2016 IEEE International Conference on Healthcare Informatics (ICHI 2016)

Chicago, Illinois, USA
4-7 October 2016
Welcome from the ICHI 2016 General Chairs .................................................................xiv
Organizing Committee ........................................................................................................xvi
Program Committee Members ............................................................................................xviii
Reviewers ............................................................................................................................xix
Keynotes ..............................................................................................................................xxi
Workshop Committee ........................................................................................................xxvi
Tutorial Abstracts ..................................................................................................................xxviii
Industry Track Abstracts ......................................................................................................xxxiv
Panel Abstracts .......................................................................................................................xxxix
Healthcare Data Analytics Challenge ................................................................................xli
Doctoral Consortium ...........................................................................................................xlii

Workshop — Health Data Science: Creation, Analysis and Interpretation
Predicting the Helpfulness of Online Physician Reviews ......................................................1
  Nujood Alodadi and Lina Zhou
Towards Identifying Leading Indicators of Smoking Cessation Attempts from Social Media .................................................................7
  Aron Culotta
Drugs or Dancing? Using Real-Time Machine Learning to Classify Streamed “Dabbing” Homograph Tweets ...........................................................................................................10
  Antonio A. Ginart, Sanmay Das, Jenine K. Harris, Roger Wong, Hao Yan,
  Melissa Krauss, and Patricia A. Cavazos-Rehg
Prevalence and Attitudes about Illicit and Prescription Drugs on Twitter ...................................................14
  Iris Seaman and Christophe Giraud-Carrier
A Personalized Approach for Detecting Unusual Sleep from Time Series Sleep-Tracking Data .................................................................................................................................18
  Zilu Liang, Mario Alberto Chapa Martell, and Takuichi Nishimura
Human Daily Activity Recognition for Healthcare Using Wearable and Visual Sensing Data .............................................................. 24
  Xi Liu, Lei Liu, Steven J. Simske, and Jerry Liu

Timing of Coping Instruction Presentation for Real-Time Acute Stress Management: Long-Term Implications for Improved Surgical Performance ............................................. 32
  Lauren Kennedy and Sarah Henrickson Parker

Paper Session 1: Healthcare Systems

Seamless Design of Decision-Intensive Care Pathways ................................................................. 35
  Carlo Combi, Barbara Oliboni, Alessandro Zardiniy, and Francesca Zerbato

Access Control Model for Cooperative Healthcare Environments: Modeling and Verification .............................................................................................................................. 46
  Mohamed Abomhara, Huihui Yang, and Geir M. Køien

Using Access Control to Mitigate Insider Threats to Healthcare Systems ........................................ 55
  Suhair Alshehri, Sumita Mishra, and Rajendra K. Raj

Using Electronic Medical Records and Physician Data to Improve Information Retrieval for Evidence-Based Care ........................................................................................................ 61
  Mengqi Jin, Hongli Li, Christopher H. Schmid, and Byron C. Wallace

Learning Optimal Individualized Treatment Rules from Electronic Health Record Data ........................................................... 65
  Yuanjia Wang, Peng Wu, Ying Liu, Chunhua Weng, and Donglin Zeng

Paper Session 2: Temporal Analytics

Unsupervised Time-Series Clustering Over Lab Data for Automatic Identification of Uncontrolled Diabetes .................................................................................................................. 72
  Alexander Rusanov, Patric V. Prado, and Chunhua Weng

Combining Naive Bayes Classifiers with Temporal Association Rules for Coronary Heart Disease Diagnosis ........................................................................................................... 81
  Kalia Orphanou, Arianna Dagliati, Lucia Sacchi, Athena Stassopoulou, Elpida Keravnou, and Riccardo Bellazzi

Predicting Clinical Events by Combining Static and Dynamic Information Using Recurrent Neural Networks .................................................................................................................. 93
  Cristóbal Esteban, Oliver Staeck, Stephan Baier, Yinchong Yang, and Volker Tresp

