

IAI - Exercise Sheet 5

This week we have a set of questions about knowledge representations. They should be read in conjunction with your lecture notes and handouts for Week 5.

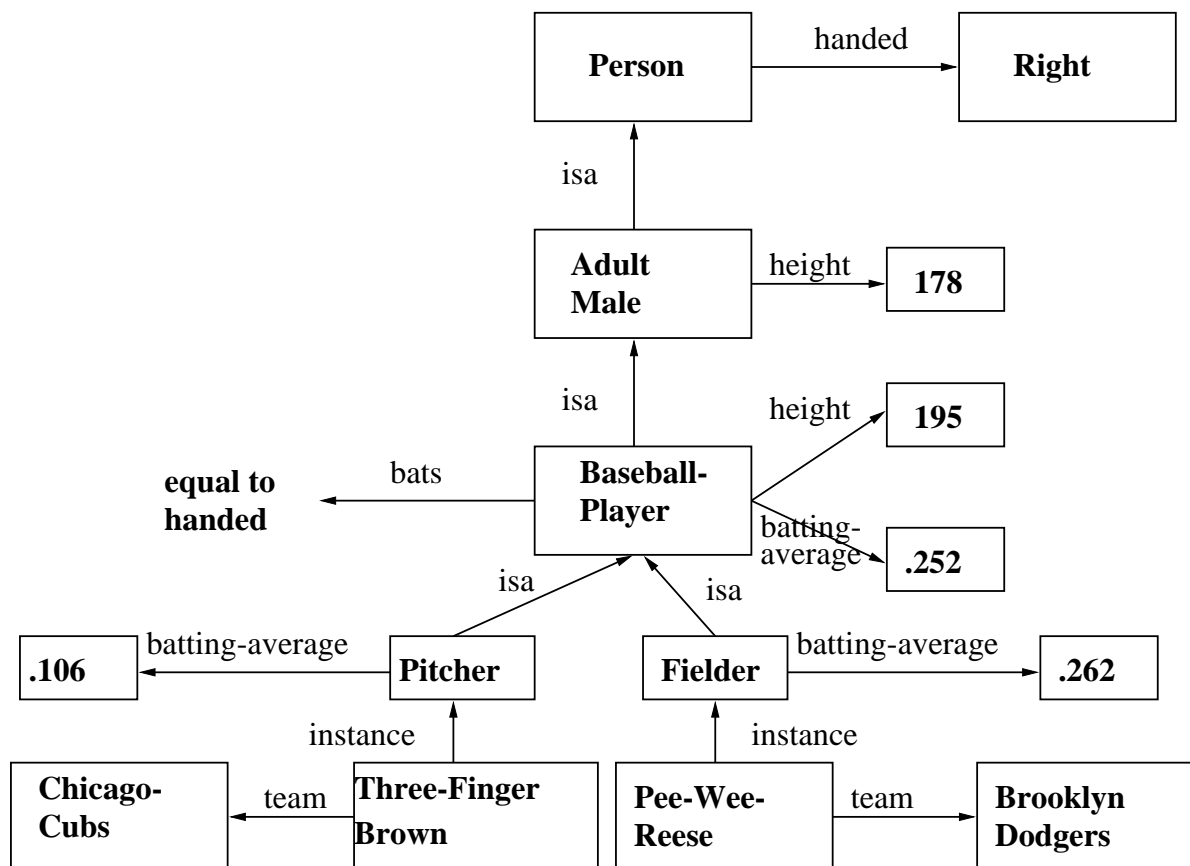
Question 1

Is the following dilemma a problem for AI systems? If so, how can we deal with it?

- An AI system must contain a lot of knowledge if it is to handle anything beyond trivial toy problems.
- As the amount of knowledge grows, it becomes harder to access the appropriate information when needed, so more knowledge must be added to help. But then there will be even more knowledge to manage, and so more must be added, and so on...

Question 2

Recall the semantic network about baseball players from the lectures and Rich & Knight:



How could the same information could be represented in natural language? Or in terms of first order logic? Or as a database? Is one form of representation clearly better than the others, or are there advantages and disadvantages to each? Are there aspects of baseball players that none of these forms of representation can accommodate?

Question 3 (Exam style question)

List two advantages and two disadvantages of using each of the following as a *general purpose* AI knowledge representation scheme:

- (a) Natural Language
- (b) Standard Computer Science Databases
- (c) Frames
- (d) Semantic Networks
- (e) First Order Logic
- (f) If-Then Rule Based Systems

Question 4 (Exam style question)

From a theoretical point of view, what are the main properties required of any good AI knowledge representation?

A list of the practical aspects of formulating good AI knowledge representations may look somewhat different. Suggest such a list of practical issues. How are the practical issues and the theoretical requirements related?

Discuss how the theoretical requirements and practical issues are dealt with, or not dealt with, in each of the following knowledge representation schemes:

- (a) Natural Language
- (b) Standard Computer Science Databases
- (c) Frames
- (d) Semantic Networks
- (e) First Order Logic
- (f) If-Then Rule Based Systems

Question 5

What other AI knowledge representation schemes exist, apart from those listed in the above questions 3 and 4?

Question 6

We previously saw from: <http://world.honda.com/ASIMO/> , that the Honda *ASIMO* is a pretty impressive humanoid robot. What were the major knowledge representation issues that the developers needed to overcome to achieve it's abilities? How were these tied in with the associated hardware considerations?