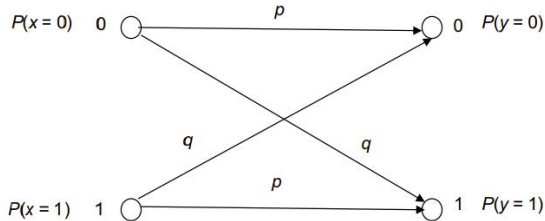


INFORMACIJSKI KANALI

BINARNO SIMETRIČNI KANAL



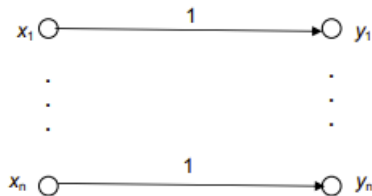
$$\begin{aligned} P(x=0) &= \alpha & P(x=1) &= 1-\alpha \\ P(x=0) + P(x=1) &= 1 \\ P(y=0|x=0) &= P(y=1|x=1) = p \\ P(y=0|x=1) &= P(y=1|x=0) = q \\ p + q &= 1 \end{aligned}$$

$$[P(Y|X)] = \begin{bmatrix} p & q \\ q & p \end{bmatrix}$$

$$[P(X,Y)] = \begin{bmatrix} p\alpha & q\alpha \\ q(1-\alpha) & p(1-\alpha) \end{bmatrix}$$

$$H(Y|X) = -[p \log(p) + q \log(q)] \quad C = 1 + p \log(p) + q \log(q)$$

BEŠUMNI INFORMACIJSKI KANAL



$$[P(Y|X)] = \begin{bmatrix} 1 & 0 & \dots & 0 \\ 0 & 1 & \dots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \dots & 1 \end{bmatrix}$$

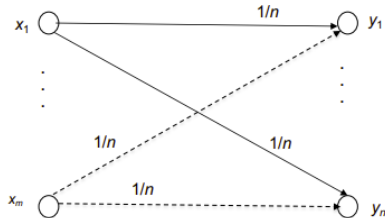
$$[P(X,Y)] = \begin{bmatrix} P(x_1, y_1) & 0 & \dots & 0 \\ 0 & P(x_2, y_2) & \dots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \dots & P(x_n, y_n) \end{bmatrix}$$

$$\begin{aligned} H(X,Y) &= H(X) = H(Y) \\ H(Y|X) &= H(X,Y) - H(X) = 0 \end{aligned}$$

$$H(X|Y) = H(X,Y) - H(Y) = 0$$

$$\begin{aligned} I(X;Y) &= H(X) - H(X|Y) = H(X) = H(Y) - H(Y|X) = H(Y) \\ C &= \log(n) \end{aligned}$$

NEOVISNI INFORMACIJSKI KANAL



$$[P(Y|X)] = \begin{bmatrix} \frac{1}{n} & \frac{1}{n} & \dots & \frac{1}{n} \\ \frac{1}{n} & \frac{1}{n} & \dots & \frac{1}{n} \\ \vdots & \vdots & \ddots & \vdots \\ \frac{1}{n} & \frac{1}{n} & \dots & \frac{1}{n} \end{bmatrix}$$

$$[P(X,Y)] = [P(X)] \cdot [P(Y|X)] = \begin{bmatrix} \frac{1}{n} P(x_1) & \frac{1}{n} P(x_1) & \dots & \frac{1}{n} P(x_1) \\ \frac{1}{n} P(x_2) & \frac{1}{n} P(x_2) & \dots & \frac{1}{n} P(x_2) \\ \vdots & \vdots & \ddots & \vdots \\ \frac{1}{n} P(x_n) & \frac{1}{n} P(x_n) & \dots & \frac{1}{n} P(x_n) \end{bmatrix}$$

$$\sum_{j=1}^n P(y_j|x_i) = n \cdot \frac{1}{n} = 1$$

$$\sum_{i=1}^m P(x_i, y_j) = \frac{1}{n} \sum_{i=1}^m P(x_i) = \frac{1}{n} = P(y_j)$$

$$\sum_{j=1}^n P(x_i, y_j) = n \cdot \frac{1}{n} P(x_i) = P(x_i)$$

$$P(x_i, y_j) = P(x_i) P(y_j) = \frac{1}{n} P(x_i)$$

$$H(Y) = H(Y|X) = \log(n)$$

$$I(X;Y) = C = 0$$

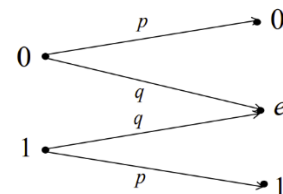
SLABO SIMETRIČAN KANAL

$$I(X;Y) \leq \log(\text{card}(Y)) - H(Y|x)$$

$$C = \log(\text{card}(Y)) - H(Y|x)$$

$$H(Y|x) = \sum_{y \in Y} P(y|x_i) \log\left(\frac{1}{P(y|x_i)}\right)$$

BINARNI KANAL S BRISANJEM SIMBOLA



$$[P(Y|X)] = \begin{bmatrix} p & q & 0 \\ 0 & q & p \end{bmatrix}$$

$$P(x_i=0) = \alpha, P(x_i=1) = 1-\alpha$$

$$P(y_j=0|x_i=0) = P(y_j=1|x_i=1) = p$$

$$P(y_j=e|x_i=0) = P(y_j=e|x_i=1) = q$$

$$P(y_j=1|x_i=0) = P(y_j=0|x_i=1) = 0$$

$$p + q = 1$$

$$I(X;Y) = H(X) - H(X|Y)$$

$$H(X) = -\sum_{i=1}^2 P(x_i) \log_2 P(x_i) = -\alpha \log \alpha - (1-\alpha) \log(1-\alpha)$$

$$H(X|Y) = qH(X) = (1-p)H(X)$$

$$I(X;Y) = pH(X)$$

$$C = p [\text{bit/simbol}]$$

Markovljev izvor - matrica prijelaznih vjerojatnosti

$$\Pi = \begin{bmatrix} \alpha & 1-\alpha \\ 1-\beta & \beta \end{bmatrix}$$

Vrste kodova

SIMBOL (x _i)	VRSTA KODA			
	SINGULARNI	NESINGULARNI	JEDINSTVENO DEKODABILNI	PREFIKSNI
1	0	0	10	0
2	0	010	00	10
3	0	01	11	110
4	0	10	110	111
"1234" →	0000	00100110	100011110	010110111
Dekodirano	?	?	1234	1234
Prvih 6 simbola	?	?	?(123 ili 124)	123