Linking Patient Alone Time and Provider Time to Staffing Levels and LOS at the Emergency Department: A RFID Based Study ........................................................................ 102
  Shivaram P. Arunachalam, Gomathi Marisamy, Mustafa Sir, David Nestler, Thomas Hellmich, and Kalyan Pasupathy

Mining Online Heterogeneous Healthcare Networks for Drug Repositioning ........................................... 106
  Mengnan Zhao and Christopher C. Yang
Paper Session 3: Tools to Support Patient Care

Virtual Standardized Patient as a Training Tool for Mild TBI Screening ............................................................... 113
  Raghavi Sakpal, Dale-Marie Wilson, Christine Elnitsky, Katherine Taber,
  and Timothy W. Brearly

Usability Evaluation of a Pediatric Virtual Patient Creation Tool ................................................................. 118
  Lauren Cairco Dukes, Nancy Meehan, and Larry F. Hodges

A Patient Deterioration Warning System for Boosting Situational Awareness of Monitored Patients ................................................................. 129
  Thomas Schmidt, Annmarie Lassen, and Uffe Kock Wiil

Combining Mouse and Keyboard Events with Higher Level Desktop Actions to Detect Mild Cognitive Impairment ................................................................. 139
  Ann Gledson, Dommy Asfiandy, Joseph Mellor, Thamer Omer Faraj Ba-Dhfari,
  Gemma Stringer, Samuel Couth, Alistair Burns, Iracema Leroi, Xiaojun Zeng,
  John Keane, Christopher Bull, Paul Rayson, Alistair Sutcliffe, and Peter Sawyer

A Proactive Solution, using Wearable and Mobile Applications, for Closing the Gap between the Rehabilitation Team and Cardiac Patients ................................................................. 146
  Remus A. Dobrican and Denis Zampunieris

Paper Session 4: Helping People Help Themselves

Human Factors in the Design of Longitudinal Smartphone-based Wellness Surveys ................................................................. 156
  Sudip Vhaduri and Christian Poellabauer

Extending Agent Based Telehealth Platform with Activities of Daily Living Reasoning Capabilities ................................................................. 168
  Daniel Bjerring Jørgensen, Kasper Hallenborg, and Yves Demazeau

Forecasting Patient Outflow from Wards having No Real-Time Clinical Data ................................................................. 177
  Shivapratap Gopakumar, Truyen Tran, Wei Luo, Dinh Phung,
  and Sventha Venkatesh

Predicting Seizures from Electroencephalography Recordings: A Knowledge Transfer Strategy ................................................................. 184
  Jian Liang, Rui Lu, Changshui Zhang, and Fei Wang

Paper Session 5: Activity and Tracking

Peer Influence on the Engagement of Fitness Tracker Usage: A Diabetic and Obesity Study ................................................................. 192
  Yu Chen, Yunan Chen, Mirana Randriambelonoro, Antoine Geissbuhler,
  and Pearl Pu
Exploring Longitudinal Use of Activity Trackers

Jochen Meyer, Jochen Schnauber, Wilko Heuten, Harm Wienbergen,
Rainer Hambrecht, Hans-Jürgen Appelrath, and Susanne Boll

“Technology isn’t Always the Best”: The Intersection of Health Tracking Technologies and Information Practices of Digital Natives

Eunjeong Cheon, Mohammad Hossein Jarrahi, and Norman Makoto Su

Going Outside While Staying Inside — Exercise Motivation with Immersive vs. Non–immersive Recreational Virtual Environment Augmentation for Older Adult Nursing Home Residents

Jon Ram Bruun-Pedersen, Stefania Serafin, and Lise Busk Kofoed

#Sleep_as_Android: Feasibility of Using Sleep Logs on Twitter for Sleep Studies

Fatema Akbar and Ingmar Weber

**Paper Session 6: Medical Information Exchange, Mining in Networks and EHR**

A Secure Framework for Medical Information Exchange (MI-X) between Healthcare Providers

