Multiagent Systems (SMA-UPC)

Multiagent Systems
Sistemas Multiagente

SMA-UPC

Introduction

Knowledge Engineering and Machine Learning Group
UNIVERSITAT POLITÈCNICA DE CATALUNYA
https://kemlg.upc.edu

Multiagent Systems (SMA-UPC)

Aims of the course

- To provide the student with the knowledge to design and program **distributed multi-agent systems** using **intelligent agents**.
  - What is an agent?
  - What is an intelligent agent?
  - How can intelligent agents be used in distributed problems?
- During the course we will see how to:
  - apply several Artificial Intelligence techniques in Agents,
  - model knowledge in distributed problems,
  - design systems able to distribute decision making and tasks among agents.

Course Contents (1 of 7)

1. Introduction
   - 1.1. Origins
   - 1.2. Agent types
   - 1.3. Agent Architectures
     - 1.3.1. Deliberative Architectures
     - 1.3.2. Reactive Architectures

Course Contents (2 of 7)

2. Knowledge Representation and Communication
   - 2.1. Knowledge Representation
     - 2.1.1. Ontologies: design, methodologies
     - 2.1.2. Mark-up Languages (XML, RDF, DAML+OIL)
   - 2.2. Agent Communication
     - 2.2.1. Communication Protocols
     - 2.2.2. Communication Languages and Performatives (KQML, FIPA ACL)

Course Contents (3 of 7)

3. Reasoning in Agents
   - 3.1. Introduction to reasoning
   - 3.2. Deductive Reasoning Agents
   - 3.3. Practical Reasoning Agents. BDI agents

Course Contents (4 of 7)

4. Multiagent Systems Design
   - 4.1. Agent-Oriented Software Engineering methodologies
     - 4.1.1. Introduction to Agent-Oriented Software Engineering
     - 4.1.2. GAIA methodology
     - 4.1.3. Prometheus Methodology

Course Contents (5 of 7)

- 4.2. Coordination Models
  - 4.2.1. Introduction to Coordination.
  - 4.2.2. Social Models
    - 4.2.2.1. Reputation and Trust. Social Roles.
    - 4.2.2.2. Electronic Organizations
    - 4.2.2.3. Electronic Institutions
  - 4.2.3. Non-social Models
    - 4.2.3.1. Explicit Coordination
    - 4.2.3.2. Implicit Coordination

Course Contents (6 of 7)

- 5. Situated Agents (robots)
  - 5.1. Perception Problems
  - 5.2. Problems on action execution
  - 5.3. Situated Agents' Architectures
    - 5.3.1. Reactive Architectures
    - 5.3.2. Deliberative Architectures
    - 5.3.3. Hybrid Architectures
  - 5.4. Knowledge Representation and Uncertainty
  - 5.5. Planning and Uncertainty
  - 5.6. Multi-Robot Systems

Course Contents (7 of 7)

6. Other applications for SMA
   - 6.1. Interacting with humans
     - 6.1.1. Adjustable Autonomy
     - 6.1.2. User Modelling
   - 6.2. Simulations
   - 6.3. Multiagent Sistems for videogames

Course Material

- No need to buy books, but if you want to buy one:
  - **Wooldridge, M. "Introduction to Multiagent Systems". John Wiley and Sons, 2002.**
- If you feel that your knowledge on AI is not in good condition, have a look to:
  - **Russell, S. & Norvig, P. "Artificial Intelligence: A Modern Approach" Prentice-Hall Series in Artificial Intelligence. 2009**
- References to papers and other on-line documents will be provided during the course.
- Most of the material will be made available at the course's website:
  - *http://www.lsi.upc.edu/~jvazquez/teaching/sma-upc/*

Who am I?

- Javier Vázquez-Salceda
  - Doctor in AI at UPC
  - Associate Professor at the Knowledge Engineering and Machine Learning Group (KEMLg)
- Research interests: theoretical and applied issues of **Multiagent Systems (MAS).**
- specially interested in
  - the conflict between Autonomy and Control in agents,
  - the relation between agent goals&behaviour vs. the social expectations and/or regulations,
  - the use of norms to provide flexible specifications of accepted behaviour
- Where am I?
  - Departament de Llenguatges i Sistemes Informàtics
  - office: K2M room 202e *(access through Omega building)*
  - tel: (+34) 93 413 79 03
  - e-mail: jvazquez@lsi.upc.edu

Multiagent Systems (SMA-UPC)

Who are you?

References

- Luck, M., McBurney, P., Shehory, Onn, Willmott, S. "Agent Technology: Computing as interaction. A Roadmap to Agent Based Computing". Agentlink, 2005. ISBN 085432 845 9
- Wooldridge, M. "Introduction to Multiagent Systems". John Wiley and Sons, 2002.
- Russell, S. & Norvig, P. "Artificial Intelligence: A Modern Approach" Prentice-Hall Series in Artificial Intelligence. 2009 ISBN 0-13-103805-2
- Weiss, G. "Multiagent Systems: A modern Approach to Distributed Artificial Intelligence". MIT Press. 1999. ISBN 0262-23203