Knowledge Representation Laboratory 5:
Learning

CITS3005

This laboratory will continued the problog tutorial and build some simple programs ProbLog2 to examine the Monty Hall problem.

1. Continue to work through the ProbLog tutorial at `https://dtai.cs.kuleuven.be/problog/tutorial.html`, particularly the *Parameter Learning*, , *Sampling*, *Most Probable Explanation* and *Decision Theory* sections.

2. Implement the Monty Hall puzzle, discussed in lectures, in ProbLog2 and confirm that the optimal strategy is to switch.

3. Extend the Monty Hall puzzle to have *four* doors, where the player is given two opportunities to switch. What is the best strategy in these circumstances?

4. Modify the problem so that the host chooses which door to open randomly. Given the door opened is a goat (use `evidence`), what is the value of switching?

5. Apply *sample* to generate many examples of the a player using a fixed probability of switching, to see how often they win. Can you apply *learning from information* `lfi` to reconstruct the players switch probability given the game outcomes?

6. **Challenge** Apply the Decision Theoretic module top determine the optimal strategy when there are three prizes, a, b, c, with value $v(a), v(b), v(c)$ and when the host choose to opens a door with prize x behind it ($d(x)$) given the other door has prize y behind it, the host uses probability $\frac{v(x)}{v(x)+v(y)}$.