Ahmed Ibrahim, Baban Mahmood, and Mukesh Singhal

Discovering Drug-Drug Interactions and Associated Adverse Drug Reactions with Triad Prediction in Heterogeneous Healthcare Networks

Haodong Yang and Christopher C. Yang

A fully integrated open-source toolkit for mining healthcare big-data: architecture and applications

A. Ravishankar Rao and Daniel Clarke

Detection of Chronic Kidney Disease and Selecting Important Predictive Attributes

Asif Salekin and John Stankovic

Mining the Clinical Narrative: All Text are Not Equal

Keith Feldman, Nicholas Hazekamp, and Nitesh V. Chawla

**Industry Track**

Personalized Recommendation in Online Health Communities with Heterogeneous Network Mining

Ling Jiang and Christopher C. Yang

Big-Data Based Decision-Support Systems to Improve Clinicians’ Cognition

Don Roosan, Matthew Samore, Makoto Jones, Yarden Livnat, and Justin Clutter

Improvements on the Effectiveness and Scalibility of CMS Referral Analytics System

Xin Wang, Qingxin Wu, Xu Liu, Yugang Jia, and Nathan Cohen
A Comprehensive Informatics Framework to Increase Breast Cancer Risk Assessment and Chemoprevention in the Primary Care Setting .................................................................................................................293

Jeffrey Wood, Katherine Crew, Rita Kukafka, and Joseph Finkelstein

Supporting Patient Healing through ICUsmartCARE: Technologies that Enable Family Collaboration, Presence, and Information Flow .................................................................................................................297

Anthony Faiola, Elizabeth Lerner Papautsky, and Min Joo

Poster Session 1

E-Health Readiness Assessment in Uganda: Integration of Telemedicine Services into Public Healthcare System ......................................................................................................................................................................301

Vincent Micheal Kiberu and Vincent Micheal Kiberu

LabLinker: Finding Links of Laboratory Test Results between Structured Records and Clinical Notes ........................................................................................................................................................................302

Sijia Liu, Vipin Chaudhary, Liwei Wang, and Hongfang Liu

An Interactive Retrieval Framework for Online Health Information .........................................................................................................................................................................................................................303

Mingkun Gao, Liu Yuan, and Wai-Tat Fu

Poster Paper: An Accurate Crowdsourcing-Based Adaptive Fall Detection Approach Using Smart Devices ................................................................................................................................................................................................304

Hsuan-Man Chen, Chi-Kang Chen, Hsin-I Wu, and Ren-Song Tsay

Patterns of Interaction within Smoking Cessation Groups on Facebook: A Social Network Analysis ................................................................................................................................................................................................305

Mengnan Zhao, Christopher C. Yang, Johannes Thrul, and Danielle Ramo

Large Scale Infrastructure for Health Data Analytics ..................................................................................................................................................................................................................................................306

Samantha Crossfield, Owen Johnson, and Thomas Fleming

Medical Diagnostics Reusable Knowledge Components ..................................................................................................................................................................................................................................................307

Morcous Massoud

Developing an Intelligent Cross-Facility-Based Therapeutic Decision Reminder Engine ..................................................................................................................................................................................................................................................308

Cheng-Yi Yang, Ming-Chieh Tsai, Ray-Jade Chen, Yu-Sheng Lo, Lan-Ying Kang, and Chien-Tsai Liu

A Simple, Subscription-Based Clinical Result Notification System ..........................................................................................................................................................................................................................309

Thomas Nahass, Benjamin H. Slovis, Hojjat Salmasian, Gilad Kuperman, and David K. Vawdrey

Organizational Characteristics and Strategic Information Systems Planning: A Study of United States Hospitals ..........................................................................................................................................................................................................................310

Soumya Upadhyay, Deirdre McCaughey, William Opoku-Agyeman, and Darell Burke
A Data Mining Approach on the Structure of Patient Satisfaction in HCAHPS Databases ................................................................. 311

