Axioms of Probability

$$0 \leq P(A) \leq 1$$

$$P(\text{true}) = 1 \qquad P(\text{false}) = 0.$$

$$P(A \vee B) = P(A) + P(B) - P(A \wedge B)$$

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

If A and B are independent:

$$P(A \wedge B) = P(A)P(B)$$

$$P(H \mid E) = \frac{P(E \mid H)P(H)}{P(E)}$$

Bayesian categorization:

$$P(c_i \mid E) = \frac{P(c_i)P(E \mid c_i)}{P(E)}$$

Naïve Bayes:

$$P(E \mid c_i) = P(e_1 \wedge e_2 \wedge \cdots \wedge e_m \mid c_i) = \prod_{j=1}^{m} P(e_j \mid c_i)$$

Laplace Smoothing:

$$P(e_j \mid c_i) = \frac{n_{ij} + mp}{n_i + m}$$

$$_i \mid)$$