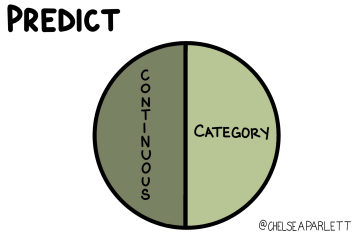
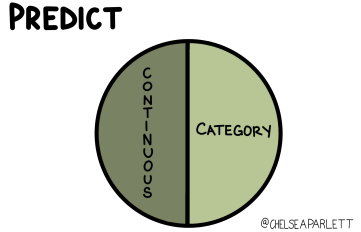


Naive Bayes

Chelsea Parlett-Pelleriti

Bayes



$$P(\text{outcome} \mid x_1, x_2, x_3 \ldots) =$$

$$\frac{P(x_1, x_2, x_3 \ldots \mid \text{outcome}) \cdot P(\text{outcome})}{P(x_1, x_2, x_3)}$$

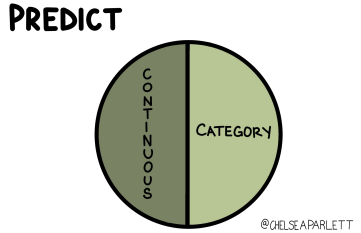
$$P(A \mid B) = \frac{P(B \mid A) * P(A)}{P(B)}$$

♡ = heart attack
S = smoke
D = diabetes
O = obese

$$P(♡ \mid S, D, O) = \frac{P(S, D, O \mid ♡) * P(♡)}{P(S, D, O)}$$

$$P(♡\!\!\!/ \mid S, D, O) = \frac{P(S, D, O \mid ♡\!\!\!/) * P(♡\!\!\!/)}{P(S, D, O)}$$

Naive

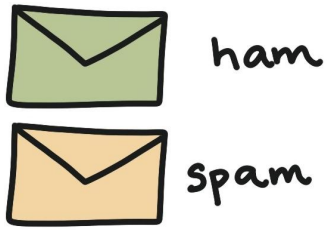


$$P(S, D) = P(S) \cdot P(D|S)$$

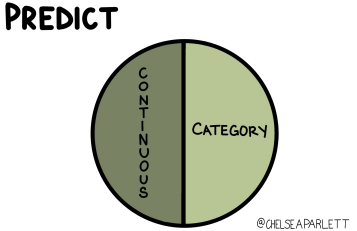
iff $P(D|S) = P(D)$

they're independent

Example



is_spam	viagra	love	dollar	buy
0	0.03	0.36	0.02	0.02
1	0.32	0.05	0.83	0.74



$$P(\text{outcome} \mid x_1, x_2, x_3 \ldots) = \frac{P(x_1, x_2, x_3 \ldots \mid \text{outcome}) \cdot P(\text{outcome})}{P(x_1, x_2, x_3)}$$

$$P(\text{outcome} \mid x_1, x_2, x_3 \ldots) = \frac{P(x_1, x_2, x_3 \ldots \mid \text{outcome}) \cdot P(\text{outcome})}{P(x_1, x_2, x_3)}$$

$$P(\text{outcome} \mid x_1, x_2, x_3 \ldots) = \frac{P(x_1, x_2, x_3 \ldots \mid \text{outcome}) \cdot P(\text{outcome})}{P(x_1, x_2, x_3)}$$