Probability notes: Barber

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Chapter 1

Probability refresher

The summation of probability over all the states is 1:
$\sum p(x = x) = 1$
This is called the *normalisationcondition*.
Two variables x and y can interact though:
$p(x = aory = b) = p(x) + p(y) - p(x = aandy = b)$
Shorthand $p(x, y)$ is used for $p(xandy)$.

Marginal

Definition: Marginals

A marginal gives the probabilities of various values within a set, without reference to other variable values. This is the opposite to conditional probability, where the values are dependent on other variables.

Given a joint distribution p(x, y) the distribution of a single variable is given by: $p(x) = \sum p(x, y)$

Here, p(x) is termed a marginal of the joining probability distribution p(x, y). The process of computing a marginal from a joining distribution is called marginalisation.

Conditional probability/Bayes rule

$p(a, b) = p(a|b)p(b)$ and thus $p(a|b) = \frac{p(a,b)}{p(b)}$ The probability of event x conditioned on knowing event y (or more shortly, the probability of x given y) is defined as:
$p(x|y) = \frac{p(x,y)}{p(y)}$

Chapter 2

Appendix

2.1 Glossary

Definition: Marginals

A marginal gives the probabilities of various values within a set, without reference to other variable values. This is the opposite to conditional probability, where the values are dependent on other variables.