FIRST IEEE INTERNATIONAL CONFERENCE ON
HEALTHCARE INFORMATICS, IMAGING, AND SYSTEMS
BIOLOGY

26-29 July 2011
San Jose, California, USA

Sponsored By
The IEEE Computer Society Technical Committee on Computational Life Sciences

with support from
Computer Scientist at the National Institute of Standards and Technology and as Chief Scientist at Fujifilm’s San Jose Research Lab. His more recent work has been using probabilistic shape analysis and machine learning for segmentation of deformable structures in 2D and 3D radiological images. Currently, he works with Jonathan as a computer vision consultant at Voxeleron LLC where, in particular, he is applying his extensive experience in radiology to the development of new, more advanced algorithms for OCT.

4:50pm – 5:00pm  Coffee Break 9

5:00pm – 6:00pm    Tutorial 6: Systems Biology

Modeling Autism

Mary Randolph-Gips, University of Houston, USA

This tutorial will start with a whirlwind tour through the scientific research of the biological aspects of autism. Autism is the fastest rising developmental disorder in the world today with US rates rising from 1 in 2500 in 1970 to 1 in 91 today. In the past autism was considered purely a psychological or neurological disorder. There is increasing evidence that it is a highly diverse disease affecting multiple systems of the body such as the metabolic, gastrointestinal, immunological, mitochondrial, and neurological. The presentation will be followed by a freewheeling discussion over the best ways to model autism. Autism appears to result from a combination of genetic and environmental factors. This leads to many interesting questions. How can we incorporate outside environmental factors in a model? How can we model across such different body systems? How do we incorporate knowledge from such diverse scales such as mitochondrial, gastrointestinal and neurological? How can we incorporate the information we do have such as lab and clinical information to inform the model? Since autism is a developmental disorder, how can we model over time and development?

Biographical Notes

Mary Randolph-Gips is an assistant professor of Computer Engineering and Systems Engineering at the University of Houston -Clear Lake. Prior to receiving her Ph.D. in Electrical Engineering from the University of Houston, she was a Space Shuttle Payload Operations flight controller. Her experience with the intricacies of Shuttle operations inspired her interest in other complex systems such as the human body. Dr. Randolph-Gips is also the mother of a child with autism.
We wish to thank the authors of all the submitted papers for their interest in the conference. We also wish to thank the members of the program committee and the auxiliary reviewers who assisted them, for reviewing the papers and providing valuable comments and recommendations to authors. Thanks to Hayit Greenspan and Zeeshan Syed for handling the tutorial sessions and demos, Aidong Zhang for publicizing the conference. Thanks to our technical sponsors, IEEE Computer Society and its Technical Committee on Computational Life Sciences, and American Medical Informatics Association (AMIA). Thanks to our sponsorship chair, Jayashree Kalapathy-Cramer who secured us our funding and our funding sponsors Oregon Health University, and IBM. Thanks to our site sponsor Almaden Research Labs of IBM for hosting the conference and providing a team of people for local event planning and coordination that worked hard to make the conference happen. From IBM, we thank David Beymer who did the local arrangements, banners and advertising, Fei Wang who did website setup and update, and Wendy Fedde for all event planning including negotiating hotel contracts, and event arrangement with local food catering and decoration. Finally, thanks to the registration site team from IEEE and logo designs by Naveed Hashmi.

As the inaugural conference, we hope HISB 2011 will be a successful start of this new field with many such annual conferences to follow in future years. We also hope the conference program with its peer-review sessions, plenaries, tutorials and panels we have assembled will be an exciting and enriching experience that meets your expectations, and we look forward to seeing you in San Jose.

Tanveer Syeda-Mahmood
Xue-wen Chen

HISB 2011 General Co-Chairs

Aziz Boxwala
James S. Duncan
Satoru Miyano

HISB 2011 Program Co-Chairs

3:30pm – 3:40pm    Coffee Break 8

3:40pm – 4:50pm    Tutorial 4: Biomedical Imaging

Image Processing for Optical Coherence Tomography
Jonathan Oakley and Daniel Russakoff, Voxeleron

This tutorial will introduce the physics of OCT together with an overview of its applications. The focus will be on clinical utility, ophthalmology in particular. We will concentrate on graph algorithms as they have emerged as the method of choice in both academia and industry. We will give an overview of how they are implemented and their advantages and disadvantages. Image registration and machine learning will comprise the remainder of our tutorial. To close, we will give some perspective on where the technology is heading in terms of hardware development and newer applications, and how these will affect algorithm developers.

