Title: Interactive Human-Machine Learning
Titre: Apprentissage Homme-Machine Interactif
Domaine: Human-Computer Interaction
Keywords: Substrates, Instrumental Interaction, Co-adaptive systems, Machine learning, Human-Computer Partnerships

Lien: http://insitu.lri.fr/Main/Positions
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Profile of candidate:
Masters degree in Human-Computer Interaction or related field. Fluency in written and spoken English. Solid programming skills, including Java, Javascript, C or C++, and web programming skills.

Summary:
This thesis will explore how to create new approaches to interactive machine learning and human motion analysis that link humans and machines in tight action-feedback loops. Users will be able incrementally exercise meaningful control over learning algorithms through progressive feed forward and feedback. They will be able to easily explore alternative designs, design meaningful feature representations, and leverage large datasets aggregated over communities of users while also tailoring systems to their own needs.

Objectives:
This thesis explores how to create more effective human-computer partnerships, taking advantage of machine learning algorithms, but keeping the user in control. The goal is to explore how to convert machine learning approaches into progressive algorithms that enable users to maintain control throughout. Rather than assuming a single "correct" answer, to be determined from a noisy, "deformed" signal from a human being, the idea is to capitalize on human variation, and through effective feedback, enhance user expression.

Context:
The theoretical foundation of this thesis derives from a revised understanding of the notion of co-adaptation, in which humans adapt and adapt to technology, but so do machines. This reciprocal co-adaptation results in four processes:
- Human adapts to the system: users learn to use technology and are constrained by prescribed modes of use;
- Human adapts the system: users appropriate properties and features in novel ways;
- Technology adapts to human: machine learning techniques adapt according to user's behavior over time; and
- Technology adapts human: the use of behavior modification techniques to shape the user's behavior.

This thesis is associated with W. Mackay's ERC Advanced Grant (CREATIV), which seeks to create more effective human-computer partnerships through co-adaptive instruments.

Method:
The thesis will begin by exploring existing progressive recognition algorithms for detecting human gestures, either in a creative context such as music or dance, or a scientific context. The student will begin by identifying existing progressive algorithms for detecting gesture and then use participatory design techniques to work with expert users who are interested in sophisticated control of their gestures. The student will then build upon the principles of co-adaptation to design, implement and test novel technologies that support these human-computer partnerships.
Expected Results:
This thesis will enhance our theoretical understanding of the principles of substrates and co-adaptive instruments, will provide novel human-machine learning technology that enables users to control creative processes, and will provide empirical results as to how users control these novel human-machine learning techniques over time.

References: