

# IJCAI'16 BOOM Workshop Program (07/09/2016, Full Day)

8:30 am - 8:40 am **Opening Ceremony**

8:40 am - 9:20 am **Invited Talk 1: Prof. Chen Wang (Mayo Clinic)**

Title: "Mining big matrices to address big clinical questions - translational bioinformatics research in ovarian cancer"

9:20 am - 10:00 am **Invited Talk 2: Prof. Aidong Zhang (NSF / SUNY Buffalo)**

Title: "Machine Learning and Risk Factor Analysis for Health"

10:00 am - 10:15 am **Oral Presentation I:** Stochastic Convex Sparse Principal Component Analysis

Presented by: Inci M. Baytas, Michigan State University

10:15 am - 10:30 am **Oral Presentation II:** On the Organization and Retrieval of Health QA Records for Community-based Health Services

Presented by: Prof. Yangqiu Song, Hong Kong University of Science and Technology

10:30 am - 11:00 am **Coffee Break A**

11:00 am - 11:40 am **Invited Talk 3: Prof. Fei Wang (Cornell University)**

Title: "Integrative Network Analytics for Insights Generation from Complex Healthcare Data"

11:40 am - 11:55 am **Oral Presentation III:** Complex Temporal Topic Evolution Modelling Using the Kullback-Leibler Divergence and the Bhattacharyya Distance

Presented by: Dr. Ognjen Arandjelović, University of St Andrews, UK

11:55 am - 12:10 am **Oral Presentation IV:** Detecting Visually Observable Disease Symptoms from Faces

Presented by: Prof. Jiebo Luo, University of Rochester

12:10 am - 12:30 am **Spotlight Presentations:** 10 accepted **short abstracts**, 2 minutes each

12:30 pm - 1:50 pm **Lunch Break** (on yourself)

1:50 pm - 2:30 pm **Invited Talk 4: Prof. Ji Liu (University of Rochester)**

Title: "Asynchronous parallel optimization"

2:30 pm - 2:45 pm **Oral Presentation V:** Enhancing protein interacting residue prediction with integrated contact matrix prediction

Presented by: Prof. Li Liao, University of Delaware

2:45 pm - 3:30 pm **Invited Talk 5: Prof. Jiebo Luo (University of Rochester)**

Title: "Exploring the Healing Power of Big Image Data"

3:30 pm - 4:30 pm **Coffee Break B & Poster Session**

4:30 pm - 5:30 pm **Panel Discussion:** Bringing the Power of Big Data and Machine Learning to Biomedical Informatics

Panel Host: Prof. Aidong Zhang

5:30 pm - 5:50 pm **Best Paper Award Ceremony & Closing Session**

### **Invited Talk 1**

Title: "Mining big matrices to address big clinical questions - translational bioinformatics research in ovarian cancer"

#### **Abstract:**

With quickly evolving biotechnologies, high-throughput microarray and sequencing-based measurements provide unprecedented opportunities for biological and clinical research. However, considerable challenges remain in fully extracting information from data and making clinically relevant interpretations, due to complexity of human diseases and lack of context-specific bioinformatics approaches. This presentation reflects my engineering perspectives in bioinformatics, and summarizes my efforts aiming to bridge gaps between data-mining and clinical research. The talk will be focusing on my bioinformatics data mining works in identifying molecular subtypes of ovarian cancer, from transcriptional to methylation data, and from serous histology to all the remaining histological types of ovarian cancer. Some identified molecular subtypes are not only predictive of prognosis but also relevant to therapeutic potentials. I will also share with audiences my opinions on problem formulation, and call for potential collaborations.

#### **Bio:**

Dr. Chen Wang is currently an Assistant Professor of biomedical informatics, and an Associate Consultant within the Division of Biomedical Statistics and Informatics at Mayo Clinic. He also holds a joint appointment of Associate Consultant in the Department of Obstetrics and Gynaecology at Mayo Clinic since 2015. Dr. Wang graduated with a PhD degree in Electrical Engineering from Virginia Polytechnic Institute and State University. He also holds master and bachelor degrees, both in electrical engineering and information science from the University of Science and Technology of China. Dr. Wang has been the principal investigator of one pilot study, and one career enhancement award from ovarian SPORE at Mayo Clinic. He also serves as bioinformatics co-investigators for several NIH- and DOD-funded grants focusing on breast and ovarian cancer studies. As a bioinformatician experienced in statistics and machine learning techniques, Dr. Wang's area of research has been in applying and developing bioinformatics tools to address biological and clinical questions. Dr. Wang also currently serves as Associate Director of Bioinformatics in clinical genomic

sequencing laboratory in Department of Laboratory Medicine Pathology of Mayo Clinic, focusing on developing critical sequencing-based bioinformatics methods for clinical genetics tests.

## **Invited Talk 2**

Title: "Machine Learning and Risk Factor Analysis for Health"

Abstract:

The overwhelming amount of patients health data collected through internet provide valuable sources for exploratory analysis to assist clinical decision-making and further medical research. In recent years, many machine learning approaches have been utilized to mine potentially meaningful information from the massive patient health data. In this talk, I will demonstrate how machine learning approaches, deep learning in particular, can be used to conduct disease risk prediction and informative risk factor selection. I will focus on osteoporosis and bone fracture diseases. Both osteoporosis and bone fracture are complicated bone diseases which are associated with potential risk factors that include but are not limited to the information of demographic attributes, patients' clinical records regarding disease diagnoses and treatments, family history, diet, and lifestyle. I will show how the deep learning approach can be used to learn integrated risk features for predicting the bone diseases and to select the most influential risk factors that cause the disease progression. With the success of both tasks, we can avoid unnecessary tests, reduce the cost of public health care, and change modifiable risk factors for disease control or prevention.

