Entropy: Definition

Entropy H(X) measures the uncertainty/randomness of random variable X

$$H(X) = H(p) = \sum_{x \in \Omega} -p(x) \log p(x) \qquad \Omega = all \ \ possible \ \ values$$

$$Define \ \ 0 \log 0 = 0, \ \ \log = \log_2$$

Example:

$$H(X) = \begin{cases} 1 & fair \ coin \ p(Head) = 0.5 \\ between \ 0 \ and \ 1 & biased \ coin \ p(Head) = 0.8 \\ 0 & completely \ biased \ p(Head) = 1 \end{cases}$$