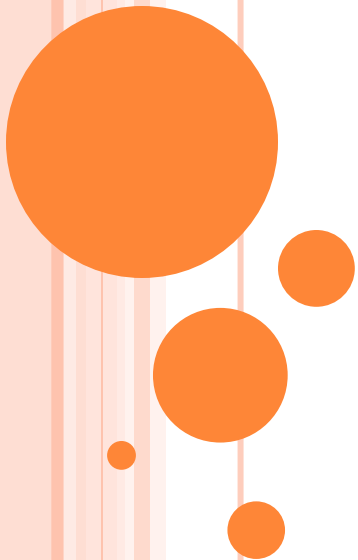


ARTIFICIAL INTELLIGENCE

LECTURE 9

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2012-2013 3rd year, semester 5



INTRODUCTION

- The content of this lecture is based on the book on expert systems [GR], and on the documentation from Clips website [CLIPS].
- The lecture will be taught on 3rd of december 2012 in room 045C, between 16:20 and 17:50. It's topic will be again CLIPS/Jess syntax and programming style.
- Note: this powerpoint presentation will be all the written material for the lecture, those who come at the lecture (in room 045C) will hear the rest of the explanations, and can see more examples on the blackboard

CONTENTS

- How to duplicate facts unordered facts (using the duplicate command) [GR, 341 (352)]
- Debugging programs, the watch command
- (watch <watch-item>), where <watch-item> is one of the symbols: facts, rules, activations, statistics, compilations, focus, all
- Refraction [GR, 347 (358)]
- (refresh <rule-name>)
- (agenda) – lists which rules will trigger, matched on what facts

- Commands for manipulating constructs [GR, 350, section 7.13]:
 - Listing constructs
 - (list-defrules)
 - (list-deftemplates)
 - (list-deffacts)
 - Printing definitions:
 - (ppdefrule <defrule-name>)
 - (ppdeftemplate <defftemplate-name>)
 - (ppdeffacts <deffacts-name>)
 - Deleting constructs
 - (undefrule <defrule-name>)
 - (undeftemplate <defftemplate-name>)
 - (undeffacts <deffacts-name>)
 - Clearing all the constructs (clear)

- More commands for debugging [GR]

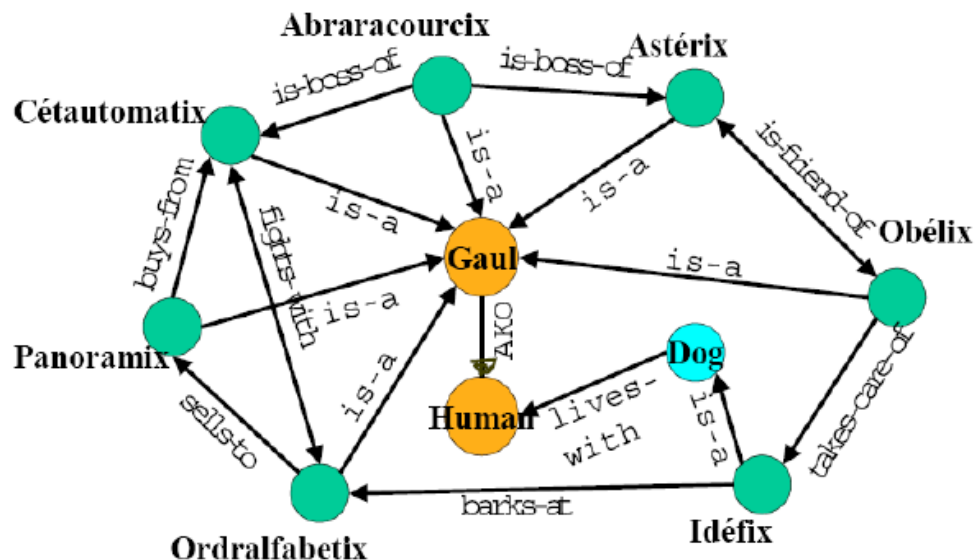
EXAMPLE EXPERT SYSTEM

- An example of an expert system for modeling the problem: “A cat moves in a linear array of rooms until it senses milk in the room”
- <http://www.cs.trinity.edu/~yzhang/teaching/spring2011/CSCI3344/projects/instruction/cat.clp>