Masumi Okuda, Akira Yasuda, and Shusaku Tsumoto

Development of a Medication Information Generator System for Older Adults ................................................................. 312

Hyunggu Jung and Jiyoun Lee

Mining Nurse Care Data: A Study Case on Pressure Ulcer Prediction ........................................................................ 313

A. Ammar Ghaibeh, Yoko Setoguchi, and Hiroki Moriguchi

Dual Clustering for Clinical Care Construction ................................................................................................. 314

Haruko Iwata, Shusaku Tsumoto, and Shoji Hirano

Poster Paper: Predicting Seizures from Electroencephalography Recordings:
A Knowledge Transfer Strategy .......................................................................................................................... 315

Jian Liang, Rui Lu, Changshui Zhang, and Fei Wang

Comparing SAS® Text Miner, Python, R: Analysis on Random Forest
and SVM Models for Text Mining ................................................................................................................................... 316

Arun Jalanila and Nirmal Subramanian

Efficient Population of Structured Data Forms for Medical Records Using
Syntactic Constraints and Intermediate Text ............................................................................................................. 317

Ronald P. Loui and Ashley Hollinshead

Empathic Virual Assistant for Healthcare Information with Positive Emotional
Experience ....................................................................................................................................................................... 318

Hyo Jin Do and Wai-Tat Fu

Mindbot: A Social-Based Medical Virtual Assistant .......................................................................................................... 319

Ping-Jing Yang and Wai-Tat Fu

SecondLook: Participatory Design Process to Create a Phone App
that Detects Digital Dating Abuse ................................................................................................................................... 320

Tania Roy, Larry F. Hodges, Shaundra Bryant Daily, and Jerome McClendon

Key Challenges to Enabling IT in Healthcare .................................................................................................................. 328

Mike Krey

Medical Text Simplification by Medical Trainees: A Feasibility Study ...................................................................................... 334

Yong K. Choi, Katrin Kirchhoff, and Anne M. Turner

Hand-to-Mouth Motion Tracking in Free-Living Conditions for Improved Weight
Control ............................................................................................................................................................................. 341

Chris Fortuna, Christophe Giraud-Carrier, and Joshua West

Visual Effect on the Odor Identification Ability of Children with Autism
Spectrum Disorder ............................................................................................................................................................... 349

Sayaka Matsumoto, Shohei Horiguchi, Hiroshi Shigeno, and Ken-Ichi Okada

Predicting Adverse Drug Events Using Heterogeneous Event Sequences ............................................................................. 356

Isak Karlsson and Henrik Boström
Evaluation Strategies for Telehealth Implementations ................................................................. 363
Anthony Maeder and Nathan Poulteny

Communication Patterns in a Collaborative Medication Scheduling Task among Older Adults ......................................................................................................................... 367
Thomas G. Kannampallil, Daniel G. Morrow, Wai-Tat Fu, Liza Raquel, and Angela Muriset

Developing Novel Machine Learning Algorithms to Improve Sedentary Assessment for Youth Health Enhancement .......................................................................................................................... 375
Gowtham Kumar Golla, Jordan A. Carlson, Jun Huan, Jacqueline Kerr, Tarrah Mitchell, and Kelsey Borner

Evaluating EHR Data Availability for Cohort Selection in Retrospective Studies ................. 380
Morgan Harrell, Daniel Fabbri, and Mia Levy

Enhance Network Communications in a Cloud-Based Real-Time Health Analytics Platform Using SDN ............................................................................................................................................ 388
Alireza Izaddoost and Carolyn McGregor

Combining Particle Filtering and Transmission Modeling for TB Control ........................................ 392
Rahim Oraji, Vernon H. Hoeppner, Anahita Safarishahrbijari, and Nathaniel D. Osgood

Deep State Space Models for Computational Phenotyping .......................................................... 399
Soumya Ghosh, Yu Cheng, and Zhaonan Sun

