

Machine Learning Assignment 55

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Problem 1

(a) *No errors, no links.*

$$\begin{aligned}
 P(\text{scam}) &= \frac{4}{10} &= \frac{2}{5} \\
 P(\text{not scam}) &= \frac{6}{10} &= \frac{3}{5} \\
 P(\text{scam}) \prod_{\substack{\text{observed} \\ \text{features}}} P(\text{feature} | \text{scam}) &= \frac{2}{5} * \left(\frac{0 \text{no errors}}{4} * \frac{1 \text{no links}}{4} \right) \\
 &= 0 \\
 P(\text{not scam}) \prod_{\substack{\text{observed} \\ \text{features}}} P(\text{feature} | \text{not scam}) &= \frac{3}{5} * \left(\frac{5 \text{no errors}}{6} * \frac{3 \text{no links}}{6} \right) \\
 &= \frac{1}{4}
 \end{aligned}$$

(a) *Contains errors, contains links.*

$$\begin{aligned}
 P(\text{scam}) \prod_{\substack{\text{observed} \\ \text{features}}} P(\text{feature} | \text{scam}) &= \frac{2}{5} * \left(\frac{4 \text{errors}}{4} * \frac{3 \text{links}}{4} \right) \\
 &= \frac{3}{10} \\
 P(\text{not scam}) \prod_{\substack{\text{observed} \\ \text{features}}} P(\text{feature} | \text{not scam}) &= \frac{3}{5} * \left(\frac{1 \text{error}}{6} * \frac{3 \text{links}}{6} \right) \\
 &= \frac{1}{20}
 \end{aligned}$$

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P(\text{scam}) \prod_{\substack{\text{observed} \\ \text{features}}} P(\text{feature} | \text{scam}) &= \frac{2}{5} * \left(\frac{4\text{errors}}{4} * \frac{1\text{no links}}{4} \right) \\
&= \frac{1}{10} \\
P(\text{not scam}) \prod_{\substack{\text{observed} \\ \text{features}}} P(\text{feature} | \text{not scam}) &= \frac{3}{5} * \left(\frac{1\text{error}}{6} * \frac{3\text{no links}}{6} \right) \\
&= \frac{1}{20}
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P(\text{scam}) \prod_{\substack{\text{observed} \\ \text{features}}} P(\text{feature} | \text{scam}) &= \frac{2}{5} * \left(\frac{0\text{no errors}}{4} * \frac{3\text{links}}{4} \right) \\
&= 0 \\
P(\text{not scam}) \prod_{\substack{\text{observed} \\ \text{features}}} P(\text{feature} | \text{not scam}) &= \frac{3}{5} * \left(\frac{5\text{no error}}{6} * \frac{3\text{links}}{6} \right) \\
&= \frac{1}{4}
\end{aligned}$$