Course guide
270706 - PAR - Planning and Approximate Reasoning

Unit in charge: Barcelona School of Informatics
Teaching unit: 1042 - URV - Universitat Rovira i Virgili.

Degree: MASTER'S DEGREE IN ARTIFICIAL INTELLIGENCE (Syllabus 2017). (Compulsory subject).

Academic year: 2022  ECTS Credits: 5.0  Languages: English

LEACTER

Coordinating lecturer: AÏDA VALLS MATEU

Others: Primer quadrimestre:
AÏDA VALLS MATEU - 11, 12

PRIOR SKILLS

Some experience in programming is recommended.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CEA2. Capability to understand the basic operation principles of Planning and Approximate Reasoning main techniques, and to know how to use in the environment of an intelligent system or service.
CEP1. Capability to solve the analysis of information needs from different organizations, identifying the uncertainty and variability sources.
CEP8. Capability to respect the surrounding environment and design and develop sustainable intelligent systems.

Generical:
CG3. Capacity for modeling, calculation, simulation, development and implementation in technology and company engineering centers, particularly in research, development and innovation in all areas related to Artificial Intelligence.

Transversal:
CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.
CT6. REASONING: Capability to evaluate and analyze on a reasoned and critical way about situations, projects, proposals, reports and scientific-technical surveys. Capability to argue the reasons that explain or justify such situations, proposals, etc..

TEACHING METHODOLOGY

Oral exposition fo the teacher
Practical exercises with software tools.

LEARNING OBJECTIVES OF THE SUBJECT

1. Know the fundamental basis of Approximate Reasoning and Planning methods
2. Support the implementation with the use of programming languages user manuals.
3. Identify the possibilities and limitations of Artificial Intelligence
4. Apply the model of search space to decompose a problem.
5. Be able to discuss the results obtained on the basis of the theoretical models studied.
6. Formalize a problem in terms of fuzzy logic and apply reasoning methods on this uncertainty model.
STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours small group</td>
<td>8,0</td>
<td>6.40</td>
</tr>
<tr>
<td>Hours medium group</td>
<td>16,0</td>
<td>12.80</td>
</tr>
<tr>
<td>Self study</td>
<td>80,0</td>
<td>64.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>16,0</td>
<td>12.80</td>
</tr>
<tr>
<td>Guided activities</td>
<td>5,0</td>
<td>4.00</td>
</tr>
</tbody>
</table>

Total learning time: 125 h

CONTENTS

Approximate reasoning

Description:
1.1 Probabilistic models
1.2 Fuzzy Logic and Fuzzy expert systems
1.3 Models based on the Theory of Evidence

Planning techniques

Description:
2.1 PDDL language
2.2 STRIPS
2.3 Linear planners
2.4 Graphplan
2.5 MDP
2.6 Reinforcement Learning

ACTIVITIES

Exam with questions and exercises. Exam focused mainly on Approximate Reasoning.

Specific objectives:
1, 3, 5, 6

Related competencies:
CG3. Capacity for modeling, calculation, simulation, development and implementation in technology and company engineering centers, particularly in research, development and innovation in all areas related to Artificial Intelligence.
CEP8. Capability to respect the surrounding environment and design and develop sustainable intelligent systems.
CEA2. Capability to understand the basic operation principles of Planning and Approximate Reasoning main techniques, and to know how to use in the environment of an intelligent system or service.
CEP1. Capability to solve the analysis of information needs from different organizations, identifying the uncertainty and variability sources.
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Full-or-part-time: 2h
Guided activities: 2h
Exercise about design and development of a fuzzy expert system, using specific software tools.

Specific objectives:
2, 4, 5, 6

Related competencies:
CEA2. Capability to understand the basic operation principles of Planning and Approximate Reasoning main techniques, and to know how to use in the environment of an intelligent system or service.
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Full-or-part-time: 12h
Guided activities: 2h
Self study: 10h

Practical exercise to solve a case study using a planner.

Specific objectives:
2, 4, 5

Related competencies:
CEA2. Capability to understand the basic operation principles of Planning and Approximate Reasoning main techniques, and to know how to use in the environment of an intelligent system or service.
CEP1. Capability to solve the analysis of information needs from different organizations, identifying the uncertainty and variability sources.
CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

Full-or-part-time: 17h
Guided activities: 2h
Self study: 15h

Lectures and lab practise about Approximate Reasoning

Description:
Weekly, 2 hours theoretical lecture and 1 h practise in laboratories.

Full-or-part-time: 42h
Theory classes: 14h
Laboratory classes: 7h
Self study: 21h

Lectures and exercises about Planning.

Description:
Weekly, 2 hours theoretical lecture and 1 h practise in laboratories.

Full-or-part-time: 43h
Theory classes: 14h
Laboratory classes: 8h
Self study: 21h
Exam with questions and exercises about Planning.

Specific objectives:
1, 3, 4, 5

Related competencies:
CG3. Capacity for modeling, calculation, simulation, development and implementation in technology and company engineering centers, particularly in research, development and innovation in all areas related to Artificial Intelligence.
CEP8. Capability to respect the surrounding environment and design and develop sustainable intelligent systems.
CEA2. Capability to understand the basic operation principles of Planning and Approximate Reasoning main techniques, and to know how to use in the environment of an intelligent system or service.
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Full-or-part-time: 2h
Guided activities: 2h

Short activities

Description:
Home work about to solve a short problem on an specific topic.

Specific objectives:
3, 4, 5, 6

Related competencies:
CEP8. Capability to respect the surrounding environment and design and develop sustainable intelligent systems.
CEA2. Capability to understand the basic operation principles of Planning and Approximate Reasoning main techniques, and to know how to use in the environment of an intelligent system or service.
CEP1. Capability to solve the analysis of information needs from different organizations, identifying the uncertainty and variability sources.
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Full-or-part-time: 10h
Self study: 10h

GRADING SYSTEM

The student must do 2 exams, 30% each.
The student must solve 2 practical exercises, 40%
BIBLIOGRAPHY

Basic:

RESOURCES

Hyperlink:
- http://moodle.urv.cat