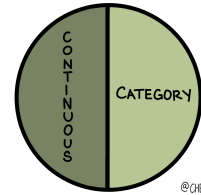


PREDICT



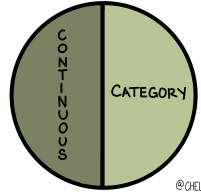
@CHELSEAPARLETT

Naive Bayes

Chelsea Parlett-Pelleriti

Bayes

PREDICT



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$$P(\text{outcome} | x_1, x_2, x_3 \dots) =$$

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

$$\frac{P(x_1, x_2, x_3 \dots | \text{outcome}) \cdot P(\text{outcome})}{P(x_1, x_2, x_3)}$$

♥ = heart attack

S = smoke

D = diabetes

O = obese

$$P(\text{♥} | S, D, O) =$$

$$P(S, D, O | \text{♥}) * P(\text{♥})$$

$$P(S, D, O)$$

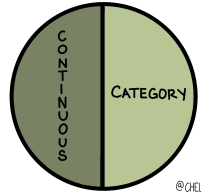
$$P(\cancel{\text{♥}} | S, D, O) =$$

$$P(S, D, O | \cancel{\text{♥}}) * P(\cancel{\text{♥}})$$

$$P(S, D, O)$$

Naive

PREDICT

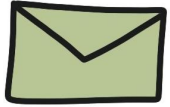


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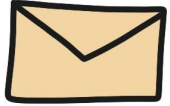
$$P(S, D) = P(S) \cdot P(D|S)$$

iff $P(D|S) = P(D)$
they're independent

Example

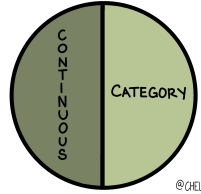


ham



spam

PREDICT



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

$$P(\text{outcome} | x_1, x_2, x_3 \dots) =$$

$$\frac{P(x_1, x_2, x_3 \dots | \text{outcome}) \cdot P(\text{outcome})}{P(x_1, x_2, x_3)}$$

$$P(\text{outcome} | x_1, x_2, x_3 \dots) =$$

$$\frac{P(x_1, x_2, x_3 \dots | \text{outcome}) \cdot P(\text{outcome})}{P(x_1, x_2, x_3)}$$

$$P(\text{outcome} | x_1, x_2, x_3 \dots) =$$

$$\frac{P(x_1, x_2, x_3 \dots | \text{outcome}) \cdot P(\text{outcome})}{P(x_1, x_2, x_3)}$$