Erinson Bomayo

Erinson Bomayo.

160043336

Demostrar que una fuente de información discreta, aleatoria y de memoria nula,

$$\log(q) \geq H(s) \rightarrow \log(q) - H(s) \geq 0$$

$$\ln(x) \geq 1 - \frac{1}{x} \quad // * (-1)$$

$$-\ln(x) \leq \frac{1}{x} - 1$$

$$\ln\left(\frac{1}{x}\right) \leq \frac{1}{x} - 1$$

$$\log(q) - H(s) = \log(q) - \sum_{i=1}^{q} P_i \log\left(\frac{1}{P_i}\right)$$

$$= \left(\sum_{i=1}^{q} P_i\right) \log(q) - \sum_{i=1}^{q} P_i \log\left(\frac{1}{P_i}\right)$$

$$\sum_{i=1}^{q} P_i \left[\log(q) - \log\left(\frac{1}{P_i}\right)\right] \quad // \log\left(\frac{x}{y}\right) = \log(x) - \log(y)$$

$$\frac{q}{1/P_i} = qP_i$$

$$\sum_{i=1}^{q} P_i \log(qP_i)$$

Erinson Borrayo.
160004336.

$$\frac{1}{\ln(2)} \sum_{i=1}^{q} P_i \ln(q P_i)$$

Por lo demostrado sabemos que

$$\frac{1}{\ln(2)} \sum_{i=1}^{q} P_i \ln(q P_i) \geq \frac{1}{\ln(2)} \sum_{i=1}^{q} P_i \left[1 - \frac{1}{q P_i} \right]$$

$q \cdot 1/q = 1$

$$\rightarrow \frac{1}{\ln(2)} \sum_{i=1}^{q} P_i - \frac{1}{q} = \frac{1}{\ln(2)} \left[\sum_{i=1}^{q} P_i - \sum_{i=1}^{q} \frac{1}{q} \right] = 0$$

$$\frac{1}{\ln(2)} \sum_{i=1}^{q} P_i \log(q P_i) \geq 0.$$

$$\log(q) - H(s) \geq 0.$$

$$\log(q) \geq \underline{\underline{H(s)}}$$

Escaneado con CamScanner