Biographical Notes

Jonathan Oakley has a B.Sc. in Computer Science from the University of York, England, a Masters from the department of Medical Physics at University College, London, and a Ph.D. in medical image processing from the Swiss Federal Institute of Technology. Since then, he has spent over ten years working on image processing algorithm development for KLA-Tencor, Fujifilm and, most recently, Carl Zeiss Meditec Inc., where he worked exclusively in Optical Coherence Tomography. While at Zeiss, he was responsible for motion correction, image registration and various anatomical segmentation algorithms including the Optic Nerve Head as well as retinal layer segmentation algorithms, some of which have generated new scientific findings and consequently new market opportunities for ophthalmic imaging in the neurological domain. In 2010 he and Daniel Russakoff formed Voxeleron LLC.

Daniel Russakoff received an A.B. in geophysics from Harvard University and his Ph.D. in computer science from Stanford. His research interests are in computer vision and pattern recognition in general, and biomedical image analysis in particular. He has authored numerous conference and journal papers and holds several patents on topics ranging from stereo vision to medical image registration. Since he left academia, he has worked as a...
Jaideep Srivastava is Professor of Computer Science & Engineering at the University of Minnesota, where he directs a laboratory focusing on research in Web Mining, Social Media Analytics, and Health Analytics. He has authored over 275 papers, and his research has been supported by government agencies, including NSF, NASA, ARDA, IARPA, NIH, CDC, US Army, US Air Force, and MNDOT; and industries, including IBM, United Technologies, Eaton, Honeywell, Cargill, and Huawei Telecom. He has an active collaboration with Allina’s Center for Healthcare Innovation, where he is a Distinguished Fellow. He is on the oversight committee for healthcare information architecture for the University of Minnesota. Dr. Srivastava has significant experience in the industry, in both consulting and executive roles. He has lead a data mining team at Amazon.com (www.amazon.com), and built a data analytics department at Yodlee (www.yodlee.com). He has provided technology and strategy advice to Cargill, United Technologies, IBM, Honeywell, KPMG, 3M, TCS, and Eaton, and has served as Advisor to the State Government of Minnesota and the Government of India. He holds distinguished professorships at Heilongjiang University and Wuhan University, China. Dr. Srivastava has BS from Indian Institute of Technology (IIT), Kanpur, India, and MS and PhD from University of California, Berkeley. He is a Fellow of the Institute of Electrical and Electronics Engineers (IEEE), and has been an IEEE Distinguished Visitor. He has given over 150 invited talks in over 30 countries, including more than a dozen keynote addresses at major conferences.

Dr. Kuo-Wei Hsu is an Assistant Professor in the Department of Computer Science at the National Chengchi University, Taipei, Taiwan. He is co-organizing a tutorial on Data Mining for Healthcare Management at SIAM International Conference on Data Mining Conference 2011 and PAKDD 2011. He has also presented tutorials on 'Data Mining for Social Network Analysis' at International Conference on Web-Age Information Management (WAIM), 2008 and SIAM International Conference on Data Mining (SDM), 2008. His research interests include ensemble learning, database support for data mining, and data mining applications to tax and healthcare data sets. Before starting his doctoral study, he worked as an Information Engineer at the National Taiwan University Hospital, where he participated in the development of a Health Information System. He received his Ph.D. in Computer Science from University of Minnesota, Twin Cities, USA.

On behalf of IBM, it is my pleasure to welcome you all to the first IEEE International Conference on Healthcare Informatics, Imaging and Systems Biology being held at our Almaden Research Labs in San Jose, California, July 26-29, 2011. By bringing together the communities of healthcare informatics, imaging and systems biology, this conference is taking a bold new leap into this inter-disciplinary field and we are happy to support this effort.

IBM Research has a long history of commitment to research and advances in the field of healthcare going as far back as the 1960s where data management systems for storing electronic health records built by IBM were being considered at top research institutions. Hosting an IEEE International conference at a research facility of IBM is a first for us and is particularly pleasing to have this occur in our centennial year when we are celebrating our many accomplishments.

I hope you will find the conference program both informative and enjoyable and will have a great stay in San Jose. My best wishes for a successful inaugural HISB conference 2011.

Josephine Cheng
Vice President & IBM Fellow
IBM Research - Almaden
Towards Aging-In-Place: Automatic Assessment of Product Usability for Older Adults with Dementia
Babak Taati, Jasper Snoek, Alex Mihailidis, University of Toronto, Canada

1:00pm – 2:00pm  Lunch

2:00pm – 3:30pm  Tutorial 5: Healthcare Informatics
Data mining for healthcare management
Prasanna Desikan, Allina Hospitals & Clinics, Kuo-Wei Hsu, National Chengchi University, Jaideep Srivastava, University of Minnesota

Data Mining for Healthcare Management (DMHM) has been instrumental in detecting patterns of diagnosis, decisions, treatments in healthcare and healthcare quality improvement strategies. This tutorial will help researchers by providing a survey on the research till date, enable the understanding of how data mining can be useful for healthcare management and motivate them to pursue new research in this field. It will also be useful for practitioners from industrial organizations to understand how data mining techniques can help them leverage the potential of large amounts of healthcare data that has been collected.

