What's the probability you also like me GIVEN that I already liked you?

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

- Prior Distribution: P(A) is initial belief
- Likelihood: B
- Posterior Distribution: P(A|B) is the new believe I have about A given some evidence B I observed

Learning Probabilistic Graphical Models in R by David Bellot(2016)

An Example

If the machine is working knowing that we observed the last light bulb was not working?

- **Prior Distribution: P(Machine Working) = P(Broken)=0.5 is our initial guess**
- **Likelihood:**

  P(Good Bulb|Working Machine)=0.99   P(Bad Bulb|Working Machine) = 0.01

  P(Good Bulb|Broken Machine)=0.6   P(Bad Bulb| Broken Machine)=0.4

- **Posterior Distribution: P(A|B) is the new believe I have about A given some evidence B I observed**

$$P(Machine\ Working|Bad\ Buld) =$$

$$\frac{P(Bad|Working) * P(Working)}{P(Bad|Working) * P(Wroking) + P(Bad|Broken) * P(Working)}$$

Update Belief based on new evidences