Presentation and guidelines of the course Intelligent Systems (SIN)

Contents

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Intelligent systems: presentation

Workload: 4.5 credits (3 + 1.5) / 2 h + 1.5 h per week

Objectives:

Introduce the concept of Intelligent System under a practical standpoint.

Contents are organized in two thematic blocks:

- **Knowledge representation and search**
- **Machine learning**

The techniques presented will provide the computer scientist competences to understand and solve problems that require cognitive abilities or capabilities associated to the development of intelligent systems.

Theory syllabus: 14 sessions in two blocks

Block 0: Presentation and guidelines

Block 1: Knowledge representation and search (7 sessions)

0. Introduction to Artificial Intelligence. Concepts, fields and applications.
1. Uninformed search.
2. Informed search: heuristic functions, A* algorithm.
3. A* algorithms with memory limitations.
4. Adversarial search.
5. RBS, components and architecture. CLIPS. Pattern-matching.
6. Inference with RBS: chaining and control. Inference engine.

Block 2: Machine Learning (7 sessions)

0. Introduction to machine learning.
1. Probabilistic reasoning: Bayes rule.
2. Supervised learning: Logistic regression.
3. Supervised learning: Decision trees.
4. Unsupervised learning: K-means algorithm.

Theory schedule (groups by columns chronologically sorted)

Exams in red: A2 06/11, A4 08/01, A5,A6 24/01

	3D	3G	3B	3E	3C	3A	3F	4GIA
	Spanish	Spanish	Spanish	English	Spanish	Valencian	Spanish	Spanish
	VJ/JA	Luis	Eva	Jorge	Eva	Albert	CF/Jorge	Albert
	Tuesday	Wednesday	Wednesday	Thursday	Thursday	Thursday	Thursday	Friday
Session	15:00-17:00	11:30-13:30	12:00-14:00	08:30-10:30	08:30-10:30	10:30-12:30	17:00-19:00	11:00-13:00
0: B0	10/09	11/09	11/09	12/09	12/09	12/09	12/09	13/09
1: B1	10/09	11/09	11/09	12/09	12/09	12/09	12/09	13/09
2: B1	17/09	18/09	18/09	19/09	19/09	19/09	19/09	20/09
3: B1	24/09	25/10	25/09	26/09	26/09	26/09	26/09	27/09
4: B1	01/10	02/10	02/10	03/10	03/10	03/10	03/10	04/10
5: B1	15/10	08/10	08/10	10/10	10/10	10/10	10/10	11/10
6: B1	22/10	16/10	16/10	17/10	17/10	17/10	17/10	18/10
7: B1	29/10	23/10	23/10	24/10	24/10	24/10	24/10	24/10
A2	**06/11**	**06/11**	**06/11**	**06/11**	**06/11**	**06/11**	**06/11**	**06/11**
8: B2	12/11	13/11	13/11	07/11	07/11	07/11	07/11	08/11
9: B2	19/11	20/11	20/11	14/11	14/11	14/11	14/11	15/11
10: B2	26/11	27/11	27/11	21/11	21/11	21/11	21/11	22/11
11: B2	03/12	04/12	04/12	28/11	28/11	28/11	28/11	29/11
12: B2	10/12	11/12	11/12	12/12	12/12	12/12	12/12	05/12
13: B2	17/12	18/12	18/12	19/12	19/12	19/12	19/12	13/12
14: B2	XX/XX	XX/XX	XX/XX	XX/XX	XX/XX	XX/XX	XX/XX	20/01
A4	**08/01**	**08/01**	**08/01**	**08/01**	**08/01**	**08/01**	**08/01**	**08/01**
A5, A6	**24/01**	**24/01**	**24/01**	**24/01**	**24/01**	**24/01**	**24/01**	**24/01**

Lab assignments

B1. Search (5 sessions)

- Presentation of the search environment: 8-puzzle.
- Analysis and evaluation of heuristic functions.

B2. Machine learning (5 sessions)

- Development of pattern recognition systems.
- Application to clasification tasks.

Work teams: 1-2 people.

Evaluation of lab assigments performed: Individual lab test evaluation.

