DD office 1.5 hour session 23 Apr 20

natural language | math

STAT 131 23 Apr 20

①

haphazardly meet a person

choosing that person in a like-at-random fashion

90% of attendees are economists (E)

relative frequency

$P\left(\begin{array}{c}\text{a person} \\ \text{randomly chosen} \\ \text{from among} \\ \text{the conference} \\ \text{attendees is E}\end{array}\right) = 0.9$

$P(E) = 0.9$

$p = P(st \mid sh) = 0.37$

$= P(\text{unknown} \mid \text{data})$

unknown = st or E

data = sh

$p(\text{win a prize}) = p(\underline{GP} \text{ or } \underline{\$1M} \text{ or } \underline{\$50k} \text{ or } \ldots \text{ or } (\$4 \text{ R}))$

no overlap

$$= p(GP) + p(\$1M) + \ldots + p(\$4 \text{ R})$$

$$= \frac{1}{292201338} + \frac{1}{11688053.\underline{52}} + \ldots + \frac{1}{38.\underline{32}}$$

$$\doteq \frac{1}{24.87}$$

③ $p(A \mid \underline{W=B}) = ?$ unknown data $(? \tfrac{1}{2})$

$$= \frac{p(A)\, p(W=B \mid A)}{p(W=B)}$$

$p(A) = \frac{1}{3}$

$\frac{1}{2}$

let's compute $p(W=B)$ directly by partitioning over the truth

unknown (truth)

$A = (A \text{ gets pardon})$

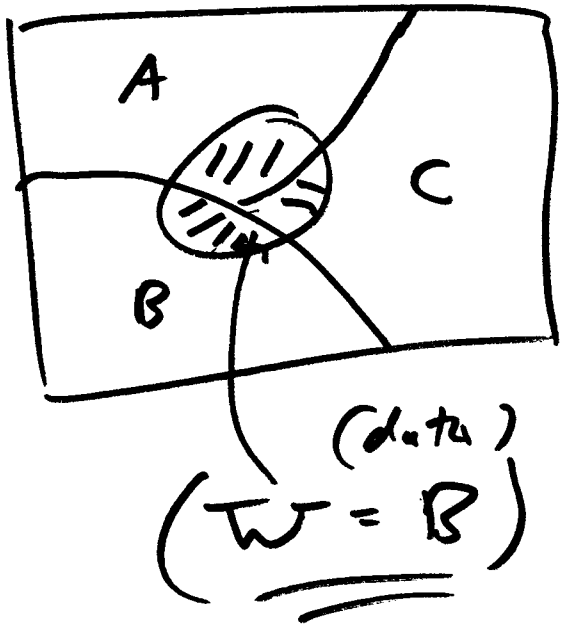
$B = (B \text{ ——})$

$C = (C \text{ ——})$

data

$(W = x) = \quad x = \{A, B, C\}$

(warden says x won't get pardon)



$$P(W = B) =$$

$$P(\underline{W = B}, A) +$$

$$P(W = B, B) +$$

$$P(W = B, C)$$

$$= \overset{\frac{1}{3}}{P(A)} \cdot \overset{\frac{1}{2}}{P(W = B \mid A)} +$$

$$\overset{\frac{1}{3}}{P(B)} \cdot \overset{0}{\underline{P(W = B \mid B)}}$$

$$+ \overset{\frac{1}{3}}{P(C)} \cdot \overset{1}{P(W = B \mid C)}$$

$$= \frac{1}{6} + 0 + \frac{1}{3} = \frac{1}{2}$$

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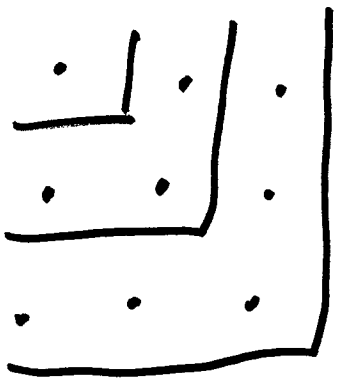
so $\underline{P(A \mid W = B)} = \dfrac{\frac{1}{3} \cdot \frac{1}{2}}{\frac{1}{2}} = \frac{1}{3}$

$$= P(A)$$

(meta-code)
(process)
how to solve
applied math
problems

If general situation
is too abstract
to support useful
insights, (get
play feel):
write down a special
case and play with it.



$$1 = 1 = 1^2$$

$$1 + 3 = 4 = 2^2$$

$$1 + 3 + 5 = 9 = 3^2$$

$$1 + 3 + \cdots + (2n-1) = n^2$$

for all integers $n \geq 1$

(proof by induction)

$n = 7$

$r = 2$

create quality scores (0 - 100)

Equality pool						
81	67	58	72	88	?	?
						← stop and hire
81	67	92	?	?	?	?
		← stop and hire				
81	67	58	72	26	13	59
						← stop & hire

$i = 3$

P(best among first 3 is one of first 2) = $\frac{2}{3}$

ELM ? → $= \frac{r}{i}$

since candidates arrive in quality-random order, the ELM applies to any single slot having the best person in it: $\frac{r}{i}$

slots → r

total slots → i