Introduction to Data Science

Naive Bayes Classifier

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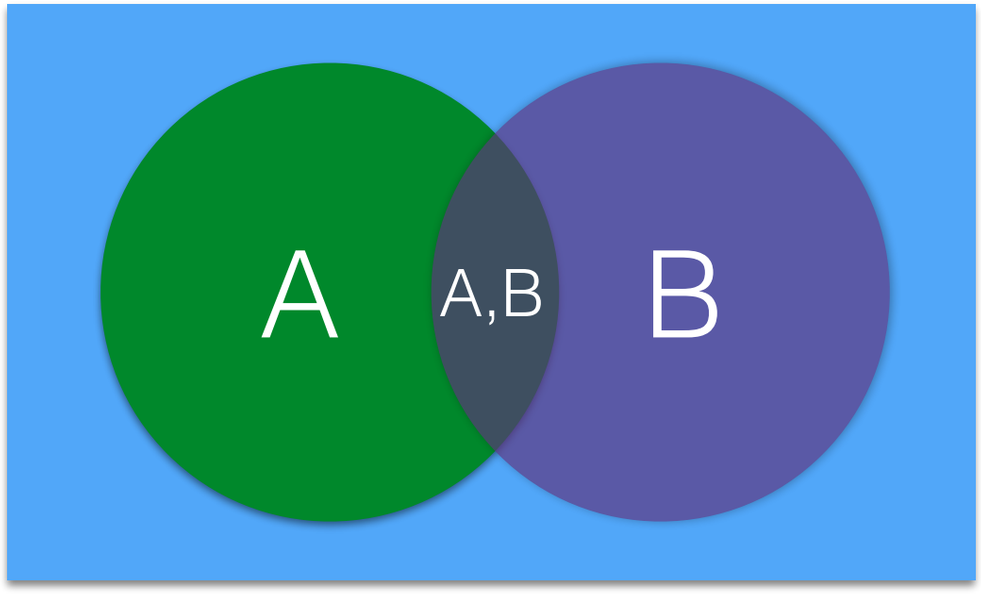
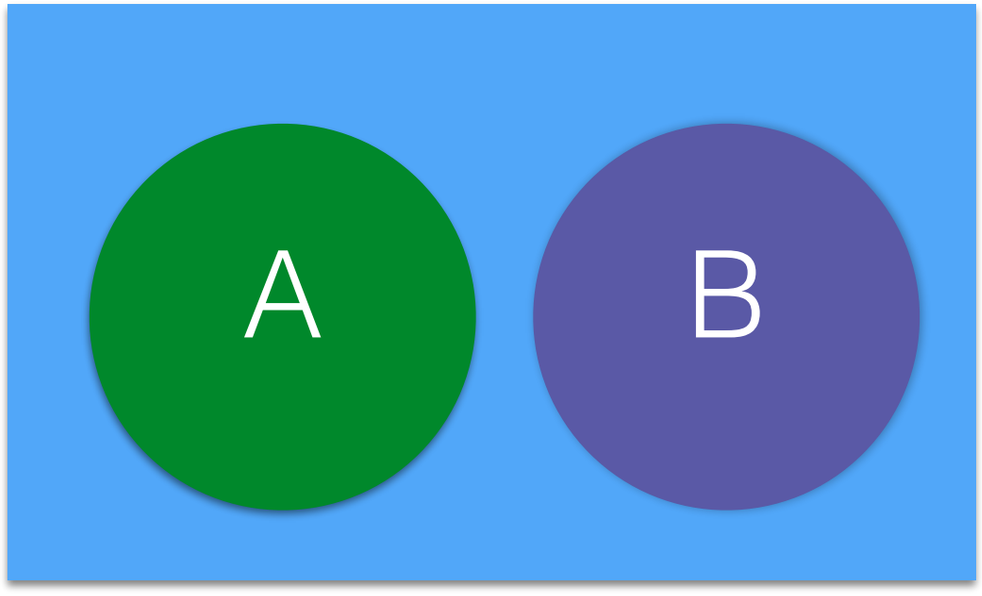
Conditional Probability

$$p(A|B) = \frac{p(A,B)}{p(B)} \qquad p(B|A) = \frac{p(B,A)}{p(A)}$$





Bayes Theorem

$$p(B|A) = \frac{p(B,A)}{p(A)} \qquad p(A|B) = \frac{p(A,B)}{p(B)}$$

$$p(A,B) = p(B|A) * p(A) = p(A|B) * p(B)$$

$$p(A|B) = \frac{p(B|A)p(A)}{p(B)}$$

Bayes Classifier

$$p(App|Tweet) > p(Other|Tweet)$$

Bayes Theorem $p(A|B) = \frac{p(B|A)p(A)}{p(B)}$

$$\Rightarrow p(App|Tweet) = \frac{p(Tweet|App)p(App)}{p(Tweet)}$$

Bayes Classifier

$$p(A, B) = p(B|A) * p(A)$$

$$p(App, Tweet) = p(Tweet|App) * p(App)$$

$$p(Tweet|App) * p(App) = p(w_1, w_2, w_3, ...|App) * p(App)$$

$$= p(w_1|App) * p(w_2, w_3, ...|App, w_1) * p(App)$$

$$= p(w_1|App) * p(w_2|App, w_1) * p(w_3, ...|App, w_1, w_2) * p(App)$$

Naive Bayes Classifier

$$p(w_i|App, w_j) = p(w_i|App)$$
$$p(w_i|App, w_j, w_k) = p(w_i|App)$$

Independence

$$p(w_1|App) * p(w_2|App, w_1) * p(w_3, ...|App, w_1, w_2) * p(App)$$

$$p(w_1|App) * p(w_2|App) * p(w_3|App) * ... * p(App)$$

Naive Bayes Classifier

$$p(w_1|App) * p(w_2|App) * ... > p(w_1|Other) * p(w_2|Other) * ...$$