Biographical Notes
Dr. Prasanna Desikan is currently Senior Research Scientist at Center for Healthcare Innovation, Allina Hospitals and Clinics. Previously he worked at Boston Scientific on their advanced remote patient monitoring system. Prior to that, he worked as a Senior Researcher for Infobionics Inc., where he was actively involved in developing a new database management system based on novel data model called Cellular Data Model. His current research focus is on applying Data mining techniques for healthcare management. He has co-organized a tutorial on Data Mining for Healthcare Management at SDM 2011 and PAKDD 2011 and also successfully co-organized workshop on Data mining for healthcare management at PAKDD 2010, PAKDD 2011.
A Scalable Reference Standard of Visual Similarity for a Content-Based Image Retrieval (CBIR) System  
Jessica Faruque, Daniel Rubin, Chris Beaulieu, Jarrett Rosenberg, Ronald Summers, Aya Kamaya, Grace Tye and Sandy Napel, Stanford University, USA

Consistent Information Content Estimation for Diffusion Tensor MR Images  
Brian Booth and Ghassan Hamarneh, Simon Fraser University, Canada

Acceleration of Point Correlation Function Calculation for Pathology Image  
Lee Cooper, Joel Saltz, Emory University, USA, Umit Catalyurek and Kun Huan, Ohio University, USA

11.20am – 11:40am  Coffee break 7

11:40am – 1:00pm  Oral session 8: Healthcare Informatics: eHealth

Session Chair: Aziz Boxwala, University of California, San Diego

3G Smartphone Technologies for Generating Personal Social Network Contact Distributions and Graphs  
Julian Benavides, Bryan Demianyk, Bob McLeod, Marcia Friesen, Ken Ferens, University of Manitoba, Canada, Shamir Mukhi, CNPHI, Canada

Healthcare Information Networks: Discovery and Evaluation  
Jonathan Lutes, Meeyoung Park, Bo Luo, Xue-wen Chen, University of Kansas, USA

Observational Data and Emotive and Adaptive Computing in eHealth  
Leslie Ball, University of Abertay, Dundee, Scotland

HEALTHCARE INFORMATICS
Michael Ackerman  
Natasha Balac  
Timothy Bickmore  
Olivier Bodenreider  
Cynthia Brandt  
Umit Catalyurek  
Elizabeth Chen  
Bill Cody  
Prasanna Desikan  
Shahram Ebadollahi  
Michael Grasso  
Daniel Gruhl  
Marcelline Harris  
Robert Jenders  
Jayashree Kalpathy-Cramer  
Ronilda Lacson  
Tze Yun Leong  
Fengjun Li  
Shiguo Lian  
Brad Malin  
Daniella Meeker  
Genevieve Melton-Meaux  
Eneida Mendonca  
Omolola Ogunyemi  
Chandan Reddy  
Michal Rosen-Zvi  
Yuval Shahar  
Joe Terdiman  
Adam Wright  
Hua Xu

MEDICAL IMAGING
Sameer Antani  
Nicholas Ayache  
Albert Chung  
Alejandro Frangi  
Guido Gerig  
Ghassan Hamarneh  
Yanxi Liu  
Sandy Napel  
Omaima Nomir  
Nikos Paragios  
Daniel Racoceanu  
Anand Rangarajan  
Linda Shapiro  
Joao Manuel Tavares  
Chris Taylor  
Russ Taylor  
Baba Vemuri  
Pingkun Yan

SYSTEMS BIOLOGY
Benso Alfredo  
Edmund Crampin  
Ernesto Edye  
Wataru Fujibuchi  
Saman Halmamuge  
Samps Hautaniemi  
Lenwood Heath  
Teruyoshi Hishiki  
Tony Hu  
Jun Huan  
Yin-Fu Huang  
Sun Kim  
Ju Han Kim  
Mark Kon  
Henry HS Lu  
See-Kiong Ng  
Laxmi Parida  
Leif Peterson  
Alberto Policriti  
Michal Rosen-Zvi  
Bertil Schmidt  
Tetsuo Shibuya  
Aidong Zhang

PROGRAM COMMITTEE
The conference will be run as a single-track session conference.

All sessions will be held in Auditorium A, IBM Almaden Research Center, 650 Harry Road, San Jose, CA 95120.

Coffee breaks and continental breakfast will be served outside the Auditorium.

Lunch, banquet, and reception will be held in Almaden Research Center Cafetaria Patios.

Registered attendees of the conference are also eligible to participate in the Medical Informatics Day activities at IBM Almaden Research Center in Auditorium B on July 26, 2011.

The technical committee meeting of the IEEE Computer Society Technical Committee on Computational Life Sciences that will select the venue of the next conference will be held in the morning of July 29, 2011.

