Probabilities and probability distributions

CS5811
October 5, 2020
Monday
1

$p(1)$ = anything from 0 to 1

$\mathbb{P}(\text{Dieroll}) = \langle \frac{1}{6}, \frac{1}{6}, \frac{1}{6}, \frac{1}{6}, \frac{1}{6}, \frac{1}{6} \rangle$ probability distribution

1 2 3 4 5 6

$\mathbf{P}$ $\mathbb{P}$

$\mathbf{P}(\text{Coin Toss}) = \langle \frac{1}{2}, \frac{1}{2} \rangle$

H T

$\alpha \langle 0.2, 0.2 \rangle$

$\alpha = \frac{1}{0.4}$

$\langle \frac{0.2}{0.4}, \frac{0.2}{0.4} \rangle$

$\langle 0.5, 0.5 \rangle$

$\alpha \langle 0.5, 0.5 \rangle$

world: coin toss, roll die

50

2^{50}

probability:

frequency : $\dfrac{\text{desired outcome}}{\text{total number of outcomes}}$

subjective :

1. $P(r) = \dfrac{149}{478} = 0.31$

$$P(S=r) = \frac{\cancel{\#}(S=r)}{(S=r)+(S=s)+(S=u)}$$

$$= \frac{149}{149+151+178}$$

2. $P(S) = \alpha \langle \underset{r}{149}, \underset{s}{151}, \underset{u}{178} \rangle$

$$= \langle 0.31, 0.32, 0.37 \rangle$$

3. $P(r, a, n) = \dfrac{13}{478} = 0.03$

4. $P(\underset{S}{\cancel{r}}, \underset{I}{a}) = \dfrac{29+13}{478} = \dfrac{42}{478} = 0.09$

hidden variable(s)

$P(r, a, H)$

hidden variable (Has a pet)

$$\frac{\overset{r,a,H=y}{29} + \overset{r,a,H=n}{13}}{478}$$

5. $\mathbb{P}(\underbrace{r, a}, H) = \alpha \langle 29, 13 \rangle$

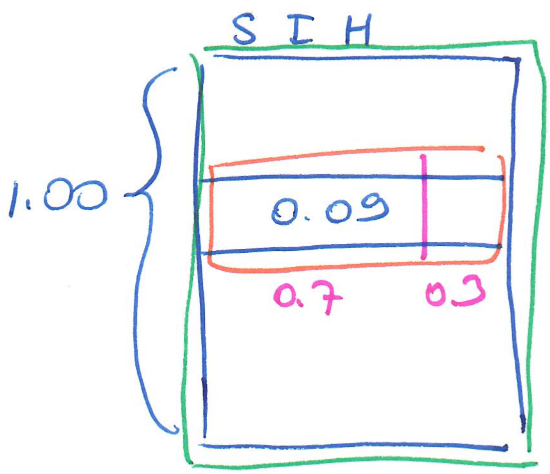
the "world" is now

$S = r$ and $I = a$

$= \left\langle \frac{29}{42}, \frac{13}{42} \right\rangle$

$= \langle 0.7, 0.3 \rangle$

Taking the results of #4 and #5 how can we compute $P(r, a, y)$?



a, a $S=r$ $I=a$

$\langle 0.7, 0.3 \rangle$

$0.09 \times 0.7 = 0.063$

$\frac{42}{478} \times \frac{29}{42}$

$\frac{\cancel{42}}{478} \times \frac{29}{\cancel{42}} = \frac{29}{478}$

$= 0.063$

6. $\mathbb{P}(r, I, H)$

for next time