Bahiana
School of Medicine and Public Health)
Study of Online Health Discussion Fora for the Detection of Medication Misuses .3.13
Elise Bigeard (CNRS UMR 8163 STL Univ. Lille France ; Univ. Bordeaux
Inserm Bordeaux Population Health Rsearch Center team ERIAS UMR 1219
Bordeaux France), Natalia Grabar (CNRS Univ. Lille UMR 8163 STL Lille
France), and Frantz Thiessard (Univ. Bordeaux Inserm Bordeaux
Population Health Research Center team ERIAS UMR 1219 Bordeaux France)
Electronic System for Chaotic Time Series Prediction Associated to Human Disease .323

Ana Dalia Pano-Azucena (INAOE), Esteban Tlelo-Cuautle (INAOE), and Sheldon Tan (University of California Riverside) Lessons Learned in the Development of a Computable Phenotype for Response in Myeloproliferative

Neoplasms .328.... Evan Sholle (Weill Cornell Medical College), Spencer Krichevsky (Weill Cornell Medical College), Joseph Scandura (Weill Cornell Medical College), Claudia Sosner (Weill Cornell Medical College), and Thomas Campion Jr. (Weill Cornell Medical College)

Contributions to the Acquisition of Heart Rate and Photoplethysmography Signal Using a Real-Time

Software .332

Pedro Henrique de Brito Souza (University of Brasília), Israel Machado Brito Souza (Pontifical Catholic University of Goiás), Tharcis Pereira Sacramento (Pontifical Catholic University of Goiás), Patrícia Cândida de Matos Lima Martins (Pontifical Catholic University of Goiás), Priscila Valverde de Oliveira Vitorino (Pontifical Catholic University of Goiás), Gabrielly Craveiro Ramos (Pontifical Catholic University of Goiás), Talles Marcelo Gonçalves de Andrade Barbosa (Pontifical Catholic University of Goiás), and Adson Ferreira da Rocha (University of Brasília)

Poster Sessions

Poster Session 1

Electromyography Based Orthotic Arm and Finger Rehabilitation System .338 Jose Gotuzzo (California State University, Fullerton), Sonny Vu (California State University, Fullerton), Sharlyn Dee (California State University, Fullerton), and Kiran George (California State University, Fullerton)	
Med Conformity: Enhance Adherence with Prescription Opioids .340 Joseph Miles (State University of New York at Oswego) and Nafees Qamar (State University of New York at Oswego)	
Context-Aware Analysis Scheduling in Wireless Body Area Networks .342 Joseph Reeves (department of computer science, California State University Fresno) and Ming Li (department of computer science, California State University Fresno)	
An Efficient Algorithm to Enhance the Quality of Digital Image Using Numerical and Computational Analysis .345 Dong Kyun Kim (Choice Research Group), Eun Suh Kim (Choice Research Group), and Andrew Kyung (Choice Research Group)	
In Technology We Trust: Extending TAM from a Healthcare Technology Perspective .348 Raja Manzar Abbas (Lero-The Irish Software Research Centre, University of Limerick, Limerick, Ireland), Noel Carroll (Lero-The Irish Software Research Centre, National University of Ireland Galway, Galway, Ireland), and Ita Richardson (Lero-The Irish Software Research Centre, HRI- Health Research Institute, University of Limerick, Limerick, Ireland)	

A Gamified Mobile System for Crowdsourcing Video for Autism Research .350 Haik Kalantarian (Stanford University), Peter Washington (Stanford University), Jessey Schwartz (Stanford University), Jena Daniels (Stanford University), Nick Haber (Stanford University), and Dennis Wall (Stanford University)
 Memory Aid Device to Improve Face-Name Memory in Individuals with Alzheimer's Disease .353 Sanjana Nonavinakere (California State University, Fullerton), Juan Aldana (California State University, Fullerton), Samuel Sisson (California State University, Fullerton), Eligio Cruz (California State University, Fullerton), and Kiran George (California State University, Fullerton)
LifeGrid: Understanding and Quantifying the Impact of Social Determinants on Chronic Disease for Predictive Health .355 William Southerland (Howard University), Joseph Wright (Howard University Hospital College of Medicine), Dawn Payne (Georgetown University), and Gloria Washington (Howard University)
Soul Glow: An Application for Helping to Understand and Improve Mental Health Care of HBCU Students .358 Lucretia Williams (Howard University) and Gloria Washington (Howard University)
Patient-Centered Strategies to Increase Participation in Cancer Clinical Trials .361 Lynette Hammond Gerido (Florida State University School of Information) and Zhe He (Florida State University School of Information)
DNA Methylation Data to Predict Suicidal and Non-Suicidal Deaths: A Machine Learning Approach .363 Rifat Zahan (Department of Computer Science, University of Saskatchewan), Ian McQuillan (Department of Computer Science, University of Saskatchewan), and Nathaniel Osgood (Department of Computer Science, University of Saskatchewan)
Text Classification of Flu-Related Tweets Using FastText with Sentiment and Keyword Features .366 Ali Alessa (Department of Computer Science and Engineering, University of Bridgeport, Bridgeport, CT, USA), Miad Faezipour (Departments of Computer Science and Engineering and Biomedical Engineering, University of Bridgeport, Bridgeport, CT, USA), and Zakhriya Alhassan (Computer Science Department, School of Engineering and Computing Sciences, Durham University, Durham, UK)