**CONFERENCE PROGRAM**

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**Friday, July 29**

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<td>8:30am – 9:15am</td>
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<td><em>University of Washington, Seattle, USA, David Fenstermacher, H. Lee Moffitt Cancer Center, USA</em></td>
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<td><strong>A Quantitative Framework for Consent Management in Health Information Exchange Systems</strong></td>
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<td><strong>Concept-based exchange of electronic healthcare records: The LinkEHR approach</strong></td>
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<td><em>Montserrat Robles Viejo, Diego Bosca Tomas, Ernesto Reig Alarez, Luis Marco Ruiz,</em></td>
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<td><em>Universitat Politècnica de València, Spain</em></td>
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<td>10.20am – 11:20am</td>
<td>Oral session 7: Biomedical Imaging: Content-Based Retrieval and Image Analysis</td>
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A Low-cost Real-time Three-dimensional Confocal Fluorescence Endomicroscopy Imaging System

Feng Zhao and Martin Mc Ginnity, University of Ulster, UK

5.15pm – 6:30pm  Panel 2: HISB Industry Panel

Topic: Translating HISB from research to bedside: Challenges faced by the industry

Moderator: Scott Schumacher, Distinguished Engineer, Former Senior VP & Chief Scientist, IBM Initiate Systems, Associate Professor, UCLA

Panelists:
Charles Friedman, Chief Scientific Officer, ONCHIT, Dept. of Health and Human Services
Sangeeta Reddy, Managing Director, Apollo Hospitals, India
John Mattison, Chief Medical Officer, Kaiser Permanente, USA
Sean Zhou, Head of Technology and Research, Siemens Healthcare, USA
Mahendran Maliapen, National University Health System (NUHS), Singapore

6.45pm – 9:30pm  Conference Banquet Dinner & Awards

Tuesday, July 26

8:00am – 6:00pm  Onsite Registration (Main Lobby)

1:00pm – 2:30pm  Tutorial 1: Healthcare Informatics

Image and Text Informatics: Foundations and Clinical Applications
Daniel M. Rubin, M.D., Stanford University

This tutorial provides an overview of the foundational methods and emerging clinical applications in imaging informatics. It will review the major imaging modalities in radiology and the role of imaging data in the context of informing and guiding medical care. The tutorial will describe the key methodologies of imaging informatics while pointing to synergies with the broader biomedical informatics techniques, including knowledge representation and ontologies, semantic image annotation, imaging information models and tools, and computer assisted detection/diagnosis (CAD). We will conclude by describing emerging imaging informatics applications: image similarity, content based image retrieval, semantic image analysis, structured reporting, and decision support of image interpretation. At the conclusion of the tutorial, attendees will have a deeper understanding of the exciting developments driving the imaging informatics field, the use of informatics methods to images, the new algorithms/techniques, and the forthcoming applications that will enable discovery in research and improvement in healthcare quality.

Biographical Notes

Daniel Rubin is Assistant Professor in the Department of Radiology at Stanford University. Work in the lab lies at the intersection of biomedical informatics and imaging science. His NIH-funded research program focuses on developing informatics methods of knowledge representation, natural language processing, and decision support to improve the quality and consistency of radiology practice. Major projects include (1) developing methods to extract information and meaning from images for data mining, (2) developing statistical natural language processing methods to extract and summarize information in radiology reports and published articles, (3) resources to integrate images with related clinical and molecular data to discover novel image biomarkers of disease, and (4) translating these methods
into practice by creating decision support applications that relate radiology findings to diagnoses and that will improve diagnostic accuracy and clinical effectiveness.

2:30pm – 2:40pm   Coffee Break 1

2:40 – 4:10pm     Tutorial 2: Systems Biology

**An Overview of System Biology Research and Techniques**

*Ilya Goldberg, NIH*

The emerging discipline of Systems Biology is concerned with how large collections of interacting proteins act together to affect physiology and biological processes. A brief overview of the tools used to measure and understand these interactions will be presented. The confluence of the two disciplines involves using biological imaging to measure the outcome of these complex interactions as biological processes progress, as well as detect perturbations in physiology when these interactions are manipulated experimentally.

Two example studies will be used to illustrate how imaging can lead to the discovery and measurement of biological processes, how imaging plays a key role in discovering the genes involved in these processes as well as the nature of their genetic interactions.

**Biographical Notes**

Dr. Goldberg received his Ph.D. in Biochemistry and Cell Biology from the Johns Hopkins University School of Medicine in 1996. Following postdoctoral training in crystallography and virology at Harvard University, and image informatics at MIT, he joined the NIA in 2001. While at MIT, he founded the Open Microscopy Environment (OME: http://openmicroscopy.org) together with Drs. Peter Sorger and Jason Swedlow. The aims of OME are to provide open information interchange formats and open-source software infrastructure for the scientific imaging community. Currently, the IICBU continues to develop software and standards for OME, new approaches to pattern recognition in images, and new technology for image-based high throughput screening. All of this technology development drives the central theme of the IICBU: How cell and tissue morphology relate to cellular and organismal state.

