Artificial Intelligence

20. Exam Preparation

Ready, Steady, Go!

Jana Koehler Álvaro Torralba

SAARLAND UNIVERSITY
COMPUTER SCIENCE

Summer Term 2019

Thanks to Prof. Hoffmann for slide sources

Agenda

1. Basic Facts
2. Exam-Relevant Contents
3. Q&A
4. Example Exercises

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- NO laptops or mobile phones in exam!
- Pocket calculators allowed.

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- You must bring your own paper to write on.
- NO pencils, you must use a pen.

Where and When

Wednesday, 24th July 2019
14:00 – 16:00

Günter-Hotz-Hörsaal
AND
Building E1 3, HS002

... *Where? When?*

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- Please check the webpage to find the room that is assigned to you.

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When:

- The actual exam will be 120 minutes, starting from the moment we allow you to look at the exam sheets.
- We expect that moment to be 14:15.
- You must be there at 14:00. We need time for everybody to arrive/settle down, and for the exam sheets to be distributed.

Exam Registration and Admission

- You must be registered for the exam.

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→ You must bring your student ID along to the exam.

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- Chapter 12 (General Game Playing).

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→ Everything else is exam-relevant.

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Q&A

Questions?

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Propositional Reasoning

Prove, using propositional resolution, that the following formula is unsatisfiable:

$$P \wedge (P \rightarrow Q) \wedge (Q \rightarrow R) \wedge (\neg Q \vee \neg R \vee S) \wedge \neg S$$

Predicate Logic Reasoning

Consider the following statements:

(i) All dogs have a black leg.

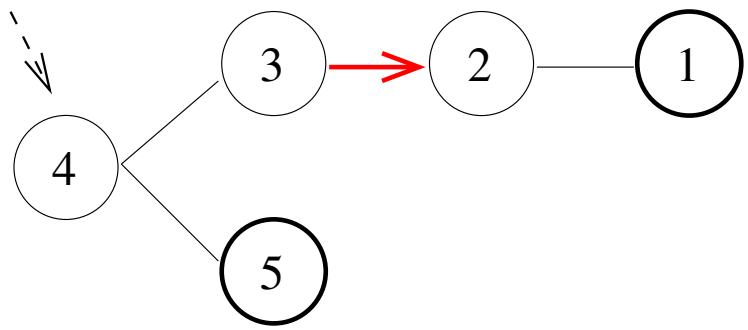
(ii) There exists a dog all of whose legs are yellow.

(iii) If something is yellow, then it is not black.

1. Formalize these statements as a set θ of predicate logic formulas, using the predicate symbols $\{Dog(.), Leg(.,.), Black(.), Yellow(.)\}$.
2. Bring the formulas into prenex normal form.
3. Bring the formulas into Skolem normal form.
4. Bring the formulas into clausal normal form and write them up as a set Δ of PL1 clauses.
5. Use PL1 resolution to prove that Δ is unsatisfiable.

Planning

Consider this planning task:



- Facts: $\{at(x) \mid x \in \{1, \ldots, 5\}\} \cup v(x) \mid x \in \{1, \ldots, 5\}\}$.
- Actions: $drive(x, y)$ where $|x - y| = 1$ and $(x, y) \neq (2, 3)$. Precondition $\{at(x)\}$, add list $\{at(y), v(y)\}$, delete list $\{at(x)\}$.
- Initial state: $\{at(4), v(4)\}$.
- Goal: $\{v(1), v(5)\}$.

(a) Give an optimal plan for the initial state, and give an optimal relaxed plan for the initial state. What are the h^* and h^+ values for the initial state?

(b) Draw the tree of all states that can be reached from the initial state within 2 steps; connect states by drawing edges from each state to its successor states. Annotate each state with its h^+ value.