

Boeing	Airbus
0,06	0,03
0,75	0,25

$$P(d) = 0,75 \cdot 0,06 + 0,25 \cdot 0,03 =$$

$$= 0,0525$$

$$P(B|d) = \frac{P(B) \cdot P(d|B)}{P(d)} = 0,757$$

$$P(B) = 0,75$$

$$P(A) = 0,25$$

$$P(d|A) = 0,03$$

$$P(d|B) = 0,06$$

$$P(d) = ?$$

$$P(B|d) = ?$$

$$P(S) = 0,27; P(\bar{S}) = 0,73$$

$$P(\text{"urgent"} | S) = 0,46$$

$$P(\text{"urgent"} | \bar{S}) = 0,19$$

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$$P(S | \text{"urgent"}) = ?$$

$$P(\text{urgent}) = 0,27 \cdot 0,46 +$$

$$+ 0,19 \cdot 0,73 = 0,26$$

$$P(S | \text{"urgent"}) = \frac{P(S) \cdot P(\text{urgent} | S)}{P(\text{urgent})}$$

$$= 0,47$$

$$P(\bar{S} | \text{"urgent"}) = 0,51$$

Fast	Label
urgent, winner	1

$$p(S) = \frac{\text{len}(\text{spam})}{\text{len}(\text{all})}$$

$$p(N/S) = ?$$

$$p(w_{\text{new}}) = \frac{N_{\text{spam}} \cdot \alpha}{N_{\text{all}} + N_{\text{voc}} \cdot \alpha}$$

$\alpha = 1$  no normalization.

$N_{\text{voc}}$ : unique words count

$$P(S / "w" \cap "u") = \frac{P(S \cap "w" \cap "u")}{P("w" \cap "u")}$$

$$P(S / "w") = \frac{P(S) \cdot P(w|S)}{P("w")}$$

$$= \frac{P(S \cap "w") \cdot P("u" / S \cap "w")}{P("u") \cdot P("w" \cap "u")}$$

$$= \frac{P(S) \cdot P(w|S) \cdot P("u" / S \cap "w")}{P(w) \cdot P(u) \cdot P(w \cap u)}$$

$$= P(S) \cdot P('w' / S) \cdot P('u' / S \cap 'w') \propto P(S) \cdot P(w/S) \cdot P(u/S)$$

inner  
SPAM

→ Urgent?

$$P(nS / 'w' \cap 'u') = P(nS) \cdot P('w' / nS) \cdot P('u' / nS)$$

New text ^ Hello, nice weekend!

$P(S / \text{"Hello"} \cap \text{"nice"} \cap \text{"weekend"}) \propto$

$P(S) \cdot P(\text{"Hello"} / S) \cdot P(\text{"nice"} / S) \cdot P(\text{"w"} / S).$