**Modern Statistical Methods for Genetic Association Study: Structured Genome-Transcriptome-Phenome Association Analysis**

*Seyoung Kim, Eric Xing, Carnegie Mellon University*

Prof. Kim is an Assistant Professor in the Machine Learning Department in the School of Computer Science at Carnegie Mellon University. Prof. Eric Xing is an Associate Professor in the School of Computer Science at Carnegie Mellon University. They have quickly emerged as the leaders in the development and application of statistical machine learning methods to systems biology problems. A talk version of their tutorial at ISMB 2011 "On Modern Statistical Methods for Genetic Association Study: Structured Genome-Transcriptome-Phenome Association Analysis" will be presented.

3:50pm – 4:10pm   Coffee break 6

4:10pm – 5:10pm   Oral session 5: Biomedical Imaging: Motion Capture & Analysis

**Session Chair: Hayit Greenspan, Tel Aviv University**

**Cephalometric Benchmark Tracing Using Deformable Templates**

*Yuxin Chen, Brian Potetz, Bo Luo, Xue-wen Chen, University of Kansas, USA, and Yunfeng Lin, Sichuan University, China*

**Comparing Shape Tracking, Speckle Tracking, and a Combined Method for Deformation Analysis in Echocardiography**

*Colin Compas, Ben Lin, Smita Sampath, Albert Sinusas and James Duncan, Yale University, USA*
Applying an Instance-specific Model to Longitudinal Clinical Data for Prediction

Emily Watt, Alex Bui, UCLA, USA

Knowledge Discovery and Data Mining of Free Text Radiology Reports

Malika Mahoui, Indiana University-Purdue University, USA, Jeff Friedlin, Regenstrief Institute, Germany, Josette Jones, Indiana University-Purdue University, USA, Patrick Jamieson, Logical Semantics, USA

Comparison of Semantic Similarity Measures for Application Specific Ontology Pruning

Wei-Nchih Lee, Will Bridewell, Amar Das, Stanford University, USA

A Computational Framework for Search, Discovery, and Trending of Patient Health in Radiology Reports

Robert Patton, Carlos Rojas, Barbara Beckerman, Thomas Potok, Oak Ridge National Laboratory, USA

1:00pm – 2:00pm Lunch

2:00pm – 3:50pm Invited Speaker Session: Systems Biology
Session Chair: Xue-wen Chen, University of Kansas

Computational methods for functional genomics and pharmacogenomics

Russ Altman, Stanford University

Prof. Altman is the Chairman, Department of Bioengineering Director, Biomedical Informatics Training Program at Stanford University. He is interested in the application of computational technologies to problems in molecular biology of relevance to medicine. In particular, his laboratory focuses on (a) building structured information repositories to support biological research including the creation of a comprehensive pharmacogenomics knowledge base (http://www.pharmgkb.org/), (b) elucidation and analysis of three

4:10pm – 4:20pm Coffee Break 2

4:20 – 6:00pm Tutorial 3: Biomedical Imaging

Large-Scale, High-throughput, Microscopic Imaging and Analysis

Hanchuan Peng, Howard Hughes Medical Institute

With the development of advanced microscopic imaging and molecular labeling techniques, the number of biological images acquired in digital forms is growing explosively. Large-scale bioimage databases are becoming available. Analyzing and visualizing these images has been proven critical for biologists to seek answers to many biological problems. This tutorial reviews recent advances of bioimage analysis and visualization, major challenges and some significant case studies in cell biology, gene expression analysis, neuroscience, etc. It will also briefly discuss some high-performance bioimage visualization and analysis tools.

Biographical Notes

Dr. Hanchuan Peng is currently a senior computer scientist and the head of a computational bioimage analysis lab at Janelia Farm Research Campus, Howard Hughes Medical Institute. He was previously with Lawrence Berkeley National Laboratory, UC Berkeley, on computational biology, bioinformatics, and high-performance data mining, and Johns Hopkins University Medical School on human brain imaging and analysis. Dr. Peng is interested in bioimage analysis and large-scale informatics, as well as computational biology. His recent work has been focusing on building single-neuron whole-brain level 3D digital atlases for animals including fruit fly and C. elegans, and V3D, which is a high-performance visualization-assisted analysis system for large 3D+ biological and biomedical- image data sets. He is also the inventor of the minimum-redundant maximum-relevance (mRMR) feature selection algorithm. Dr. Peng is an organizer of some recent international meetings on microscopic image analysis and informatics, e.g. 2005 (Stanford), 2006 (Santa Barbara) and 2009 (Janelia Farm) Bioimage Informatics Conferences, 2010 Turning-Images-to-Knowledge Conference (Janelia Farm), 2008 and 2010 Computer Vision for Neurosciences meetings, 2010 Hackathon on 3D Image Visualization and Analysis, etc.
Progress in Biomedical Imaging and its Impact on Healthcare

