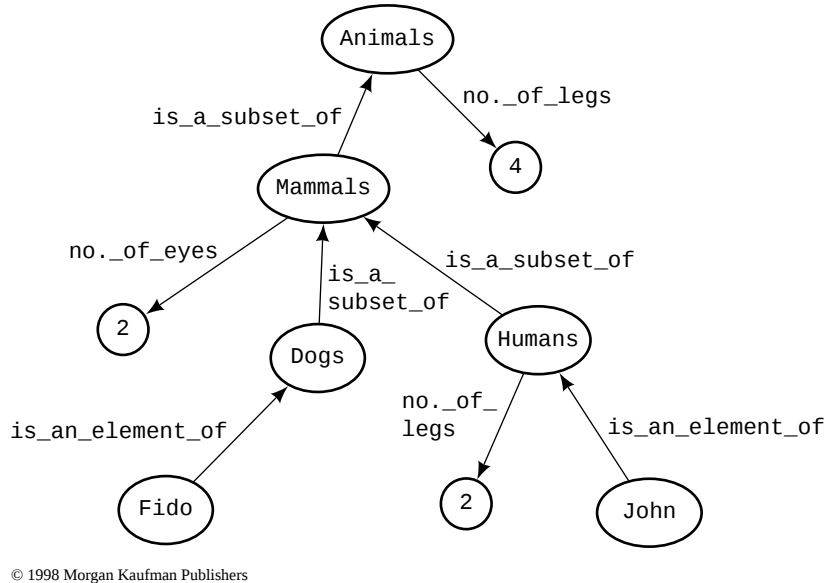


CIS 32 Homework 4

- Express in first order logic the information in the semantic network below:



Take care that they are written in such a way that they make explicit information about what is inherited—this information is often implicit in the network—and that the relevant things are **not** inherited.

(15 points)

- Taking your answer to the previous question, can you prove that Fido has four legs from the logical formulae you wrote down. If you can, give the proof. If you cannot, what information would you need to add?

(15 points)

- Consider the problem of devising a plan for a kitchen-cleaning robot.

(a) Write a set of STRIPS-style operators that might be used. When describing these, take into account that:

- Cleaning the stove or the refrigerator will get the floor dirty.

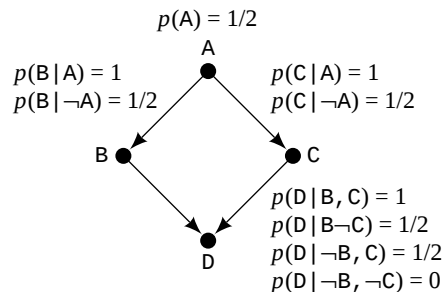
- ii. The stove must be clean before covering the drip pans with foil.
- iii. Cleaning the refrigerator generates garbage and messes up the counters.
- iv. Washing the counters of the floor gets the sink dirty.

(20 points)

- (b) Write a description of a kitchen that has a dirty stove, refrigerator, counters, and floor. (The sink is clean, and the garbage has been taken out.) Also write a description of a goal state where everything is clean, there is no trash, and the stove drip pans have been covered with foil.

(15 points)

4. An admissions committee for a college is trying to determine the probability that an admitted candidate is really qualified. The relevant probabilities are given in the Bayes network below:



A = applicant is qualified
 B = applicant has high grade point average
 C = applicant has excellent recommendations
 D = applicant is admitted

$$p(A|D) = ?$$

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Calculate the probability of A when D is known to be true.

Note that you can safely assume that every variable is binary and that the two values of A , for example, are “applicant is qualified” which we write as “ A ” and “applicant is not qualified” which we write as “ $\neg A$ ”.

Note also that you can establish this *without* using the message passing algorithm.

(35 points)