Ryan Schraeder
10/16/2022

Naive Bayes Corrections

1b) Probability of pleading guilty given not sent to prison: 50%

Probability of not sent to prison and pleading guilty ($P(\sim P \mid G)$)

$$P(\sim P \mid G) = \frac{P(G \mid \sim P) \times P(\sim P)}{P(G \mid \sim P) \times P(\sim P) + P(G \mid P) \times P(P)}$$

$$= \frac{.50 \times .58}{.5 \times .58 + .38 \times .42}$$

$$= \frac{.29}{.4496}$$

$$= .645 \rightarrow \underline{65\%}$$

1d) Probability of pleading guilty and being sent to prison

$$P(P \mid G) = \frac{P(G \mid P) \times P(P)}{P(G \mid P) \times P(P) + P(G \mid \sim P) \times P(\sim P)}$$

$$= \frac{.38 \times .42}{(.38 \times .42) + (.5 \times .58)}$$

$$= \frac{.1596}{.45} \rightarrow .355 \rightarrow \underline{35.5\%}$$

2.3 $P(\text{Car Type} = \text{Family}) = 4/20$

$P(\text{Class C0}) = 10/20$

$P(\text{Car Type} = \text{Family} \cap \text{Class C0}) = 1/20$

$P(\text{Car Type} = \text{Family} \mid \text{Class C0}) = 1/20 \div 10/20$

$= .05 / .5$

$= .1$ or 10%

2.4 $P(\text{Car Type} = \text{Family} \mid \text{Class C1}) = \dfrac{P(\text{Car Type} = \text{Family} \cap \text{Class C1})}{P(\text{Class C})}$

$= 3/20 \div 10/20$

$= .15 \div .5$

$= .3$ or 30%

2.5 $P(\text{Size M} \mid \text{Class C0}) = \dfrac{P(\text{Size M} \cap \text{Class C0})}{P(\text{Class C0})}$

$= 3/20 \div 10/20$

$= .15 \div .5$

$= .3$ or 30%

2.6 $P(\text{Size M} \mid \text{Class C1})$

$= P(\text{Size M} \cap \text{Class C1}) / P(\text{Class C1})$

$= 4/20 \div 10/20 = .4$ or 40%