Special Session on Grounded Cognition, Creativity and Motivated Learning

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Humans develop their cognitive abilities by interacting with their environment. This interaction grounds the concepts they form of their environment and their own needs in behavior. Humans also have the ability to focus their cognitive perception and adapt their behavior. Motivations, such as hunger, curiosity or peer pressure, inspire natural systems to exhibit behaviour that is adaptive and is oriented towards different tasks at different times depending on their own needs and environment conditions. Moreover, creative behaviour provides the flexibility and adaptability to act meaningfully in dynamically changing environments. These behavioural traits are interrelated. For example, motivated learning can drive creativity. Alternatively, when new concepts are created, the question arises of how they remain grounded in behavior and how they relate to previously learned concepts.

These behavioural traits and their integration are also an advantage for artificial agents in complex or dynamic environments, where only a small amount of available information may be relevant at a particular time, and relevant information changes over time. Vibrant research fields in artificial intelligence and cognitive modeling have emerged in each of these areas. Robots such as the iCub learn by interacting with their environment, which is used to investigate and develop the computational basis for grounded cognition. Computational creativity aims to develop computer systems that can behave in ways comparable with human creativity, autonomously and interactively, with better interaction between human and machine, better autonomous systems in general, and possibly creativity of new kinds, not yet exhibited by humans.

Motivated learning is an emerging research field in artificial intelligence and cognitive modeling. Motivated learning combines computational models of motivation with advanced machine learning algorithms to empower artificial agents to self-identify new tasks on which to focus their attention and learning. Motivated learning agents can continuously generate new behaviours as a response to their experiences in their environment. They can achieve advantages over existing learning algorithms by generating dynamic behaviours that can adapt in time with an unpredictable, changing world.

The focus of this workshop is on the design of computational models of grounded cognition, creativity, motivated learning and their integration. The long term aim of research is to develop new kinds of machines that can interact with their environment in a purposive way, develop new skills and achieve goals that were not predefined by human engineers.

Special Issue of Brain Informatics

Selected papers from the Special Session will be published in a special issue of Brain Informatics (a new Springer Journal on research related to brain and computing), to appear in April 2015. The aim of the special issue is to provide a collection of invited, high quality, original research papers that cover the core topics of the Special Session. All invited contributions will be expected to report new and original results, and will be peer-reviewed in line with the editorial criteria for Springer publishing.

Topics

Topics of interests include but are not limited to:

Cognitive architectures
Concept formation
Conceptual blending
Creativity
Embodiment
Experience-based goal generation
Global workspace
Grounded cognition and behavior
Machine consciousness
Motivated active learning
Motivation and optimization
Motivated reinforcement learning
Problem solving based on intuition, creativity, insight, curiosity and imagination
Role of emotions in discovery
Role of motivation in autonomous behaviour

Special Session Organizing Committee

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