

Special Session Proposal

10th International Conference on Machine Learning and Applications (ICMLA) 2011

Title:

Machine Learning for Human Behavior Understanding and Assisted Living

Organizers:

- Vineeth N Balasubramanian, Center for Cognitive Ubiquitous Computing, Arizona State University, vineeth.nb@asu.edu
- Sethuraman Panchanathan, Center for Cognitive Ubiquitous Computing, Arizona State University, panch@asu.edu

Important Dates:

Paper Submission Deadline: Jul 15, 2011

Notification of Acceptance: Sep 2, 2011

Camera-ready Papers and Pre-registration: Oct 1, 2011

The ICMLA Conference: Dec 18-21, 2011

Short Summary:

With the growing need for assisted living technologies, the use of machine learning for human behavior understanding in assistive environments (both web-based and physical), as well as the design of newer machine learning algorithms to address the challenges, has increased in recent years. This special session solicits high-quality papers describing machine learning contributions from theoretical or application perspectives in human behavior understanding with a focus on assistive and rehabilitative technologies.

Aims and Scope:

The recent increase in the availability of miniaturized sensing equipments in multiple modalities (such as cameras, microphone arrays, EEGs, EMGs, skin conductance sensors, heart rate sensors, accelerometers, and gyroscopes) has led to the vast growth in the generation of digital multimedia data that captures human behavior. The availability of such data in small and large scales has necessitated the design of newer machine learning algorithms that can understand and recognize human behavior from sensor data, as well as be able to translate this understanding into assisted living environments. To illustrate the significance of research in this area, it has been noted that devices aimed at helping older adults live safely at home or in retirement facilities earned revenues of approximately \$154.92 million in 2009, a number that will likely rise to \$525.58 by the end of 2015. Research in machine learning plays a significant role in the design and development of newer technologies in this area. From the hardware perspective, machine learning is essential for the appropriate design of accessible interaction systems (such as brain-computer interfaces). From a content perspective, machine learning is used to understand and adapt the knowledge that a user may be accessing based on his/her behavior and special needs. From a user perspective, machine learning is crucial to modeling the users themselves, as well as the nature of the context of user-computer interaction.

Examples of work in this area include stochastic modeling using Partially Observable Markov Decision Processes (POMDPs) for dialogue systems in assistive robots, transfer learning for activity recognition in geriatric care systems, machine learning techniques in brain-computer interfaces, active learning for video-based behavior understanding for assistive technologies for individuals with visual impairments, spatiotemporal learning frameworks for gait understanding in patients with Parkinson's disease, graphical models for facial expression recognition for children with autism, probabilistic methods for autonomous navigation and interaction in intelligent wheelchairs, and context-based machine learning framework for sensor-based home monitoring of elderly patients.

Topics:

We recommend authors to submit papers describing their *machine learning contributions in human behavior understanding with a focus on assistive and rehabilitative technologies*. Papers are sought on a range of topics from theory and applications related to but not limited to:

- Multimodal analysis and information fusion
- Decision making under uncertainty
- Sequence modeling and spatio-temporal analysis
- Preference elicitation and user modeling
- Learning with humans in the loop
- Autonomous agents and multi-agent systems
- Reinforcement learning
- Transfer learning and domain adaptation
- Active and interactive learning
- Stochastic modeling such as Markov Decision Processes
- Probabilistic graphical models

Submission:

This special session will be held as part of the ICMLA 2011 conference. Authors should submit papers through the main conference submission website. Papers must correspond to the requirements detailed in the instructions to authors. All conference submissions will be handled electronically. Detailed instructions for submitting the papers are provided on the conference home page at: <http://www.icmla-conference.org/icmla11/>

Accepted papers should be presented by one of the authors to be published in the conference proceedings. Please do not hesitate to let us know if you have any questions.

We are also considering extended versions of high-quality papers in this session to be published in a special issue in one of the following journals (to be confirmed based on the quality and topics of the papers):

- ACM Transactions on Multimedia Computing, Communications and Applications
- ACM Transactions on Accessible Computing
- IEEE Transactions on Affective Computing

Program Committee Members (Tentative):

- Diane Cook, Washington State University
- Fernando Perez-Cruz, Universidad Carlos III de Madrid
- Emilio Parrado-Hernandez, Universidad Carlos III de Madrid
- Louis-Philippe Morency, University of Southern California
- David Hardoon, Institute for Infocomm Research
- Jaisiel Madrid-Sanchez, Technosite, ONCE Foundation
- Jesse Hoey, University of Waterloo
- Pascal Poupart, University of Waterloo
- Thomas Ploetz, Newcastle University
- Prasad Tadepalli, Oregon State University
- Matthai Philipose, Intel Corporation
- Narayanan Chatapuram Krishnan, Washington State University
- Sreekar Krishna, Microsoft Corporation
- Misha Pavel, Oregon State University

Biographies of Organizers:

Vineeth N Balasubramanian is an Assistant Research Professor at the Center for Cognitive Ubiquitous Computing (CUbiC) at Arizona State University (ASU). He holds dual Masters degrees in Mathematics (2001) and Computer Science (2003) from Sri Sathya Sai University, India, and worked at Oracle Corporation for two years until 2005. His PhD dissertation (2010) was nominated for the Outstanding PhD Dissertation at the Department of Computer Science at ASU, as well as for the annual ACM Doctoral Dissertation Award. He was also a recipient of the Gold Medals for Academic Excellence for his performances in the Bachelors program in Math, and for his Masters program in Computer Science. His research interests include pattern recognition, machine learning, computer vision and multimedia computing within assistive and healthcare applications. His current research includes the design of machine learning frameworks for human behavior understanding from wearable and ubiquitous sensors in assistive environments.



Sethuraman Panchanathan is the Foundation Chair in Computing and Informatics at Arizona State University (ASU) and the director of the Research Center for Cognitive Ubiquitous Computing (CUbiC) at ASU. His research interests are in the areas of pattern recognition and machine learning for human-centered multimedia computing in assistive, rehabilitative and healthcare applications. CUbiC's flagship project iCARE for individuals who are blind and visually impaired won the Governor's Innovator of the Year-Academia Award in November 2004. Panch has published over 350 papers in refereed journals and conferences and has mentored over 100 graduate students, post-docs, research engineers and research scientists who occupy leading positions in academia and industry. He has been a chair of many conferences, program committee member of numerous conferences, organizer of special sessions in several conferences and an invited speaker, panel member in conferences, universities and industry. Panch is a Fellow of the Institute of Electrical and Electronics Engineers (IEEE), Society of Optical Engineering (SPIE) and a member of the Canadian Academy of Engineering.

