Universidade da Beira Interior
Departamento de Informática
Inteligência Artificial

Practical exercises 4

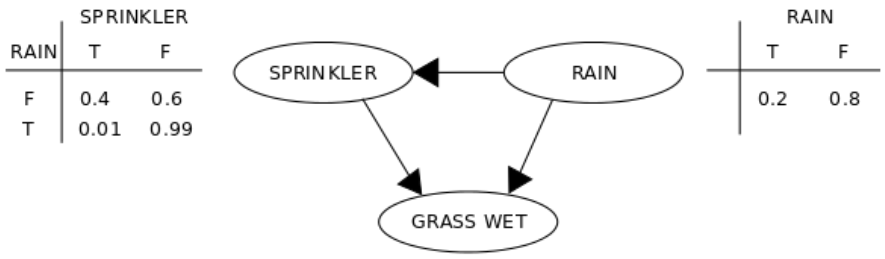
Ano letivo 2016-17

Exercises

1. Learn how to solve the 3 door problem using the code supplied (`ex1.py`) and the PDF with the detailed description (`Bayesian.pdf`).

2. Modify the previous exercise to allow for the possibility that there are 4 doors instead of 3. What is the probability the we can win the prize if we choose to change our door choice after the host opens one of the doors?

3. Consider the following example discussed in the theoretical class:



RAIN	SPRINKLER T	SPRINKLER F
F	0.4	0.6
T	0.01	0.99

RAIN T	RAIN F
0.2	0.8

SPRINKLER	RAIN	GRASS WET T	GRASS WET F
F	F	0.0	1.0
F	T	0.8	0.2
T	F	0.9	0.1
T	T	0.99	0.01

Model this Bayesian network using code similar to the one developed in the previous exercises. Confirm that your implementation is correct: you should obtain the following marginal probabilities

```
>>> g.q()
+-----------+-------+----------+
| Node      | Value | Marginal |
+-----------+-------+----------+
| grass_wet | False | 0.551620 |
| grass_wet | True  | 0.448380 |
| rain      | False | 0.800000 |
| rain      | True  | 0.200000 |
| sprinkler | False | 0.678000 |
| sprinkler | True  | 0.322000 |
+-----------+-------+----------+
```

Now use your model to answer the following questions:

(a) What is the probability that the grass not is wet?

(b) What is the probability that it is raining given that you see the grass wet? (compare with the calculations done in the theoretical class)

(c) What is the probability that the sprinkler is turned off given that the grass is not wet and there is no rain?