Eric Grimson, Professor, Medical Engineering, and Chancellor, MIT

Eric Grimson has recently been appointed the Chancellor at Massachusetts Institute of Technology. He is a Professor of Computer Science and Engineering at MIT, and holds the Bernard Gordon Chair of Medical Engineering. He also holds a joint appointment as a Lecturer on Radiology at Harvard Medical School and at Brigham and Women’s Hospital. Prof. Grimson has previously served as the Education Officer for the Dept. of Electrical Engineering and Computer Science at MIT, and as Associate Department Head. Since 2005, he has been serving as the Head of the Department of Electrical Engineering and Computer Science. He received a B.Sc. (High Honors) in Mathematics and Physics from the University of Regina in 1975 and a Ph.D. in Mathematics from MIT in 1980. Prof. Grimson is a member of MIT’s Computer Science and Artificial Intelligence Laboratory, and his group has pioneered state of the art systems for activity and behavior recognition, object and person recognition, image database indexing, image guided surgery, site modeling and many other areas of computer vision. Prof. Grimson is a Fellow of the Association for the Advancement of Artificial Intelligence (AAAI), a Fellow of the IEEE, and was awarded the Bose Award for Excellence in Teaching in the School of Engineering at MIT.

Symposium of the American Medical Informatics Association. He currently serves as Associate Editor of the Journal of the American Medical Informatics Association.

10:00am – 11:20am Oral session 3: Systems Biology
Session Chair: Seyoung Kim, Carnegie Mellon University

A systems biology approach for detecting toxicity-related hotspots inside protein interaction networks
Kauschal Desai, Drexel University, USA, David Brott, Astrazeneca Pharmaceuticals, USA, Tony Hu, Drexel University, USA, and Anastasia Christianson, Astrazeneca Pharmaceuticals

Sequence-Based Enzyme Catalytic Domain Prediction Using Clustering and Aggregated Mutual Information Content
Sun Kim, Indiana University, USA, and Kwangmin Choi, Cincinnati Children’s Hospital Medical Center, USA

Quantitative modeling the Saccharomyces cerevisiae FLR1 Regulatory Network using an S-System Formalism
Dulce Calçada, Susana Vinga, Ana Freitas, and Arlindo Oliveira, Instituto de Engenharia de Sistemas e Computadores Investigação e Desenvolvimento em Lisboa, INESC-ID, Portugal

Subtyping of Leukemia with Gene Expression Analysis Using Compressive Sensing Method
Yu-Ping Wang, Tulane University, USA
Thursday, July 28

8:00am – 6:00pm   Registration Open (Main Lobby)
7:45am – 8:30am  Continental breakfast
8:30am – 10:00am Plenary Session 3 – Healthcare Informatics

The Vision of a National ‘Learning Health System’

Charles Friedman, Chief Scientific Officer, Office of the National Coordinator for Health IT, U.S. Dept of Health and Human Services

Charles P. Friedman, PhD. is currently the Chief Scientific Officer for the Office of the National Coordinator for Health Information Technology (ONC) in the U.S. Department of Health and Human Services. As ONC’s chief scientist, he leads a group responsible for tracking and promoting innovation in health IT, for research programs to improve technology, for applications of health IT that support basic and clinical research, for evaluation of all of ONC’s programs, for programs to develop the health IT workforce, and for activities supporting global eHealth. Prior to joining ONC, Dr. Friedman was Associate Director of the National Heart, Lung, and Blood Institute of the National Institutes of Health. Dr. Friedman first joined NIH in 2003, as a Senior Scholar at the National Library of Medicine. From 1996 to 2003, Dr. Friedman was Professor and Associate Vice Chancellor for Biomedical Informatics at the University of Pittsburgh. He also served as Chief Information Officer for the University of Pittsburgh Schools of the Health Sciences. Dr. Friedman obtained bachelor’s and master’s degrees in physics from the Massachusetts Institute of Technology and also received a PhD in education from the University of North Carolina (UNC). He spent over 19 years on the medical school faculty at UNC and served as Assistant Dean for Medical Education and Informatics. In 1985, he established the Laboratory for Computing and Cognition at UNC and, in 1992, started UNC’s medical informatics training program. Dr. Friedman has written extensively for scientific journals, and authored a well-known textbook. He is a past president of the American College of Medical Informatics, and was the 2005 chair of the Annual

10:00am – 11:20am Oral session 1: Healthcare Informatics: Tele-health & Signal Analysis
Session Chair: Daniel Rubin, M.D., Stanford University

