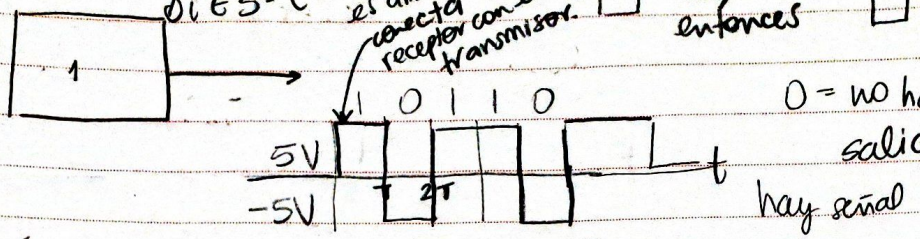
Fecha:

La n-ava extensión de una fuente de información (discreta, aleatoria, y de memoria nula).

Fuente binaria

$\delta_i \in S = \{S_0 = 0, S_1 = 1\}$



0 = no hay nada en la salida del canal.

hay señal cuando muestreamos → 0.

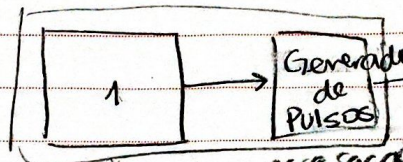
Duración de transmisión de byte: 8T

00 → σ_0 5V

01 → σ_1 10V

10 → σ_2 -5V

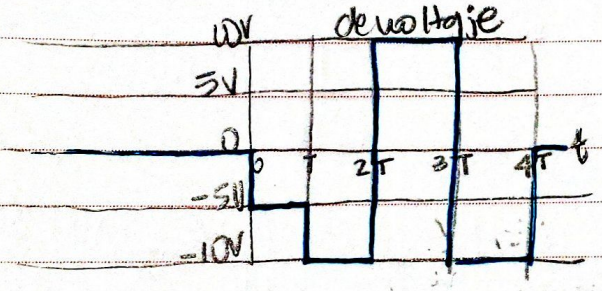
11 → σ_3 -10V



$\sigma_i \in S^{(2)}$ agrupaciones en 2 en 2 en 2.

$S^{(2)} = \{\sigma_0, \sigma_1, \sigma_2, \sigma_3\}$

sacar 2 niveles para sacar 4 niveles de voltaje.



¿unidades de Tiempo? 4 T.

... ocupada la línea al 50%.

$$H(S^n) = nH(S)$$

Fecha:

$$H(S^2) = P(\sigma_0)\log\frac{1}{P(\sigma_0)} + P(\sigma_1)\log\frac{1}{P(\sigma_1)} + P(\sigma_2)\log\frac{1}{P(\sigma_2)} + P(\sigma_3)\log\frac{1}{P(\sigma_3)}$$

$P(\sigma_0) = (0\,0)$ 0 atrás de 0 cero.

$P(\sigma_0) = P(0)\,P(0)$

Recordar: $S_i \in S = \{S_0 = 0, S_1 = 1\}$

$P_0 = P(S_0)$, $P_1 = P(S_1)$

$P_0' = P(\sigma_0)$ $\quad P_2' = P(\sigma_2)$

$P_1' = P(\sigma_1)$ $\quad P_3' = P(\sigma_3)$

columna

Ejemplo: Demostrar $H(S^2) = 2H(S)$;

fila	col 1	2
	σ_0	00
* 1	σ_1	01
2 →	σ_2	10
	σ_3	11

$* P(\sigma_2) = P_{21}P_{22}$

$= P(S_1)P(S_0)$

$$H(S^2) = P(\sigma_0)\log\frac{1}{P(\sigma_0)} + P(\sigma_1)\log\frac{1}{P(\sigma_1)} + P(\sigma_2)\log\frac{1}{P(\sigma_2)} + P(\sigma_3)\log\frac{1}{P(\sigma_3)}$$

$$= \sum_{S^2} P(\sigma_i)\log\frac{1}{P(\sigma_i)}$$

$$= \sum_{S^2} P(\sigma_i)\log\frac{1}{P_{i1}P_{i2}} \quad *\text{recordar}$$

$$H(S^2) = \sum_{S^2} P(\sigma_i)\log\frac{1}{P_{i1}} + \sum_{S^2} P(\sigma_i)\log\frac{1}{P_{i2}}$$

$H(S)$ $\qquad$ $H(S)$

$$\log\frac{1}{P_{i1}P_{i2}} = \log\left[\left(\frac{1}{P_{i1}}\right)\left(\frac{1}{P_{i2}}\right)\right]$$

$$\sum_{S^2} P(\sigma_i)\log\frac{1}{P(\sigma_i)} = P(\sigma_0)\log\frac{1}{P(\sigma_{01})} + P(\sigma_1)\log\frac{1}{P(\sigma_{11})} + P(\sigma_2)\log\frac{1}{P(\sigma_{21})} + P(\sigma_3)\log\frac{1}{P(\sigma_{31})}$$

$$= P(S_0)P(S_0)\log\frac{1}{P(S_0)} + P(S_0)P(S_1)\log\frac{1}{P(S_0)} + P(S_1)P(S_0)\log\frac{1}{P(S_1)} + P(S_1)P(S_1)\log\frac{1}{P(S_1)}$$

// agrupamos $S_0 + S_1 = H(S)$

$$P(S_0)H(S) + P(S_1)H(S)$$

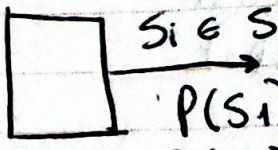
$$= [P(S_0) + P(S_1)]\,H(S) = H(S)$$

Fecha:

Ejercicios

① Demostrar $\sum_{S^2} P(\delta_i) \log \frac{1}{P_{i2}} = H(S)$

② Considero la fuente



$S_i \in S = \{S_1, S_2, S_3\}$

$P(S_1) = \frac{1}{2}$

$P(S_2) = \frac{1}{4}$

$P(S_3) = \frac{1}{4}$

a) Calcular $H(S^2)$ usando las probabilidades de δ_i.

b) Calcular $H(S^2)$ usando el teorema $H(S^2) = 2H(S)$

① $\sum_{S^2} P(\delta_i) \log \frac{1}{P_{i2}} = P(\delta_0) \log \frac{1}{P_{02}} + P(\delta_1) \log \frac{1}{P_{12}} + P(\delta_2) \log \frac{1}{P_{22}} + P(\delta_3) \log \frac{1}{P_{32}}$

$= P(S_0) P(S_0) \log \frac{1}{P(S_0)} + P(S_0) P(S_1) \log \frac{1}{P(S_1)} + P(S_1) P(S_0) \log \frac{1}{P(S_0)} + P(S_1) P(S_1) \log \frac{1}{P(S_1)}$

$= P(S_0) H(S) + P(S_1) H(S)$

$= [P(S_0) + P(S_1)] H(S) = H(S)$

entonces

$H(S^2) = H(S) + H(S)$

$H(S^2) = 2H(S)$