Exercise 1. Naïve Bayes (Homework)

Suppose you want to recognize good and bad items produced by your company. You are able to measure two properties of each item (P1 and P2) and express them with Boolean values. You randomly grab several items and test if they are good or bad, obtaining the following results:

P1	P2	result
Y	Y	good
Y	N	bad
N	N	good
N	Y	bad
Y	N	good
N	N	good

Use Naïve Bayes to predict the class, *good* or *bad,* of the following new item: P1=N, P2=Y. If there are ties, make a random choice.

$$P(good\ |P1 = N, P2 = Y) = \frac{P(P1 = N|good)P(P2 = Y|good)P(good)}{P(P1 = N, P2 = Y)} = \frac{\frac{2}{4} * \frac{1}{4} * \frac{4}{6}}{P(P1 = N, P2 = Y)}$$

$$= \frac{\frac{1}{12}}{P(P1 = N, P2 = Y)}$$

$$P(bad\ |P1 = N, P2 = Y) = \frac{P(P1 = N|bad)P(P2 = Y|bad)P(bad)}{P(P1 = N, P2 = Y)} = \frac{\frac{1}{2} * \frac{1}{2} * \frac{2}{6}}{P(P1 = N, P2 = Y)}$$

$$= \frac{\frac{1}{12}}{P(P1 = N, P2 = Y)}$$

$$P(bad\ |P1 = N, P2 = Y) = P(good|P1 = N, P2 = Y)$$

The classification would be a random choice.