Machine Learning

Bayesian Network

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Outline

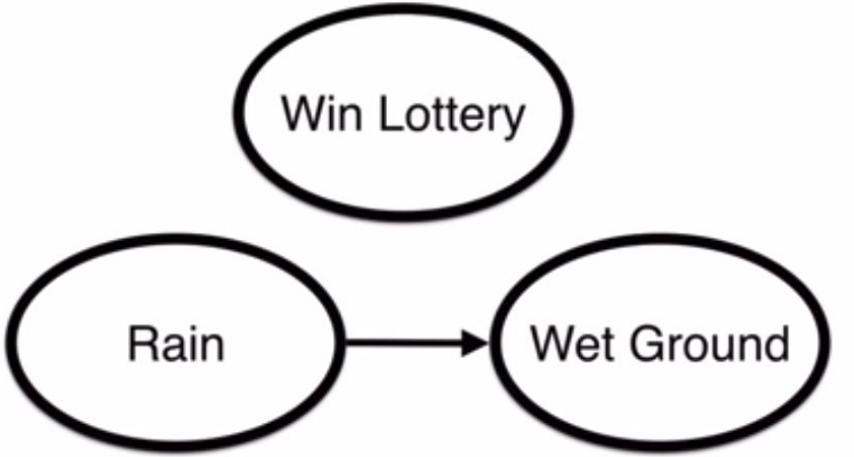
1. Bayes' Theorem
2. Bayes Network
3. Weka
4. References

Bayes' Theorem

$$p(Y|X) = \frac{p(X|Y)p(Y)}{p(X)}$$

- Comments:
  - Bayes' rule tells us how to 'invert' conditional probabilities, i.e. to find P(B|A) from P(A|B).

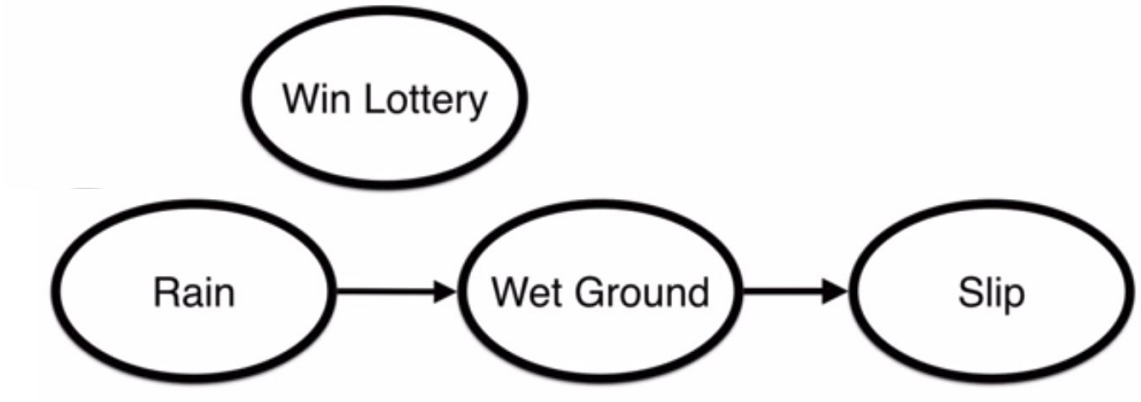
Bayes Network



$$\mathrm{P}(L, R, W) =$$

[ ] https://www.youtube.com/watch?v=TuGDMj43ehw

Bayes Network

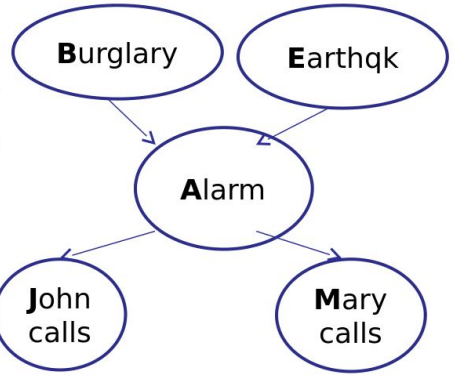


$$\mathrm{P}(L, R, W, S) =$$

[ ] https://www.youtube.com/watch?v=TuGDMj43ehw

Bayes Network

B	P(B)
+b	0.001
-b	0.999



E	P(E)
+e	0.002
-e	0.998

B	E	A	P(A|B,E)
+b	+e	+a	0.95
+b	+e	-a	0.05
+b	-e	+a	0.94
+b	-e	-a	0.06
-b	+e	+a	0.29
-b	+e	-a	0.71
-b	-e	+a	0.001
-b	-e	-a	0.999

A	J	P(J|A)
+a	+j	0.9
+a	-j	0.1
-a	+j	0.05
-a	-j	0.95

A	M	P(M|A)
+a	+m	0.7
+a	-m	0.3
-a	+m	0.01
-a	-m	0.99

$$P(+b, -e, +a, -j, +m) =$$

Weka

Download & commands

- https://www.cs.waikato.ac.nz/ml/weka/downloading.html

```
$ cd weka*
$ java -jar weka.jar
$ curl https://archive.ics.uci.edu/ml/machine-learning-databases/iris/iris.data --output iris.csv
```

References

- https://machinelearningmastery.com/load-csv-machine-learning-data-weka/
- https://www.youtube.com/watch?v=tpH905jiBZ0
- http://web.ydu.edu.tw/~alan9956/docu/refer/BayesWEKA.pdf
- https://www.youtube.com/watch?v=TuGDMj43ehw
- Artificial Intelligence: A Modern Approach http://aima.cs.berkeley.edu/
- CS 5804: Introduction to Artificial Intelligence http://courses.cs.vt.edu/cs4804/Fall16/
- UC Berkeley CS188 Intro to AI -- Course Materials http://ai.berkeley.edu/lecture_slides.html
- JavaBayes - https://www.cs.cmu.edu/~javabayes/Home/node3.html

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