Comparing Sex-Specific Association Networks of Chronic Medical Conditions 368 Min-hyung Kim (Department of Healthcare Policy and Research, Joan & Sanford I. Weill Medical College of Cornell University, New York, USA), Yongjun Zhu (Department of Library and Information Science, Sungkyungkwan University, Seoul, South Korea), Samprit Banerjee (Department of Healthcare Policy and Research, Joan & Sanford I. Weill Medical College of Cornell University, New York, USA), Lauren Evans (Department of Healthcare Policy and Research, Joan & Sanford I. Weill Medical College of Cornell University, New York, USA), Yiye Zhang (Department of Healthcare Policy and Research, Joan & Sanford I. Weill Medical College of Cornell University, New York, USA), Yiye Zhang (Department of Healthcare Policy and Research, Joan & Sanford I. Weill Medical College of Cornell University, New York, USA), Fei Wang (Department of Healthcare Policy and Research, Joan & Sanford I. Weill Medical College of Cornell University, New York, USA), Sang Min Park (Department of Family Medicine, Department of Biomedical Science, Seoul National University College of Medicine Seoul, South Korea), and Jyotishman Pathak (Department of Healthcare Policy and Research, Joan & Sanford I. Weill Medical College of Cornell University, New York, USA)
Clustering of Human Sperm Swimming Patterns in Time-Lapse Images .371 Ji-won Choi (New Jersey Institute of Technology), Leonardo Urbano (Drexel University), Puneet Masson (Penn Fertility Care, Hospital of the University of Pennsylvania), Matthew VerMilyea (Ovation Fertility), and Moshe Kam (New Jersey Institute of Technology)
Analyzing Patterns of Literature-Based Phenotyping Definitions for Text Mining Applications .3.7.4 Samar Binkheder (Indiana University –Indianapolis), Heng-Yi Wu (The Ohio State University), Sara Quinney (Indiana University –Indianapolis), and Lang Li (The Ohio State University)
A Collaborative Filtering Recommender System in Primary Care: Towards a Trusting Patient-Doctor Relationship .3.7 Qiwei Han (Nova School of Business and Economics), Íñigo Martínez de Rituerto de Troya (Nova School of Business and Economics), Mengxin Ji (University of California, Davis), Manas Gaur (Kno.e.sis Center, Ohio), and Leid Zejnilovic (Nova School of Business and Economics)
 Mapping the Treatment Journey for Patients with Prostate Cancer .380
Extracting Key Findings Compared In an Echocardiogram Report .382 Deyu Sun (Philips Research North America), Lucas Oliveira (Philips Research North America), and Kirk Spencer (University of Chicago Medical Center)
Predictive Model for the Incidence of Hyperkalemia for Congestive Heart Failure Patients on Spironolactone .384 Reham Aldakhil (King Saud bin Abdulaziz University for Health Sciences), Mouaz Almallah Almallah (Almallah), and Sherif Sakr (University of Taru)

