

lossless coding

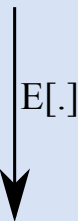
- consideration: rate
- lower bound: entropy

lossy coding

- considerations: rate and distortion
- lower bound: rate-distortion function

self information

$$I(x_i) = \log \frac{1}{p(x_i)}$$



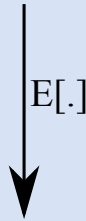
entropy

$$H(X) = \sum_i \log \frac{1}{p(x_i)} p(x_i)$$

event, $X = x_i$

conditional self information

$$I(x_i|y_j) = \log \frac{1}{p(x_i|y_j)}$$

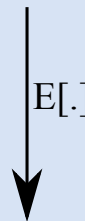


conditional entropy

$$H(X|Y) = \sum_i \sum_j \log \frac{1}{p(x_i|y_j)} p(x_i, y_j)$$

mutual information

$$I(x_i; y_j) = \log \frac{p(x_i|y_j)}{p(x_i)}$$



average mutual information

$$\begin{aligned} H(X; Y) &= \sum_i \sum_j \log \frac{p(x_i|y_j)}{p(x_i)} p(x_i, y_j) \\ &= H(X) - H(X|Y) \end{aligned}$$