

CPSC 522 — Spring 2013

Assignment 3

Due: 12:30 p.m., Wednesday 27 February 2013

Question 1

Do either part (a), part (b) or part (c). For details on OWL see: <http://www.w3.org/TR/owl2-overview/>. I'd recommend the functional style syntax.

- (a) Suppose a “beach resort” is a resort that is near a beach that the resort guests can use. The beach has to be near the sea or a lake, where swimming is permitted. A resort must have places to sleep and places to eat. Write a definition of beach resort on OWL.
- (b) A luxury hotel has multiple rooms to rent, each of which is comfortable and has a view. The hotel must also have more than one restaurant. There must be menu items for vegetarians and for meat eaters to eat in the restaurants.
 - (i) Define a luxury hotel in OWL, based on this description. Make reasonable assumptions where the specification is ambiguous.
 - (ii) Suggest three other properties you would expect of a luxury hotel. For each, give the natural language definition and the OWL specification.
- (c) Choose some domain about which you know something. Specify some vocabulary that could be used to describe the world or some data about the domain. Write meaning in English first, and then represent it in OWL, then write the English translation of the OWL (which is likely to be different from the original English).

Question 2

For the following, explain how each is categorized by Basic Formal Ontology BFO (see <http://www.ifomis.org/bfo/>):

- (a) your skin
- (b) the period at the end of the previous sentence

- (c) the excitement a child has before a vacation
- (d) the trip home from a vacation
- (e) a computer program
- (f) summer holidays
- (g) the ring of a telephone
- (h) the dust on your desk
- (i) the task of cleaning your office
- (j) the diagnosis of flu in a person

Based on this experience, suggest and justify a modification of BFO. Think about what distinctions in BFO either don't cover the cases you need or are not exclusive.

Question 3

Suppose we have a relational probabilistic model for movie prediction, where we represent

$$P(\text{likes}(P, M) | \text{age}(P), \text{genre}(M))$$

- (a) What is the treewidth of the ground belief network (after pruning irrelevant variables) for querying $\text{age}(\text{Sam})$ given the following observations?

Person	Movie	likes
Sam	Hugo	yes
Chris	Hugo	no
Sam	The Help	no
Sam	Harry Potter 6	yes
Chris	Harry Potter 6	yes
Chris	AI	no
Chris	The Help	no
David	AI	yes
David	The Help	yes

- (b) For the same probabilistic model, for m movies, n people and r ratings, what is the worst-case treewidth of the corresponding graph (after pruning irrelevant variables), where only ratings are observed? (Here is it worst over the set of all observations).
- (c) For the same probabilistic model, for m movies, n people, and r ratings, what is the worst-case treewidth of the corresponding graph, where the some ratings but all of the genres are observed?

Question 4

For this question you should use AILog (see http://artint.info/code/ailog/ailog_man.html).

Consider the electrical domain of Figure 5.2 of the textbook. Using the relations of Example 12.11 of the textbook and the probabilities of the AIspace “electrical diagnosis problem”, write an AILog program that computes the same posterior probabilities as the belief network. Make the rules as general as possible, so that your axiomatization can be applied to different configurations.

You may change the probabilities in the AIspace if you can give a rationale for the change.

You need to hand in a documented program and evidence that it works.

Question 5

How long did the assignment take? What did you learn? Was it reasonable? What suggestions do you have to improve the assignment?