Exam in 2G1524 Distributed Artificial Intelligence and Intelligent Agents, 2006-12-14, 15:00-19:00

Rules

This exam is "closed book" and you are not allowed to bring any material or equipment (such as laptops, PDAs, or mobile phones) with you. The only exceptions are an English to "your favorite language" dictionary and pencils.

Instructions

- Please read the entire exam first!
- Write clearly
- Each sheet of paper must contain your name, "personnummer", Problem number and a unique sheet number
- Sort answer pages in your final delivery in order corresponding to the order of problems in this exam
- Write only on one page of a sheet. Do not use the back side
- Only one Problem must be reported on each sheet
- If more than one sheet is needed the continuation should be clearly noted on the beginning of each sheet and the sheet numbers used should be consecutive
- Always motivate your answers. Lack of clearly stated motivation can lead to a reduction in the number of points given
- The tasks are not necessarily sorted in order of difficulty. If you get stuck it might be a good idea to go on to the next task.

Grading

The grades depend on the sum of exam and bonus points:

$n < 50$ fail (U)

$50 \leq n < 67$ grade 3

$67 \leq n < 84$ grade 4

$84 \leq n$ grade 5

GOOD LUCK!

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Problem I. What is an agent?

a) What are main differences between agents and objects?

(4p)

Problem II. Agent theory

a) In the class we considered the Wise Man puzzle (see appendix) and we also considered possible worlds. What are the possible worlds in this puzzle at the beginning and after each man answer?

(8p)

b) We consider agents as intentional systems. When such consideration is most useful and when it is not appropriate?

(6p)

Problem III. Agent Architectures

a) Show an implementation (in pseudo-code) of action selection function for agents in the subsumption architecture?

(6p)

b) What are advantages and disadvantages of horizontal and vertical layered agent architectures?

(6p)

Problem III. Negotiation

a) What are components of any negotiation setting? Explain them.

(6p)

b) Explain Borda protocol. Which desirable property of a social choice rule is not satisfied in this protocol?

(7p)

c) What are ways to get rid of deceptions in task-oriented domains? Explain how it will work for phantom, decoy and hidden tasks.

(8p)

Problem IV. Auctions

a) What is the best bidding strategy for each auction type that you know?

(4p)

Problem V. Communication

a) Explain how do we describe semantics of speech acts? Give a brief example.

(8p)

b) Describe the English auction using FIPA ACL communicative acts.

(6p)

Problem VI. Coordination

a) Is it reasonable to use Partial Global Planning in air traffic control systems? Explain your answer.

(5p)

b) Does external observation of agent behavior allow always recognize if behavior is coordinated or not? Justify your answer by examples.

(6p)

c) What is/are difference(s) between a norm and a social law in agent coordination?

(4p)

Problem VII. MAS Architectures

a) What is main idea of Blackboard architecture? What are its main components?

(5p)

b) Which operations may perform an actor?

(6p)

Problem VIII. Agent oriented Software Engineering

a) What modifications to UML are proposed in AgentUML? Give examples.

(5p)

Appendix

Three men puzzle.

There are three wise men.

It is common knowledge -- known by everyone, and known to be known by everyone, etc. -- that there are three red hats and two white hats. The king puts a hat on each of the wise men, and ask them sequentially if they know the color of the hat on their head. Suppose the first man says he does not know; then the second say he does not know either.

It follows that the third man must be able to say that he knows the color of his hat.

Why is this, and what color has the third man's hat?

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