Salient Segmentation of Medical Time Series Signals
Jonathan Woodbridge, Majid Sarrafzadeh, Alex Bui, Mars Lan, UCLA, USA

Fast classification of electrocardiograph signals via Instance Selection
Krisztian Buza, Alexandros Nanopoulos, Lars Schmidt-Thieme, University of Hildesheim, Germany, Julia Koller, Semmelweis University, Hungary

A Prototype of Wireless Electrocardiogram Biofeedback Platform and Its Preliminary Evaluation on HRV Alteration in Cognitive Unconscious Status
Wanqing Wu, Jungtae Lee, Pusan National University, South Korea

A Smart Bed Sheet based on Large-Scale Fabric Pressure Sensor for Sleeping Position Monitoring
Fang Gong, Wenyao Xu, Majid Sarrafzadeh, Lei He, UCLA, USA

11:20am – 11:40am Coffee break 3

11:40am – 1:00pm Poster Session (All tracks)

Healthcare Informatics

1. Developing a Systems and Informatics based approach to Lifestyle Monitoring within eHealth: Part II - Analysis & Interpretation
David Bradley, University of Abertay Dundee, Scotland, Simon Brownsell, Mark Hawley, Fabien Cardineux, University of Sheffield, UK

2. A Case-based Retrieval System using Natural Language Processing and Population-based Visualization
William Hsu, Ricky Taira, Fernando Vinuela, Alex Bui, UCLA, USA
3. Data Mining Session-Based Patient Reported Outcomes (PROs) in a Mental Health Setting: Toward Data-Driven Clinical Decision Support and Personalized Treatment
Casey Bennett, Thomas Doub, April Bragg, Jason Luellen, Christina Van Regenmorter, Jennifer Lockman, Randall Reiserer, Centerstone Research Institute, USA

4. Dependency Parsing for Extracting Family History
Neal Lewis, Hui Yang, San Francisco State University, USA, Daniel Gruhl, IBM Almaden Research, USA

5. Decision Support for Early Intervention through Gas Exchange Ventilation-Perfusion Analysis
Burton Clark, Justin Clark, University of Utah, USA

6. Application of Semantic Web Services for Mobile Telemedicine Service Discovery
Tara Raafat, Franjo Cecelja, University of Surrey, UK

7. Mining electronic medical records to explore the linkage between healthcare resource utilization and disease severity in diabetic patients
Noah Lee, Columbia University, USA, Jianying Hu, Fei Wang, Jimeng Sun, Shahram Ebadollahi, IBM TJ Watson Research Center, USA, Andrew Laine, Columbia University, USA

8. Grid-based Interactive Diabetes System
Fawaz AL Hazemi, Korea Advanced Institute of Science & Technology, South Korea

Biomedical Imaging

9. Objective Functional Capacity Assessment Using Inertial Sensor
Fazel Naghdy, David Stirling, Golshah Naghdy, Matthew Field and Rismawaty Arunlabi, University of Wollongong, Australia

Panelists:
Andrew Fire, Nobel Laureate, School of Medicine, Stanford University
Eric Grimson, Professor, Medical Engineering & Chancellor, MIT
Joe Terdiman, Director of Healthcare Information Technology, Kaiser Division of Research, Oakland
B.S. Manjunath, Director, Center for Bio-image Informatics, University of California, Santa Barbara

6.45pm – 8:30pm Welcome Reception
3:50pm – 5:10pm  Oral session 2: Biomedical Imaging: Segmentation & Classification
Session Chair: B.S. Manjunath, University of California, Santa Barbara

Spinal Cord Segmentation for Volume Estimation in Healthy and Multiple Sclerosis Subjects using Crawlers and Minimal Paths
Chris McIntosh, Ghassan Hamarneh, Matthew Toom, Simon Fraser University, Canada, and Roger Tom, University of British Columbia, Canada

Multiphase Level Set Model With Local K-means Energy For Histology Image Segmentation
Lei He, Rodney Long, Sameer Antani, and George Thoma, National Library of Medicine, NIH, USA

Unsupervised Grow-Cut: Cellular Automata-based Medical Image Segmentation
Payel Ghosh, Sameer K. Antani, L. Rodney Long, and George R. Thoma, National Library of Medicine, NIH, USA

Cervical Cancer Classification Using Gabor Filter
Rahmadwati Rahmadwati, Golshah Naghdy, Montse Ros, University of Wollongong, Australia, Catherine Todd, University of Wollongong, Dubai, and Eviana Norahmawati, brawijaya university, Indonesia

5.15pm – 6:30pm  Panel 1: HISB Research Panel

Topic: Finding common ground in HISB: What are the key research advances needed?