Deep Learning Model for Classifying Drug Abuse Risk Behavior in Tweets .386 Han Hu (New Jersey Institute of Technology), Pranavi Moturu (New Jersey Institute of Technology), Kannan Dharan (New Jersey Institute of Technology), James Geller (New Jersey Institute of Technology), Sophie Iorio (New Jersey Institute of Technology), Hai Phan (New Jersey Institute of Technology), Huy Vo (The City College of New York), and Soon Chun (The College of Staten Island)
Personalize Warfarin Trearment by Optimizing Protocol Assignment .388 Chih-Lin Chi (University of Minnesota), Xinpeng Shen (University of Minnesota), Kourosh Ravvaz (Aurora Health Care), John Weissert (Aurora Health Care), and Peter Tonellato (University of Missouri Health)
Predictive Models of Sepsis in Adult ICU Patients .390. Roman Z. Wang (University of Virginia), Catherine H. Sun (University of Virginia), Philip H. Schroeder (University of Virginia), Mawulolo K. Ameko (mka9db@virginia.edu), Christopher C. Moore (University of Virginia), and Laura E. Barnes (University of Virginia)
Poster Session 2
A Hybrid Method for Normalization of Medical Concepts in Clinical Narrative .392 Yen-Fu Luo (University of Massachusetts Lowell), Weiyi Sun (Nuance Communication Inc.), and Anna Rumshisky (University of Massachusetts Lowell)
Inclusion and Exclusion of Medical Codes for Primary Care Data Extraction .394 Shao-Fen Liang (King's College London), Xiaohui Sun (King's College London), Martin Gulliford (King's College London), and Vasa Curcin (King's College London)

Using Activity Tracker Data for the Assessment of Physical Activity in Public Health Studies .396..... Jochen Meyer (OFFIS Institute for Information Technology), Kai von Holdt (OFFIS Institute for Information Technology), Inna Bragina (Technical University Chemnitz), and Claudia Voelcker-Rehage (Technical University Chemnitz)

- Brain-Computer Interface Controlled Robotic Arm to Improve Quality of Life .398..... Pablo Pelayo (California State University, Fullerton), Hemamalini Murthy (California State University, Fullerton), and Kiran George (California State University, Fullerton)
- Mathematical Modeling of HPA axis Using Particle Filter Algorithm 400..... Amin Mohammadbagheri (Department of Computer Science, University of Saskatchewan), Connie Lillas (Interdisciplinary Training Institute National Graduate Zero to Three Fellow USA), and Nathaniel D. Osgood (Department of Computer Science)
- VOTA A Vocal Tract and Training Analysis Tool .403.....
 Giuseppe Tradigo (University of Calabria), Patrizia Vizza (Magna Graecia University of Catanzaro), Pasquale Lambardi (Ithea S.r.l.), Silvio Cosoleto (Ithea S.r.l.), Pietro Hiram Guzzi (Magna Graecia University of Catanzaro), Mario Cannataro (Magna Graecia University of Catanzaro), Aldo Quattrone (Magna Graecia University of Catanzaro), and Pierangelo Veltri (Magna Graecia University of Catanzaro)

Identifying Audit Trail Viewer Requirements for User-Focused Design: A Qualitative Focus Group Study.405. <i>Patrik Satrjeenpong Satrjeenpong (Informatician), Archana Tapuria</i> <i>(Research Fellow), Vasa Curcin (Lecturer), and Dipak Kalra (Professor</i> <i>in Health Informatics)</i>
Predicting Time to First Treatment in Chronic Lymphocytic Leukemia Using Machine Learning Survival and Classification Methods .407 David Chen (Biomedical Statistics and Informatics, Mayo Clinic),
Gaurav Goyal (Department of Hematology, Mayo Clinic), Ronald Go (Department of Hematology, Mayo Clinic), Sameer Parikh (Department of Hematology, Mayo Clinic), and Che Ngufor (Biomedical Statistics and Informatics, Mayo Clinic)
Detection of Inflammation from Temperature Profile Using Arthritis Knee Joint Datasets .409 Parijata Majumdar (Department of Computer Science and Engineering, Tripura University (A Central University)), Kakali Das (Department of Computer Science and Engineering, Tripura University (A Central University)), Niharika Nath (Department of Life Sciences, New York Institute of Technology (NYIT)), and Mrinal Kanti Bhowmik (Department of Computer Science and Engineering, Tripura University (A Central University))
Diagnostic Classification of Lung CT Images Using Deep 3D Multi-Scale Convolutional Neural Network .4.12 <i>Ahmad P. Tafti (Marshfield Clinic Research Institute), Fereshteh S.</i> <i>Bashiri (Marshfield Clinic Research Institute), Eric LaRose</i> <i>(Marshfield Clinic Research Institute), and Peggy Peissig (Marshfield</i> <i>Clinic Research Institute)</i>
Constructing Fluid Ontology Space for Object–Property Management in the Biomedical Sciences .4.15 Charles Kronk (University of Cincinnati)
A Real-Time Hardware-In-The-Loop Testing Platform for Closed-Loop Fluid Resuscitation .4.17 Hossein Mirinejad (U.S. Food and Drug Administration), Margo Ricks (U.S. Food and Drug Administration), Bahram Parvinian (U.S. Food and Drug Administration), Jin-Oh Hahn (University of Maryland), and Christopher Scully (U.S. Food and Drug Administration)
 Towards Building a Virtual Assistant Health Coach .4.19 Itika Gupta (University of Illinois at Chicago), Barbara Di Eugenio (University of Illinois at Chicago), Brian Ziebart (University of Illinois at Chicago), Bing Liu (University of Illinois at Chicago), Ben Gerber (University of Illinois at Chicago), Lisa Sharp (University of Illinois at Chicago), Rafe Davis (University of Illinois at Chicago), and Aiswarya Baiju (University of Illinois at Chicago)
 Patient Engagement Platform for Remote Monitoring of Vestibular Rehabilitation with Applications in Concussion Management and Elderly Fall Prevention .422 Joseph Peter Salisbury (Brain Power LLC), Runpeng Liu (Brain Power LLC), Lindsey Marie Minahan (Brain Power LLC), Hye Young Shin (Massachusetts Institute of Technology), Sai Veda Pramoda Karnati (Massachusetts Institute of Technology), Shannon E. Duffy (Massachusetts Institute of Technology), Neha U. Keshav (Brain Power LLC), and Ned T. Sahin (Brain Power LLC)