SEMANTIC NETS

- Used for propositional information (information that is either true or false)
- Bibliography: [GR chapter 2], [Ra, slides 29-34]

Semantic Net Example

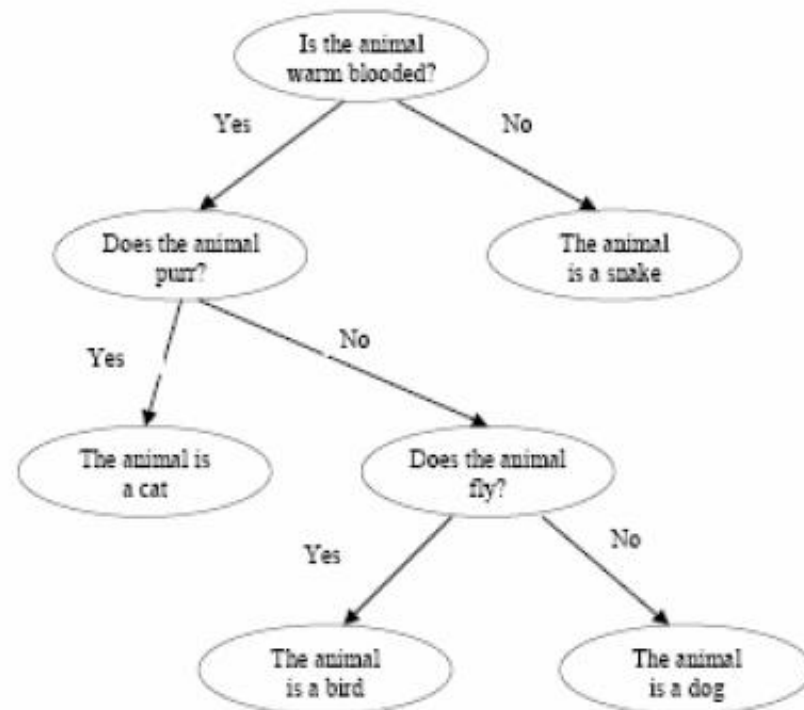


DECISION TREES [RA, SLIDE 45]

- A decision tree is a semantic net in which:
 - Each node is connected to a set of possible answers.
 - Each nonleaf node is connected to a test that splits its set of possible answers into subsets corresponding to different test results.
 - Each branch carries a particular test result's subset to another node.
 - Each leaf represents a possible answer.

DECISION TREES [RA, SLIDE 46]

Example-1 (Binary decision tree)



- From [Ra], slides 47-50 you can see two examples of decision tree implementations in CLIPS. They are also contained in the examples for [lab 3](#) expert systems, programs 34.clp and 35.clp.
- Remark the **ask-user** function, your first example of a function, written in CLIPS used to read an yes/no answer to a specific question, cycling until such an answer is given, using a while loop.
- You can also remark the way in which you can impose an order in the firing of the rules, by adding facts as (node1) into memory, which will trigger only one rule, the one we want to fire next, then retracting it, and assert the trigger for the next rule we want to fire

ASSIGNMENTS

- See the document “[assignments 2](#)” to see a list of problems.
- Do not solve problem 2 on the list, since it is rather difficult, a part of the solving can be read from [GR, section 8.6, page 371(382)]
- If you solve one until Monday december 11, you can obtain 1 point,
- Until Wednesday december 19 the number of points decreases to 0.5/problem,
- in the weeks 13 and 14 it decreases to 0.

BIBLIOGRAPHY

- [GR] Giarratano J., Riley G. – Expert Systems Principles and Programming, 3rd edition, PWS Publishing, 2002
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<http://clipsrules.sourceforge.net/OnlineDocs.html>
- [6] Barnum P.- Basic JESS Tutorial (visited nov. 2012)
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- [Ra] Rahimi S. -- Advanced Expert Systems, (online lecture, visited december 2012)
<http://www2.cs.siu.edu/~rahimi/cs537/slides/chapter02.pdf>
- [RN] Russel S., Norvig P. – Artificial Intelligence – A Modern Approach, 2nd ed. Prentice Hall, 2003 (1112 pages)
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- [W1] Mark Watson – Practical Artificial Intelligence Programming With Java AI 3rd ed., 2008
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