Review: Decision Trees

Tuesday, April 9, 2019 3:35 PM

calculating probabilities for a known situation?

yes

no, all you have is a sample

do you have a random variable?

no

yes, where
X = number of events/successes
or X = some measurement (time)

see below

classical probability

- all outcomes are equally likely
- write out sample space, use multiplication rule, addition rule

contingency table

	A	$\bar{A}$
B		
$\bar{B}$		

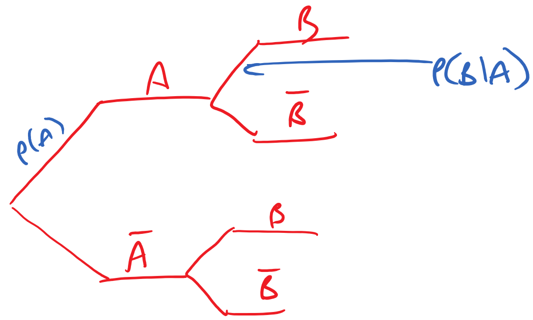
$\bar{B}$ |

$$P(A \mid B) = \frac{P(AB)}{P(B)}$$

$$P(A \text{ or } B) = P(A) + P(B) - P(\text{both})$$

$$P(A \mid B) \stackrel{?}{=} P(A)$$

tree diagram



- good method if given conditional probabilities

Bayes' theorem

- given $P(A \mid B)$, what's $P(B \mid A)$?

combination/permutation

- unordered/ordered arrangement of r objects chosen without repetition from n possibilities

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we have a random variable x
x = number of events/successes

x = number of events/successes

or x = some measurement

discrete

binomial - yes/no
- fixed number of identical trials

hypergeometric — fixed number of trials but without replacement, so p changes from trial to trial
- can approximate with binomial if $n < N/20$

Poisson — events in space/time; no max number of events

we give you $p(x)$

x	$p(x)$
0	0.4
1	0.1
2	?

$\Sigma = 1$

all of these:

continuous

some function $f(x)$

uniform

exponential

integrate

$$\int_{-\infty}^{\infty} f(x)\,dx = 1$$

$$\mu = \int_{-\infty}^{\infty} x f(x)\,dx$$

$$\sigma^2 = \int_{-\infty}^{\infty} x^2 f(x)\,dx - \mu^2$$

normal - use normal table

note: can use normal to approx binomial if $np > 5$ and $nq > 5$, then $\mu = np$, $\sigma = \sqrt{npq}$

continuous: what if you have a graph

→ Central Limit Theorem

all of these:

$$\mu = \sum x\,p(x)$$

$$\sigma^2 = \sum x^2 p(x) - \mu^2$$

$\rightarrow$ Central Limit Theorem