Assessing the Usability of a Prototype Emergency Medicine Patient-Centered Electronic Health Record
Display 424
Tracy Kim (Medstar Health, National Center for Human Factors in Healthcare) Ann Bisentz (Department of Industrial and Systems
Healthcare), Ann Bisantz (Department of Industrial and Systems Engineering, University of Buffalo), Natalie Benda (Medstar Health,
National Center for Human Factors in Healthcare), David LaVergne
(Department of Industrial and Systems Engineering, University of
Buffalo), Joseph Blumenthal (Medstar Health, National Center for Human
Factors in Healthcare), Daniel Hoffman (Medstar Health, National
Center for Human Factors in Healthcare), Karen Chow (Department of
Psychology, University of Buffalo), Rollin J. Fairbanks (Medstar Health, National Contantion Human Factors in Healthcame), and Agner
Health, National Center for Human Factors in Healthcare), and Aaron Zachary Hettinger (MedStar Health, National Center for Human Factors
in Healthcare)
An Interactive NLP Tool for Signout Note Preparation .426 Gaurav Trivedi (University of Pittsburgh), Robert Handzel (University
of Pittsburgh), Shyam Visweswaran (University of Pittsburgh), Wendy
Chapman (University of Utah), and Harry Hochheiser (University of
Pittsburgh)
Representation Learning of Finding Codes in Structured Echocardiogram Reporting .429
Xin Wang (Philips Research North America), Yugang Jia (Philips
Research North America), Merlijn Sevenster (Philips Professional
Health Services & amp; Solutions), Thomas Forsberg (Philips HSDP
R&D), Lucas Oliveira (Philips Research North America), and Kirk
Spencer (University of Chicago)
Data-Driven Clinical Phenotyping of Denosumab Exposure in a Large United States Cohort .432
Trang Le (Department of Biostatistics, Epidemiology, & Informatics, Perelman School of Medicine, University of Pennsylvania,
Philadelphia, PA USA) and Matthew Breitenstein (Department of
Biostatistics, Epidemiology, & amp; Informatics, Perelman School of
Medicine, University of Pennsylvania, Philadelphia, PA USA)
Pattern Similarity in Time Interval Sequences .434
Luca Bonomi (University of California, San Diego) and Xiaoqian Jiang
(University of Texas Health Science Center at Houston)
Classifying Depressed Users With Multiple Instance Learning from Social Network Data .436
Akkapon Wongkoblap (Department of Informatics, King's College London),
Miguel A. Vadillo (Departamento de Psicología Básica, Universidad
Autónoma de Madrid), and Vasa Curcin (School of Population Health
Sciences, King's College London)
Discovering Interpretable Medical Workflow Models .437.
Jingyuan Li (Rutgers University), Sen Yang (Rutgers University),
Shuhong Chen (Rutgers University), Fei Tao (Rutgers University), Ivan Marsic (Rutgers University), and Randall S. Burd (Children's National
Marsie (Raigers Oniversity), and Randall S. Bara (Cintaren's National Medical Center)