A Platform based on Multiple Regression to Estimate the Effect of in-Hospital Events on Total Charges ............................................................................................................................. 403
Dimitrios Zikos and Dhanashri Ostwal

Poster Session 2

An Improved Data Representation for Smoking Detection with Wearable Respiration Sensors ......................................................................................................................................................... 409
Laura Hiatt, Roy J. Adams, and Benjamin M. Marlin

Patient Care Index as an All-Inclusive Predictor of Health Information Technology Performance .............................................................................................................................................. 410
Jacob Krive

Mutiv: Music-based Mobile Application to Support Joggers ......................................................... 411
Sangwook Lee and Hyunggu Jung

Secondary Users and the Personal mHealth Record: Designing Tools to Improve Collaboration Between Patients and Providers ........................................................................................................ 412
Harry D. Tunnell IV, Mark Pfaff, and Anthony Faiola

What’s in the Store? A Review of Arabic Medical and Health Apps in the App Store .......................................................................................................................... 413
Fatema Akbar and Luis Fernandez-Luque
Towards Informal Caregiver Identification in Social Media ..............................................................414

Reda Al-Bahrani, Margaret K. Danilovich, Ankit Agrawal, and Alok Choudhary

Healthcare Assessment Questions Non-invasive Ambient Sensors ......................................................415

Dino Nienhold, Rolf Dornberger, and Safak Korkut

A Multi-featured Approach for Wearable Sensor-Based Human Activity Recognition .................................................................423

Delaram Yazdansepas, Anzah H. Niazi, Jennifer L. Gay, Frederick W. Maier,
Lakshmish Ramaswamy, Khaled Rasheed, and Matthew P. Buman

Visual Health Reminder: A Reminder for Medication Intake and Measuring Blood Pressure to Support Elderly People .................................................................432

René Baranyi, Sascha Rainer, Stefan Schlossarek, Nadja Lederer,
and Thomas Grechenig

Using the CareMap with Health Incidents Statistics for Generating the Realistic Synthetic Electronic Healthcare Record ........................................................................439

Scott McLachlan, Kudakwashe Dube, and Thomas Gallagher

Participatory Design of a Pediatric Virtual Patient Creation Tool .........................................................449

Lauren Cairco Dukes, Nancy Meehan, and Larry F. Hodges

An Accurate Crowdsourcing-Based Adaptive Fall Detection Approach Using Smart Devices .................................................................456

Hsuan-Man Chen, Chi-Kang Chen, Hsin-I Wu, and Ren-Song Tsay

eSeniorCare: Technology for Promoting Well-Being of Older Adults in Independent Living Facilities ........................................................................461

Dipanwita Dasgupta, Kimberly Green Reeves, Beenish Chaudhry,
Mayra Duarte, and Nitesh V. Chawla

Sensor-Based Tracking and Big Data Processing of Patient Activities in Ambient Assisted Living ........................................................................473

Dino Nienhold, Rolf Dornberger, and Safak Korkut

Measuring Stress, Anxiety, and Depression in PTSD Sufferers Using Micro-Movements from Video ........................................................................483

Remington A. Holt, Sarah Jones, and Gloria Washington

An Iterative Dimensionality-Scaling System for Real-Time Health Monitoring Applications ........................................................................488

Haik Kalantarian, Majid Sarrafgzadeh, Shibo Zhang, and Nabil Alshurafa

Should I see a Healthcare Professional or can I perform Self-care: Self-Referral Decision Support for Patients with Low Back Pain ........................................................................495

Wendy Oude Nijeweme–d’Hollosy, Lex van Velsen,
Karin G. M. Groothuis-Oudshoorn, Remko Soer, and Hermie Hermens

Serenity: A Low-Cost and Patient-Guided Mobile Virtual Reality Intervention for Cancer Coping ........................................................................504

Xuan Li, Nina Jolani, Thien-Tien Dao, and Holly Jimison