

COMP9016 Lab #6

Dr Ruairi O'Reilly

November 4, 2019

1 PROBABILITY

It is critical for the successful completion of the second assessment that you have a competent understanding of Probability. Launch your IDE, Jupyter Notebook. Navigate to and click on “probability.ipynb” - You are to review this notebook as it will provide you with a grounding in the practical implementation of probability using python.

1.1 PROBABILITY DISTRIBUTION - BASICS

You have an unbiased six-sided dice a . The die is rolled twice to generate the outcomes X_1 and X_2 . Using the code made available from the AIMA data repo, calculate the probability of generating SnakeEyes (1,1 - each 1 is rolled in succession rather than two dice together) and print out the probability:

Expected output: “Probability of Snake Eyes is X” where X is the probability

1.2 CONSTRUCTING A BAYESIAN NETWORK

Construct a Bayes net using the BayesNet class for the following scenario:

You have a daily commute to work, a number of considerations that can affect your commute. You also have a temperamental boss, if your late he/she will typically berate you over the phone which will leave you feeling dejected for the day. Sometimes you use the Motorway to make up time and avoid being late

Variables: Traffic (T), Rain (R), Motorway (M), Late (L), BossCalls (B)

Network Topology:

- Sometimes you decide to take the Motorway

P (R)	P(T)	P(M)	L	P(B L)	R	T	M	P(L R,T,M)
.41	.15	.01	T	.8	T	T	T	.80
			F	.1	T	T	F	.98
					T	F	T	.2
					T	F	F	.3
					F	T	T	.25
					F	T	F	.24
					F	F	T	.001
					F	F	F	.05

- Rain can result in you being late
- Traffic can result in you being late.
- Being late can cause your boss to call.

1. Draw the Bayesian Network
2. Using the BayesNode code from the AIMA repository create a Bayesian Network (BN) based on this scenario.
3. Write a query to output the CPT for the “Late” node.
4. Using the BN from Qii, write the python query to answer the following queries:
 - You took the Motorway
 - The boss does not call given that you are late
 - You are late when its raining & there is traffic as you took the Motorway

1.3 PROBABILITY DISTRIBUTION - BASICS

1.4 REVIEW

Congrats on having completed your lab on first order probability, this is a necessary topic for pursuing some of our later work as part of COMP9016!