Artificial Cognitive Systems

Course at a Glance

This course provides a comprehensive introduction to the emerging field of artificial cognitive systems. Inspired by artificial intelligence, developmental psychology, and cognitive neuroscience, the aim is to build systems that can act on their own to achieve goals: perceiving their environment, anticipating the need to act, learning from experience, and adapting to changing circumstances.

Instructors

Prof. David Vernon
Informatics Research Centre,
University of Skövde,
Sweden
david@vernon.eu

Credits: 5

Synopsis

We develop a working definition of cognitive systems, one that strikes a balance between being broad enough to do service to the many views that people have on cognition and deep enough to help in the formulation of theories and models. We then survey the different paradigms of cognitive science to establish the full scope of the subject. We follow this with a discussion of cognitive architectures before tackling the key issues: autonomy, embodiment, learning & development, memory & prospection, knowledge & representation, and social cognition.

Syllabus

The course will be given over five days. There will be two 2-hour classes each day, plus homework (4-5 hours)

1. The nature of cognition: models, definitions, autonomy, Marr’s levels of abstraction.
2. Paradigms of cognitive science: cognitivism and artificial intelligence, emergent systems, connectionism, dynamical systems, enaction.
3. Cognitive architectures: cognitivist, emergent, and hybrid architectures, desirable characteristics, example cognitive architectures.
4. Autonomy: robotic, biological, behavioural, & constitutive autonomy, homeostasis, allostasis, self-organization and emergence, autopoiesis, self-maintenance, continuous reciprocal causation, autonomic systems.
5. Embodiment: the three hypotheses, the mutual dependence of perception and action, off-line embodied cognition, situated, embedded, grounded, extended, and distributed cognition.
7. Memory and prospection: short-term, long-term, declarative, procedural, semantic, episodic, symbolic, sub-symbolic, modal, amodal, & associative memory, internal simulation, prospection, mental imagery, functional imagination, forgetting.
8. Knowledge and representation: memory and knowledge, representation, anti-representation, sharing knowledge, radical constructivism, symbol grounding, co-joint representation, Theory of Event Coding, learning from demonstration.
10. Review and discussion.

There will be a final examination decided by the instructor.

**Reading List**


**Venue**

Istituto Italiano di Tecnologia, Via Morego 30, Bolzaneto, Genova

**Course dates**

20-24 October 2014

, and adapting to changing circumstances.