- We have the bayes rule as follows:

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

If we don't have $p(B)$ directly, we can calculate it from the numerator, i.e.

$$P(B) = \int_A P(A, B) = \int_A p(B|A)P(A)$$

- We can think of the bottom term as a "normalization constant" so that the distribution sums up to 1

$$p(A|B) = \frac{p(B|A)P(A)}{\int_A p(B|A)P(A)} = \frac{p(B|A)P(A)}{Z} \propto p(B|A)P(A)$$

as Z is independent of A. This could be useful if we want to optimize over A, i.e.,

$$\mathrm{argmax}_A P(A|B) = \mathrm{argmax}_A P(B|A)P(A)$$