The AAAI 2017 Spring Symposium on
Wellbeing AI: From Machine Learning to Subjectivity Oriented Computing
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Wellbeing AI Invited Speaker Abstracts

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Abstract

This paper contains the invited speaker abstracts from the Wellbeing AI: From Machine Learning to Subjectivity Oriented Computing 2017 AAAI Spring Symposium held at Stanford University, March 27–29.

Social Regulation of Human Gene Expression

Steve W. Cole (UCLA School of Medicine)

This talk will overview a burgeoning research literature in human social genomics, which analyzes how everyday life circumstances influence the activity of the human genome. Diverse forms of social adversity have been found to evoke a common gene expression program known as the "conserved transcriptional response to adversity" (CTRA). The CTRA involves increased expression of pro-inflammatory genes and decreased expression of genes related to innate antiviral responses and antibody synthesis. Research has also begun to analyze the functional genomics of optimal health and thriving, and identify which positive social and psychological processes might inhibit CTRA gene expression and its downstream impact on disease risk. These developments create the opportunity for near-real-time genomic biofeedback that can help individuals empirically optimize their own molecular well-being over time within the context of their own unique genetic, developmental, and socio-environmental background. Intra-individual experiments in lifestyle modification can be continuously evaluated on their molecular impact and thereby help individuals optimize their own innate human genomic potential for thriving.

The Challenges for Machine Learning and Subjective Computing in Well-being AI

Takashi Kido (Preferred Networks)
Kenta Oono (Preferred Networks)
Melanie Swan (MS Futures Group)

In this AAAI Spring symposium 2017, we present "well-being AI" as an AI research paradigm for promoting psychological well-being and maximizing human potential. The goals of well-being AI are (1) to understand how our digital experience affects our health and our quality of life and (2) to design well-being systems that put humans at the center. The important challenges of this research are how to quantify subjective things such as happiness, personal impressions, and personal values, and how to transform them into scientific representations with corresponding computational methods. We have been studying a personal genome information agent named MyFinder, in which software agents monitor our daily behaviors, such as diet, sleep, working style, time management, social interactions and find the associations between our genetic profiles and phenotypes. In this presentation, we introduce our past citizen science projects on cognitive performance genomics and discuss the important and challenging problems in machine learning and subjective computing in well-being AI.

Evaluation of Care Skills Using First Person Video (FPV)

Atsushi Nakazawa, Yusuke Okino, Toyoaki Nishida (Kyoto University), *Miwako Honda* (Tokyo Medical Center), *Shogo Ishikawa, Yoichi Takebayashi* (Shizuoka University)

Due to the advancement of population aging society, the number of the patients with dementia is growing and the care for these patients becomes a serious problem. There-

fore, learning better care skills for dementia is important for professional and family caregivers.

With this study, we develop a wearable system consisting of a first person camera and an accelerometer for the purpose to obtain the important information to evaluate the care skill for dementia, namely 1) the occurrence of eye contact, 2) distance between the caregiver and receiver and 3) caregiver's head position and pose.

The eye contact is detected by using a first person video while the care. Here, we use a machine learning method using head orientation and eye region images features. Simultaneously, the head orientation is obtained by using the accelerometer.

In experiments, we first evaluate the proposed eye detection algorithm. As a result, we confirmed the proposed method can produce better result than the existing approach. Second, we compared the first person videos of care beginner and an instructor for the purpose to evaluate the effectiveness of first person camera. These results indicate the proposed system have a large potential to enable the automated evaluation of care skills.

Using Artificial Intelligence for Cognitive Healthcare and Data Mining

Michael Nova MD, Hector Gallardo-Rincon MD, Miguel Betancourt-Cravioto MD, Roberto Tapia-Conyer MD, (Pathway Genomics and The Carlos Slim Foundation)

It is estimated that a single human, in a lifetime, will generate about 2-4 terabytes of healthcare data (for reference: all the worlds music is 6 terabytes, and a single human genome ~500 gigabytes). Healthcare data, by its nature, is also mostly unstructured (not in tabular form), includes lab tests, and is "siloed"; so is difficult to analyze for useful inferences. It is also vital that the analysis includes actionable insight for both the consumer and physician, with recommendations particular to the appropriate ethnic group.

In general, medicine – and "precision medicine" – is a big data and systems problem, especially with many different types of healthcare information such as lab results, BMI or heart rate, genetic tests, wearable's, and insurance information needing to be collected and intelligently curated on an individual user basis. As an example, the United States and LATAM (Mexico) are in the grips of a serious obesity and Type-2 Diabetes epidemic, of which the vast majority of cases are preventable. Using AI data mining analytics would enable the application of bioinformatics and real-world data in patient-targeted wellness and behavioral modification programs.

Here we demonstrate in a 2000 patient population of Hispanic's managed by the Carlos Slim Foundation in Mexico, the development of Cognitive Computing and artificial intelligence (A.I.) data mining analysis system that automatically read and collated unstructured data, and then dynamically learned to make personalized recommendations impacting the prevention and health management of non-communicable diseases in the public primary health care setting. The core data-mining and analysis structure is utilized via OME™, a mobile consumer general health and wellness application that implements a Pathway A.I. and Cognitive Computing (IBM Watson), with genetic testing and other personal user information. OME™ collects and manages any type of personal health data (genetic tests, lab data, or wearable information) and dynamically delivers important personalized information to the user or physician.

The Intelligence of Unintelligent Agents: Bots-Integrated Human Coordination in Experimental Social Networks

Hirokazu Shirado, (Yale University)

Group performance often depends on how the groups are structurally assembled and how their constituent members interact. I explored how artificial software agents ("bots"), when placed within group social networks, can facilitate the collective action of the group with respect to cooperation and coordination. Contrary to the view that noisy decision-making is bad, theory suggests that bots may indeed need some noise in their behavior in order to improve the level of social coordination within groups overall. To test this proposition, I performed experiments involving a networked color coordination game (based on Kearns et al) in which groups of human subjects interact with bots. Subjects (N=4,000) were embedded in experimental networks (N=230) of 20 nodes to which I sometimes added 3 bots. The bots were programmed with 3 levels of behavioral randomness (noise), and I also experimentally manipulated their geodesic location (placing the bots in random, central, or peripheral locations within the network). In this talk, I show that bots acting with small levels of random noise and placed in central network locations meaningfully improve the collective performance of human groups. This is especially the case when the coordination problem faced by the group is hard (i.e., when the solution space is small). The bots accelerated the median time for groups to solve the problem by 55.6%. Behavioral randomness worked not only by making the task of humans to whom the bots are connected easier, but also by affecting the game play of the humans among themselves, changing their behavior for the better, thus creating further cascades of benefit in global coordination within human groups. Our work suggests that, very simple AI (here in the form of noisy bots), when mixed into systems of humans, might optimize group outcomes and help humans to help themselves.