Lab schedule (groups by columns chronologically sorted)

Exams in red: A1 23/10-29/10 (B1), A3 16/01-20/01 (B2)

	3C1	3D2	3A2	3E2	3G2	3E1	3B1	3B2	3F1	3D1	3C2	3A1	4GIA1	3G1
	Spanish	Spanish	Valencian	English	Spanish	English	Spanish	Spanish	Spanish	Spanish	Spanish	Valencian	Spanish	Spanish
	Gerard	Ángel	Albert	Jorge	Luis	Gerard	Eva Ángel	Eva	Gerard	VicentJ	Eva	VicenteJ	Albert	Luis
	Monday	Monday	Tuesday	Tuesday	Tuesday	Wed.	Wed.	Wed.	Wed.	Thursday	Friday	Friday	Friday	Friday
Session	15-16:30	15-16:30	8-9:30	10-11:30	17:30-19	8-9:30	15-16:30	16:30-18	20-21:30	19-20:30	8-9:30	11:30-13	13-14:30	13-14:30
1: B1	30/09	30/09	24/09	24/09	24/09	25/09	25/09	25/09	25/09	26/09	27/09	27/09	27/09	27/09
2: B1	07/10	07/10	01/10	01/10	01/10	02/10	02/10	02/10	02/10	03/10	04/10	04/10	04/10	04/10
3: B1	14/10	14/10	15/10	15/10	15/10	08/10	08/10	08/10	08/10	10/10	11/10	11/10	11/10	11/10
4: B1	21/10	21/10	22/10	22/10	22/10	16/10	16/10	16/10	16/10	17/10	18/10	18/10	18/10	18/10
5: A1	**28/10**	**28/10**	**29/10**	**29/10**	**29/10**	**23/10**	**23/10**	**23/10**	**23/10**	**24/10**	**25/10**	**25/10**	**25/10**	**25/10**
6: B2	18/11	18/11	19/11	19/11	19/11	20/11	20/11	20/11	20/11	14/11	22/11	22/11	22/11	22/11
7: B2	25/11	25/11	26/11	26/11	26/11	27/11	27/11	27/11	27/11	21/11	29/11	29/11	29/11	29/11
8: B2	02/12	02/12	03/12	03/12	03/12	04/12	04/12	04/12	04/12	28/11	05/12	05/12	05/12	05/12
9: B2	09/12	09/12	10/12	10/12	10/12	11/12	11/12	11/12	11/12	12/12	13/12	13/12	13/12	13/12
10: A3	**16/12**	**16/12**	**17/12**	**17/12**	**17/12**	**18/12**	**18/12**	**18/12**	**18/12**	**19/12**	**20/12**	**20/12**	**20/12**	**20/12**

Evaluation (1/2)

Grading policy

(B1="Block 1"; B2="Block 2")

A1. Lab. test B1 (1,25 points).
A2. Exam B1 (3,75 points).
A3. Lab. test B2 (1,25 puntos).
A4. Exam B2 (3,75 puntos).

