Expanding the Boundaries of Health Informatics using AI (HIAI'16): Making Proactive, Personalized, and Participatory Medicine A Reality

Saturday February 13th 2016
Phoenix, AZ USA

9:00am - 10:30am
Invited Talk: Dr. Niels Peek
"Analytical Challenges for Smarter Health Systems"

Health systems worldwide are under pressure to deliver better care for more people from fewer resources. The global economic crisis has shrunk the resources available for healthcare but the growth in demand for care services continues unabated. There is an opportunity to create smarter, "learning" health systems by utilizing the information infrastructure provided by electronic health records (EHR) systems. For instance, the data that is collected through this infrastructure can be used to develop predictive models for risk stratification and to compare the effectiveness of different treatments in real-world populations. Moreover, EHR systems can be used as a delivery platform to give feedback and advice to clinicians at the point of care. However, there are many challenges that need to be tackled before we can actually realise this vision. The data that are routinely collected in EHRs are a by-product of healthcare: Making sense of these data requires new tools that reach beyond traditional analytical concepts. Furthermore, clinical computerised decision support systems have mostly led to "alert fatigue" rather than improving care. In this presentation I will describe the current state of the art in this field, and address existing scientific, analytic and engineering challenges.

10:30am - 11:00am
Coffee Break

11:00am - 12:40pm (25 minutes per paper, 20 minute presentation and 5 minute questions)
Session 1: Learning and Prediction
1. A novel method for mining semantics from patterns over electrocardiogram data
   Zhen Qiu, Feifei Li, Hongyan Li and Shenda Hong
2. Adaptive ensemble learning with confidence bounds for personalized diagnosis
   Cem Tekin, Jinsung Yoon and Mihaela van der Schaar
3. Predictive Analytics Using Smartphone Sensors for Depressive Episodes
   Diego Klabjan, Taeheon Jeong and Justin Starren
4. Predicting 30-Day Risk and Cost of "All-Cause" Hospital Readmissions
12:40pm - 2:00pm
Lunch (on your own; no sponsored lunch provided)

2:00pm - 3:30pm
Invited Talk: Dr. John H. Holmes
"Data Driven Clinical Research: If Only It Were So Simple"

The availability of ever-increasing amounts of highly heterogeneous clinical data poses both opportunities and challenges for the data scientist and clinical researcher. Electronic medical records are more prevalent than ever, and now we see that other data sources contribute greatly to the clinical research enterprise. These sources provide genetic, image, and environmental data, just to name three. Now, it is possible to investigate the effects of built environment, such as the availability of food markets, sidewalks, and playgrounds, coupled with clinical observations noted in the process of providing patient care, along with identified genetic variants that could predispose one to diabetes mellitus. Furthermore, these data could be used in a truly integrated sense to manage such patients more effectively than relying solely on the traditional medical record. The opportunity for enhanced clinical research is manifested in this expanding data and information ecosystem. The challenges are more subtly detected, but present nonetheless. Merging these heterogeneous data into an analyzable whole depends on the availability of a robust unique identifier that has yet to be created, at least in the US. As a result, researchers have developed various probabilistic methods of record matching, occasionally at the expense of data privacy and confidentiality. Another challenge is the sheer heterogeneity of the data; it is not easy to understand the clinical context of an image or waveform without their semantic integration with clinical observation data. In addition, there is the problem of ecologic fallacy, which arises from using data that have no real connection to a clinical record in the service of proposing or testing hypotheses. This problem is quite evident when coupling environmental and clinical data: just because there is a well-stocked market with a surfeit of inexpensive, healthy food options in a person’s neighborhood doesn’t mean that that person avails herself of these items. Finally, there is the problem of data quality. Much of the data we use - whether collected by us or obtained from another source - is replete with problem, such as missingness, contradictions, and errors in representation. In this talk, we will explore in detail many of the opportunities and challenges posed to clinical researchers as they are faced with these seemingly endless sources of data.
3:30pm - 4:00pm
Coffee Break

4:00pm - 4:50pm (25 minutes per paper, 20 minute presentation and 5 minute questions)
Session 2: Information Integration
1. Combining Multiple Concurrent Physiological Streams to Assessing Patients Condition
   Shenda Hong, Hongyan Li and Zhen Qiu
2. Simultaneous Influencing and Mapping Social Networks
   Leandro Soriano Marcolino, Amulya Yadav, Aravind Srinivas
   Lakshminarayanan and Milind Tambe

4:50pm - 5:00pm
Closing remarks