INSTITUT D'INVESTIGACIÓ EN INTEL·LIGÈNCIA ARTIFICIAL - IIIA

CSIC
Consejo Superior de Investigaciones Científicas

Artificial agents are entities with some kind of body and a set of sensors and actuators to perceive and modify the environment. The world is inherently analog and so have to be the signals received by the sensors and the actions of the actuators. We introduce the Artificial Intelligence Research Institute (IIIA) and some research lines that could be benefited from analog computation.

The Artificial Intelligence Research Institute (IIIA) was founded in 1985. The IIIA produces high quality research in Artificial Intelligence. Its main research lines are: Multiagent Systems, Learning Systems, and Logic, Reasoning and Search. The Technology Development Unit (UDT) aims at applying the IIIA research results into a variety of areas. The IIIA is located on the campus of the Universitat Autònoma de Barcelona.

www.iiia.csic.es

Logic & Reasoning

- Fuzzy logic, approximate reasoning and soft computing
- Constraint satisfaction
- Automated deduction

Learning Systems

- Case-Based Reasoning
- Data Privacy
- Integration of Problem Solving and Learning
- Machine Learning for Music

Multiagent Systems

- Electronic Institutions
- Negotiation
- Personal Information Agents
- Trust and Reputation
- Expert Systems
- Autonomous Robots

Analog Environment

- Autonomous
- Situated
- Perception
- Acting
- Planing
- Reactive
- Deliberative
- Proactive

Analog in origin

Approximate Reasoning

Analog Fuzzy Logic

- Parallel inference engine
- Speed independent of the number of fuzzy rules
- Simple electronics
- High speed

Machine Learning

Analog Neural Networks

Deep Learning

Support Vector Machines

Markov Random Fields

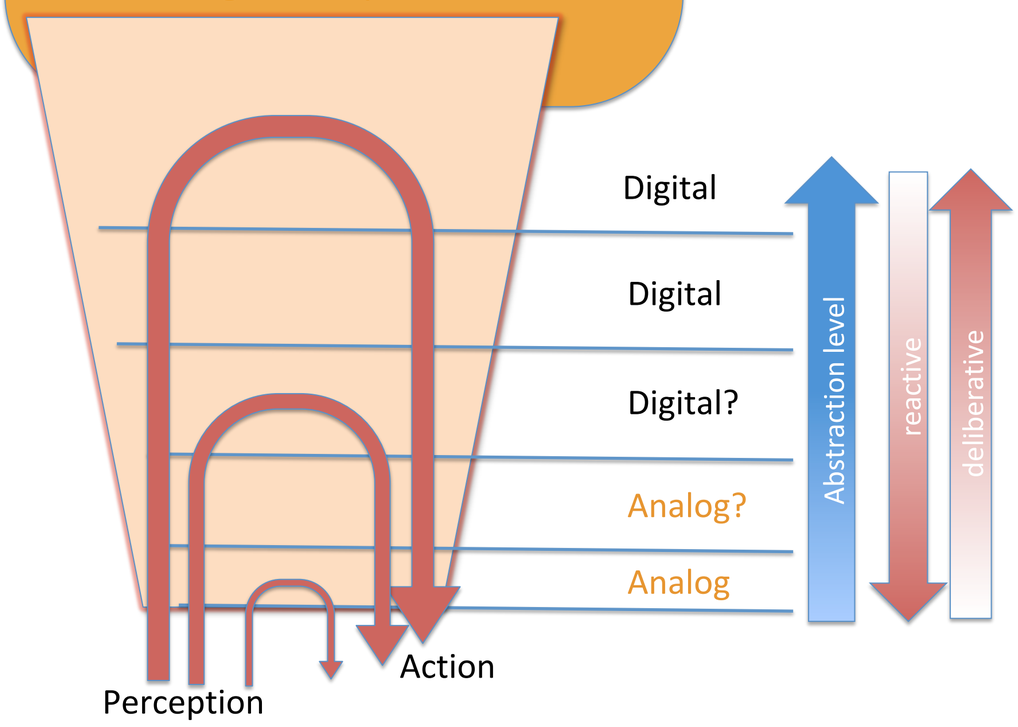
Music

Real time performances

1 Hybrid Systems Anytime Computation

Analog computing can produce fast and maybe imprecise or incomplete solutions to drive necessary action in an autonomous system.

Digital computing can perform reflexive (knowledge-based) decision making and planning using traditional digital computation



2 Symbol Grounding Problem Embodied Cognition

Can analog computing better connect symbols and reality?

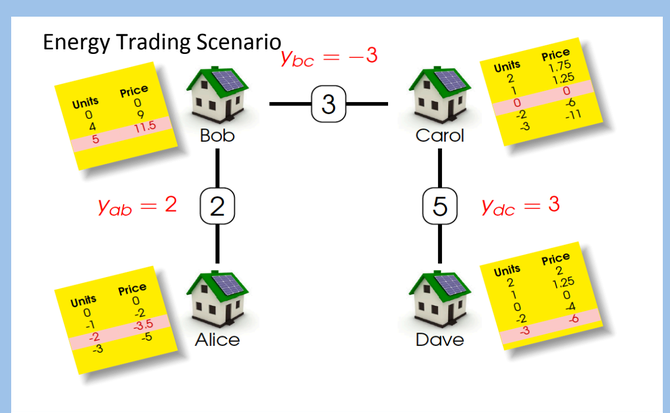
Multiagent Simulation

3 Analog/digital layered architecture?

Can we think of a layered architecture where analog layers are related with perception and action and the digital layers works at a more abstract level for embodied cognition?

Optimisation

Graphical models
Linear Programming



Digital in origin

Bayesian Networks

SAT

Constraint Satisfaction

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