Inspector Clouseau → slide 34 Lecture 1

$$p(B|K) = \frac{p(B,K)}{p(K)}$$ definition cond. prob

$$= \frac{\sum_M p(K,B,M)}{\sum_{B,M} p(K,B,M)}$$ marginalization

remark that

$p(K,B,M) = p(K|B,M)\,p(B,M)$ (def. cond. prob)

$= p(K|B,M)\,p(B)\,p(M)$ (assumed independency)

$$p(B|K) = \frac{\sum_M p(K|B,M)\,p(B)\,p(M)}{\sum_B \sum_M p(K|B,M)\,p(B)\,p(M)}$$

$$= \frac{p(B)\sum_M p(K|B,M)\,p(M)}{\sum_B p(B)\sum_M p(K|B,M)\,p(M)}$$

so
$$p(B=m|K=k) = \frac{p(B=m)\sum_M p(K=k|B=m,M)\,p(M)}{\sum_B p(B)\sum_M p(K=k|B,M)\,p(M)}$$

$$= \frac{p(B=m)\left[p(K=k|B=m,M=m)\,p(M=m) + p(K=k|B=m,M=nm)\,p(M=nm)\right]}{// + p(B=nm)\left[p(K=k|B=nm,M=m)\,p(M=m) + p(K=k|B=nm,M=nm)\,p(M=nm)\right]}$$

$$= \frac{\frac{6}{10} * \left[\frac{1}{10} * \frac{2}{10} + \frac{6}{10} * \left(1-\frac{2}{10}\right)\right]}{// + \left(1-\frac{6}{10}\right)\left[\frac{2}{10} * \frac{2}{10} + \frac{3}{10} * \left(1-\frac{2}{10}\right)\right]} = 0{,}728\ldots$$