Bio:

Dr. Aidong Zhang is currently on leave from State University of New York (SUNY) at Buffalo and serving as a program director in the Information & Intelligent Systems division of the Directorate for Computer & Information Science & Engineering, National Science Foundation (NSF). Dr. Zhang is a SUNY Distinguished Professor of Computer Science and Engineering at SUNY-Buffalo. Her research interests include data mining, bioinformatics, health Informatics, multimedia and database systems, and content-based image retrieval. She is an author of over 280 research publications in these areas. She has chaired or served on over 150 program committees of international conferences and workshops, and currently serves on several journal editorial boards. She has published two books "Protein Interaction Networks: Computational Analysis" (Cambridge University Press, 2009) and "Advanced Analysis of Gene Expression Microarray Data" (World Scientific Publishing Co., Inc. 2006). Dr. Zhang is a recipient of the NSF CAREER award and State University of New York (SUNY) Chancellor's Research Recognition award. Dr. Zhang is an IEEE Fellow.

## **Invited Talk 3**

Title: "Integrative Network Analytics for Insights Generation from Complex Healthcare Data"

Abstract:

The arrival of the Precision Medicine age brings tremendous opportunities to scientific discovery and quality improvement in medicine and healthcare. However, it also raises big challenges in dealing with large and massive healthcare data from heterogeneous sources. In this talk, I will present a computational framework called integrative network analytics to generate insights from complex

healthcare data including Electronic Health Records (EHR), drug development data, genomic data, etc. I will also demonstrate how such framework can be used in computational drug discovery and personalized treatment recommendation.

Bio:

Dr. Fei Wang is an Assistant Professor in Division of Health Informatics, Department of Healthcare Policy and Research, Cornell University. His major research interest is data analytics and its applications in health informatics. He has published more than 150 papers on top data mining and medical informatics venues. His papers have received over 3,300 citations so far. He won best student paper for ICDM 2015, best research paper nomination for ICDM 2010, Marco Romani Best paper nomination in AMIA TBI 2014, and his paper was selected into the best paper finalist in SDM 2011 and 2015. Dr. Wang is the vice chair of the KDD working group in AMIA.

#### **Invited Talk 4**

Title: "Asynchronous parallel optimization"

Abstract:

The asynchronous parallelism opens a new door to address big data involved computation, mining, optimization, and analytics. In comparison to synchronous parallelism, the asynchronous fashion substantially reduces the system overhead and maximizes the efficiency on the system level. Recently, the asynchronous parallelism has been successfully applied to deep learning, recommendation system, NLP, high performance computing, and many other areas, usually improving the computational efficiency 1-2 order magnitude over the traditional synchronous parallel algorithms. This talk will introduce several recent work about the asynchronous parallel algorithms from theory foundations to application, including convergence, speedup properties, and applications in solving deep learning, large linear systems, SVM, LASSO, linear programming, etc.

Bio:

Dr. Ji Liu is currently an assistant professor in Computer Science and Goergen Institute for Data Science at University of Rochester (UR). He received his Ph.D., Masters, and B.S. degrees from University of Wisconsin-Madison, Arizona State University, and University of Science and Technology of China respectively. His research interests cover a broad scope of machine learning, optimization, and their applications in other areas such as healthcare, bioinformatics, computer vision, and many other data analysis involved areas. His recent research focus is on asynchronous parallel optimization, sparse learning (compressed sensing) theory and algorithm, structural model estimation, online learning, abnormal event detection, feature / pattern extraction, etc. He created the machine learning and optimization group at UR. He won the award of Best Paper honorable mention at SIGKDD 2010 and the award of Best Student Paper award at UAI 2015. He published 40+ papers in the past 6 years in top journals and conferences including JMLR, SIOPT, TPAMI, TKDD, NIPS, ICML, UAI, SIGKDD, ICCV, CVPR, ECCV, AAAI, IJCAI, ACM MM, etc. His homepage is: <http://www.cs.rochester.edu/u/jliu/index.html> .

#### **Invited Talk 5**

Title: "Exploring the Healing Power of Big Image Data"

**Abstract:**

We live in the age of big data. The biggest big data is big visual data, which includes images and other associated information. The biggest challenge is to develop effective computational methods for making sense of such massive visual data. Unlike text which is clean, segmented, compact, one dimensional and indexable, visual content is noisy, unsegmented, high entropy and multidimensional. In this talk, we present a few recent advances in exploring big image related data for healthcare and wellness, including automated detection of Autism spectrum disorder (ASD) from scanned unstructured text, mental health monitoring using ubiquitous computing, as well as driving behavior changes for diabetes, eating disorder, drinking, and drug uses through social media.

**Bio:**

Dr. Jiebo Luo joined the University of Rochester (UR) in Fall 2011 after a prolific career of over fifteen years at Kodak Research Laboratories. He has been involved in numerous technical conferences, including serving as the program chair of ACM Multimedia 2010 and IEEE CVPR 2012, and the founding chair of the ACM SIGMM Workshop on Social Media. He has served on the editorial boards of the IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), IEEE Transactions on Multimedia (TMM), IEEE Transactions on Circuits and Systems for Video Technology (TCSVT), Pattern Recognition, ACM Transactions on Intelligent Systems and Technology (TIST), Machine Vision and Applications (MVA), and Journal of Electronic Imaging. He is a Fellow of the SPIE, IEEE, and IAPR. He is a Data Science CoE Distinguished Researcher at the Georgen Institute for Data Science at UR.