Information

The information of an event that has a probability of p (with $\leq p \leq 1$) is denoted as $I(p)$ and is computed as follows:

$$I(p) = -\log_b(p) = \log_b(1/p).$$

Let's use base of 2.

$$I(p) = -\log_2(p) = \log_2(1/p).$$

Information

- We will want our information measure $I(p)$ to have several properties.
- Information is a non-negative quantity:

$$I(p) \geq 0$$

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Information

- If an event has probability 1, we get no information from the occurrence of the event:

$$I(1) = 0$$

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- If two independent events occur (whose joint probability is the product of their individual probabilities), then the information we get from observing the events is the sum of the two informations:

$$I(p1 + p2) = I(p1) + I(p2).$$

Information

- We will want our information measure to be a continuous (and, in fact, monotonic) function of the probability (slight changes in probability should result in slight changes in information).