

Knowledge Representation Workshop 5

CITS3005

August 29, 2023

The Monty Hall Problem

The Monty Hall problem is named for its similarity to the Let's Make a Deal television game show hosted by Monty Hall. The problem is stated as follows. Assume that a room is equipped with three doors. Behind two are goats, and behind the third is a shiny new car. You are asked to pick a door, and will win whatever is behind it. Let's say you pick door 1. Before the door is opened, however, someone who knows what's behind the doors (Monty Hall) opens one of the other two doors, revealing a goat, and asks you if you wish to change your selection to the third door (i.e., the door which neither you picked nor he opened). The Monty Hall problem is deciding whether you do.

1. What is the best strategy to apply in this scenario, and why?
2. Represent the problem as a Bayesian reasoning problem, and verify the strategy is correct.
3. How does this strategy generalise to more doors?
4. Can you implement and verify the strategy is optimal in ProbLog?
5. In the "Monty Fall" problem, Monty Hall opens the door at random, and it just happens to be goat. Can you adjust your program to reflect the Monty Fall scenario. Does this change anything?
6. What happens if Monty Hall is drunk, and forgets which door the car is behind (with some unknown probability). Can you apply *learning from information* to discover an optimal strategy.