Moderator: Wendy Chapman, Chair, AMIA Natural Language Processing Working Group, Associate Professor, University of California, San Diego, USA

10. A Parallel Deconvolution Algorithm in Perfusion Imaging
Fan Zhu, David Rodriguez, Trevor Carpenter and Malcolm Atkinson, University of Edinburgh, UK

11. Detection of gait abnormalities in Sprague-Dawley rats after 6-hydroxydopamine injection and the experiment efficient design
Yu-Ping Wang, Tulane University, USA

12. Robust Segmentation and Tracking of Generic Shapes of Neuro-Stem Cells
Ishwar Kulkarni, Uddipan Mukherjee, Gopi Meenakashiundaram, Brian Cimmungs and Chris Sontag, University of California, Irvine, USA

13. 3D Alignment and Change Detection from Uncalibrated Eye Images
Sujit Kuthirummal, Mayank Bansal, Harpreet Sawhney, Jayakrishnan Eledath, Stanford Research Institute (SRI), USA, Richard Stone and Denise Pearson, University of Pennsylvania, USA

14. Human Embryonic Stem Cell Detection by Spatial Information and Mixture of Gaussians
Benjamin Guan, Bir Bhanu, Ninad Thakoor, Prudence Talbot and Sabrina Lin, University of California, Riverside, USA

15. Learning-based vessel segmentation in mammographic images
Erkang Cheng, Shawn McLaughlin, Vassileios Megalooikonomou, Temple University, USA, Predrag Bakic, Andrew Maidment, University of Pennsylvania, USA, and Haibin Ling, Temple University, USA

16. Feature Selection Guided by Perception in Medical CBIR systems
Pedro Bugatti, Marcela Ribeiro, Agma Traina and Caetano Traina, Jr., University of Sao Paulo, Brazil
17. Principal Curved Based Retinal Vessel Segmentation Towards Diagnosis of Retinal Diseases
Sheng You, Deniz Erdogmus, Erhan Bas, Northeastern University, USA, and Jayashree Kalpathy-Cramer, Oregon Health State University, USA

18. Organ Labeling Using Anatomical Model-driven Global Optimization
Xiaofeng Liu, GE Global Research Center, USA, Qi Song, University of Iowa, USA, Paulo MenDonca, Xiaodong Tao and Rahul Bhotika, Global Research Center, USA

19. On the Feasibility of Predicting Radiological Observations from Computational Imaging Features of Liver Lesions in CT scans
Francisco Gimenez, Jiajing Xu, Yi Liu, Tiffany Liu, Chris Beaulieu, Daniel Rubin and Sandy Napel, Stanford University, USA

Systems Biology

20. A Querying Method with Feedback Mechanism for Protein Interaction Network
Jiang Xie, Shihua Zhang, Tieqiao Wen, Shu Yu, Zhili Gu, and Wu Zhang, Shanghai University, China

21. Autism: A Systems Biology Disease
Mary Randolph-Gips, University of Houston, Texas, USA

22. Programmable models of growth and mutation of cancer-cell populations
Alberto Policriti, University of Udine, Italy, and Luca Bortolussi, University of Trieste, Italy

2:00pm – 3:30pm Plenary Session 2: Systems Biology
Sequence-based tracking of biological responses to foreign information
Andrew Fire, Nobel Laureate, Stanford University

Andrew Zachary Fire is an American biologist and professor of pathology and of genetics at the Stanford University School of Medicine. He was awarded the 2006 Nobel Prize for Physiology or Medicine, along with Craig C. Mello, for the discovery of RNA interference (RNAi). Andrew Fire was born in Palo Alto, California and raised in Sunnyvale, California. He graduated from Fremont High School. He attended the University of California, Berkeley, where he received a B.A. in mathematics in 1978 at the age of 19. He then proceeded to the Massachusetts Institute of Technology, where he received a Ph.D. in biology in 1983 under the mentorship of Nobel laureate geneticist Phillip Sharp. Fire moved to Cambridge, England, as a Helen Hay Whitney Postdoctoral Fellow. He became a member of the MRC Laboratory of Molecular Biology group headed by Nobel laureate biologist Sydney Brenner. From 1986 to 2003, Fire was a staff member of the Carnegie Institution of Washington's Department of Embryology in Baltimore, Maryland. The initial work on double stranded RNA as a trigger of gene silencing was published while Fire and his group were at the Carnegie Labs. Fire became an adjunct professor in the Department of Biology at Johns Hopkins University in 1989 and joined the Stanford faculty in 2003. Throughout his career, Fire has been supported by research grants from the U.S. National Institutes of Health. Fire is a member of the National Academy of Sciences and the American Academy of Arts and Sciences. He also serves on the Board of Scientific Counselors and the National Center for Biotechnology, National Institutes of Health.

3:30pm – 3:50pm Coffee break 4

1:00pm – 2:00pm Lunch