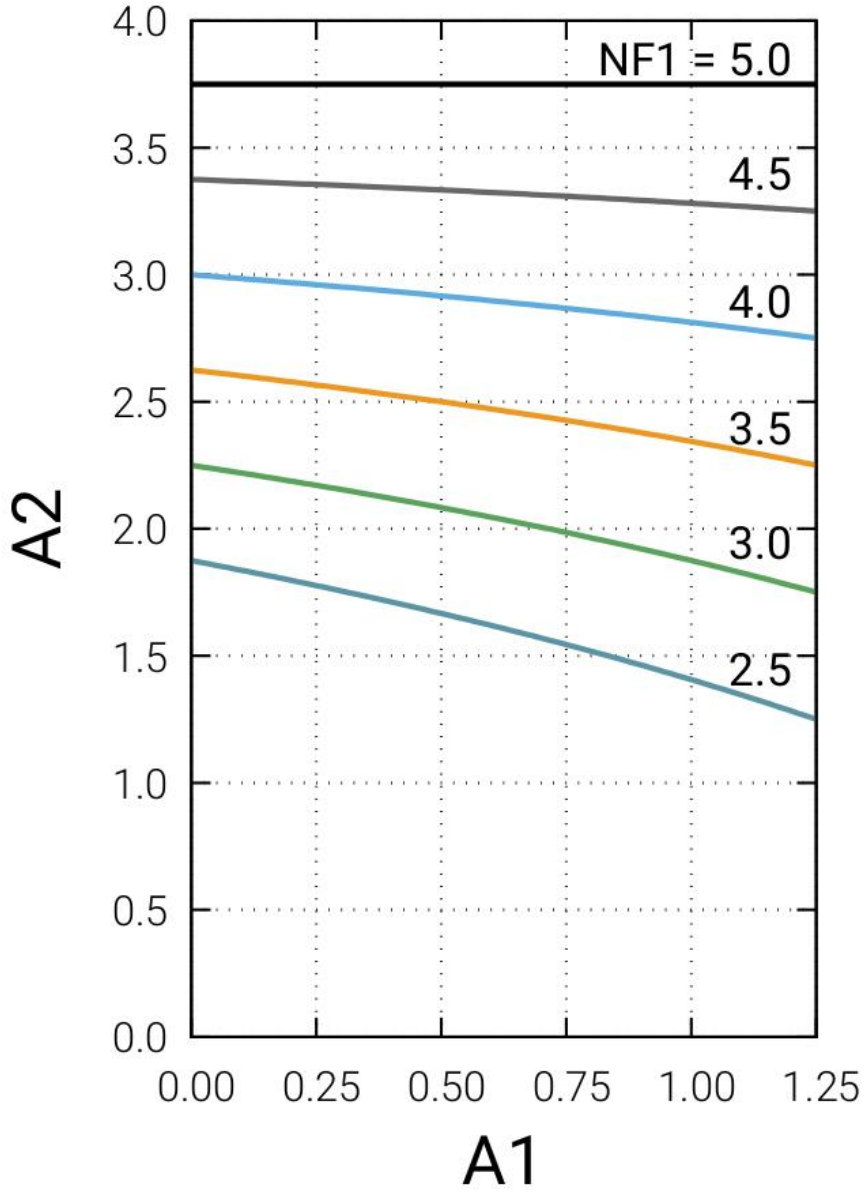
Final grade (>=5 to pass):

NF = NF1 + NF2

where

- NF1 is the final grade on B1:
- NF1 = A1 + (1 - A1/5) * A2 * 5/3,75

- NF2 is the final grade on B2:
- NF2 = A3 + (1 - A3/5) * A4 * 5/3,75



Evaluation (2/2)

- Students can modify their final grade taking two additional exams:
  - A5. Retake exam B1 (3,75 points).
  - A6. Retake exam B2 (3,75 points).
- The final modified grade (NFM) is computed as NFM = NFM1 + NFM2 where
  - NFM1 = A1 + (1 - A1/5) * A5 * 5/3,75
  - NFM2 = A3 + (1 - A3/5) * A6 * 5/3,75
- If the student does not take A5, then A5=A2
- If the student does not take A6, then A6=A4
- It is required a NFM no lower than 5 to pass the course.
- No minimum attendance required.
- *Evaluation for students with attendance exemption is the same as without*.
- *Minimum score: no minimum score is required in any evaluation activity*.
- *"Matrículas de honor":* decided by lecturers on those final grades close to 10.
- Official group changes (theory and lab): please address ETSINF staff, no SIN lecturers.
- *Non-official group changes (theory and lab): students can attend a group other than the officially signed up group as long as room is available, but exams must be taken in the official group.*

Lecturers

Lecturers	Theory groups	Lab groups
Ángel Aso	-	3B1 (B2), 3D2
Jorge Civera	3E, 3F (B2)	3E2
Carlos Fernández	3F (B1)	-
Luis Hernández	3G	3G1, 3G2
Vicent Julián	3D (B1)	3A1, 3D1
Gerard Mas	-	3C1, 3F1, 3E1
Eva Onaindía	3B, 3C	3B1 (B1) , 3B2, 3C2
Joan Andreu Sánchez	3D (B2)	-
Albert Sanchis	3A, 4GIA	3A2, 4GIA1

Bibliography

All the materials are available in PoliformaT and GitHub.

Basic:

- S. Russell, P. Norvig. ***Artificial Intelligence. A modern approach.*** *Pearson, 3rd ed., 2010.*
- K.P. Murphy. **Probabilistic Machine Learning: An Introduction.** MIT Press, 2022.

Supplementary:

- PoliformaT: slides, problems, exercises, papers, etc.
- GitHub: github.com/jorcisai/SIN
- Videolectures (recorded sessions)