 Patient Disease Identification in Clinical Notes .440 Jinhe Shi (New Jersey Institute of Technology), Yi Chen (New Jersey Institute of Technology), Guodong Gao (University of Maryland), P.Kenyon Crowley (University of Maryland), William C. Kinsman (Inovalon), Chenyu Ha (Inovalon), Chelsea N. King (Inovalon), and Eric Sullivan (Inovalon)
Wavelet Transform to Improve Accuracy of a Prediction Model for Overall Survival Time of Brain Tumor Patients Based On MRI Images .441
Lina Chato (University of Nevada, Las Vegas), Erik Chow (University of
Nevada, Las Vegas), and Shahram Latifi (University of Nevada, Las Vegas)
ECG Heartbeat Classification: A Deep Transferable Representation 443 Mohammad Kachuee (UCLA Computer Science), Shayan Fazeli (UCLA Computer Science), and Majid Sarrafzadeh (UCLA Computer Science)

Tutorials

An Interactive Tutorial on Simulated Pharmacogenomic Clinical Trials .445 Kourosh Ravvaz (Aurora Research Institute, Aurora Health Care) and John Weissert (Aurora Research Institute, Aurora Health Care)	
Is the Best Model Also the Right Solution? .4.46	
Mark R. Kanner (Aetna), Sylvie Lardeux (Aetna), and Foruhar Shiva	
(Aetna)	
Interpretable Machine Learning in Healthcare .447.	
Muhammad Aurangzeb Ahmad (University of Washington - Tacoma, KenSci	
Inc.), Ankur Teredesai (University of Washington - Tacoma, KenSci	
Inc.), and Carly Eckert (University of Washington, KenSci Inc.)	

Doctoral Consortium

Towards Interactive Natural Language Processing in Clinical Care .448 Gaurav Trivedi (University of Pittsburgh)
Application of Inertial Measurement Units for Advanced Safety Surveillance System Using Individualized Sensor Technology (ASSIST): A Data Fusion and Machine Learning Approach .450 Amir Baghdadi (Department of Industrial and Systems Engineering, Department of Mechanical and Aerospace Engineering, University at Buffalo, State University of New York)
The Validity and Reliability of Social Networks as a Source for Idiopathic Pulmonary Fibrosis Patient-Reported Outcomes .452 <i>Kim Tran (University of Arkansas, Little Rock)</i>
The Challenges of Using Temporal Representation in Real-World EHR Data .453 Kang Lin Hsieh (School of Biomedical informatic at UTHSC)

A Comparison Between Two Approaches to Identify Opioid Use Problems: ICD-9 vs. Text-Mining Approach Abdullah Alzeer (Indiana University–Purdue University Indianapolis), Jay Patel (Indiana University–Purdue University Indianapolis), Brian Dixon (Indiana University–Purdue University Indianapolis), Matthew Bair (Richard L. Roudebush VA Medical Center), and Josette Jones (Indiana University–Purdue University Indianapolis)	455
Camera-Based Peripheral Edema Measurement Using Machine Learning Junbo Chen (Electrical Eng. Department, Columbia University) and Tingyu Mao (Electrical Eng. Department, Columbia University)	457
 Mental Health Analysis Via Social Media Data	. 459
 Mining Temporal Patterns from Sequential Healthcare Data	461
Architectures and Patterns for Leveraging High-Frequency, Low-Fidelity Data in the Healthcare Domain Peng Zhang (Vanderbilt University), Jules White (Vanderbilt University), and Douglas Schmidt (Vanderbilt University)	. 463
Enabling Effective Data Interaction for Domain Experts Protiva Rahman (Computer Science and Engineering, The Ohio State University), Courtney Hebert (Biomedical Informatics, The Ohio State University), and Arnab Nandi (Computer Science and Engineering, The Ohio State University)	465

Additional Paper

Machine Learning Methods for Disease Prediction with Claims Data	467
Tanner Christensen (Department of Mathematics, Brigham Young University)	
Abraham Frandsen (Department of Mathematics, Brigham Young University)	
Seth Glazier (Department of Mathematics, Brigham Young University)	
Jeffrey Humpherys (Department of Mathematics, Brigham Young University)	
David Kartchner (Department of Mathematics, Brigham Young University)	