Homework 4

CS 3793/5233 – Fall 2016 — assigned October 20, 2016
Tom Bylander, Instructor — due November 7, 2016

1. Consider the planning problem in Exercise 8.5.

   (a) (20 pts.) Provide precondition(s) and effect(s) for each action. It will be easier if you replace the move action with two actions: move_lr and move_gar.

   (b) (20 pts.) Assume the initial state is:

   Lr_dusty, Gar_dusty, Lr_dirty_floor, Gar_dirty_floor, Dustcloth_clean, Rob_loc=Garage

   And the goal is:

   ¬Lr_dusty ∧ ¬Gar_dusty ∧ ¬Lr_dirty_floor ∧ ¬Gar_dirty_floor

   Show a sequence of actions that acheive the goal. Show each intermediate state.

2. Consider the decision network in Exercise 9.2.

   (a) (20 pts.) Determine P(Trouble2 | values for Cheat1, Trouble1, and Cheat2). Note that Cheat1=false and Trouble1=true is not possible with the given probabilities. Also, note that there is a separate probability distribution for each combination of values to Cheat1 and Cheat2.

Cheat1	Trouble1	Cheat2	P(Trouble2=true | Cheat1, Trouble1, Cheat2)
true	true	true	
true	true	false	
true	false	true	
true	false	false	
false	false	true	
false	false	false	

   (b) (20 pts.) Based on the probabilities in the previous answer, determine the expected utility of the following situations.

Cheat1	Trouble1	Cheat2	Expected Utility
true	true	true	
true	true	false	
true	false	true	
true	false	false	
false	false	true	
false	false	false	

   Note that for the first row, Cheat2=true. The utility will be a weighted combination of 30 (when Trouble2=true) and 100 (when Trouble2=false). The probabilities you calculated in part a tell you how much to weight these utility values.

(c) (10 pts.) What is an optimal decision function for the variable Cheat2? Note that the decision on Cheat2 depends on the values for Cheat1 and Trouble1.

(d) (10 pts.) What is an optimal decision function for the variable Cheat1? Note that Cheat1 has no parents, so the answer is either Cheat1=true or Cheat1=false.