

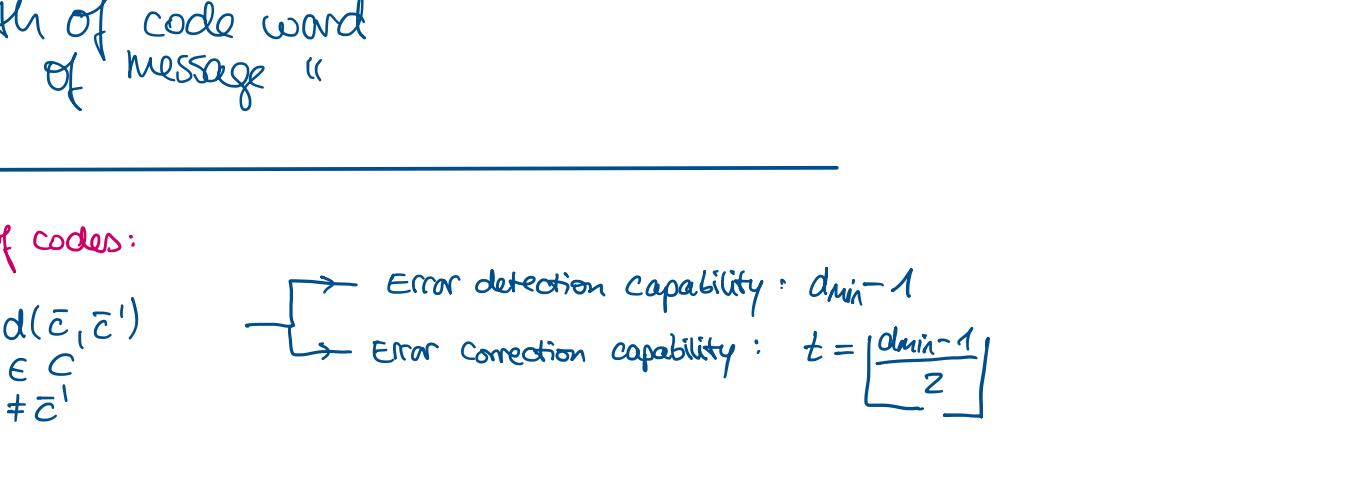
2. Lecture

Freitag, 8. September 2023 10:12

Recap: $\overline{u} \xrightarrow{\oplus} \overline{e} = \overline{u} + \overline{e}$

$$P(w(\bar{e}) = \bar{e}) = \binom{n}{i} \left(\frac{p_b}{1-p_b} \right)^i \left(1-p_b \right)^{n-i}$$

$$0 \leq \frac{p_b}{1-p_b} < 1 \quad \exp(-i) \Rightarrow \text{correcting} \quad \Rightarrow \text{low weight errors}$$



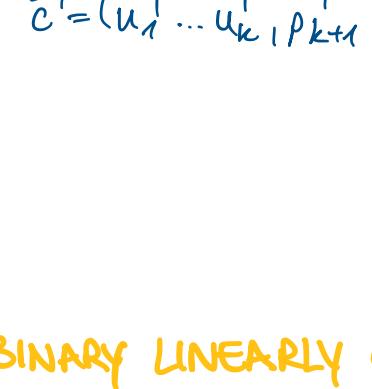
n - length of code word
 k - "length of message"

table of exp. size

Performance of codes:

$$d_{\min} = \min_{\substack{\bar{c}, \bar{c}' \in C \\ \bar{c} \neq \bar{c}'}} d(\bar{c}, \bar{c}')$$

$$\begin{aligned} &\rightarrow \text{Error detection capability: } d_{\min} - 1 \\ &\rightarrow \text{Error correction capability: } t = \lfloor \frac{d_{\min} - 1}{2} \rfloor \end{aligned}$$



Assume that \bar{c} sent & correct detection if $d(\bar{r}, \bar{c}) \leq d(\bar{r}, \bar{c}') \wedge \bar{c}' \notin C, \bar{c}' \neq \bar{c}$

$$d(\bar{r}, \bar{c}) < d(\bar{c}, \bar{c}') - d(\bar{r}, \bar{c})$$

$$2d(\bar{r}, \bar{c}) < d_{\min} - 1$$

$$t = \lfloor \frac{d_{\min} - 1}{2} \rfloor$$

$$\begin{aligned} d(\bar{c}, \bar{c}') &\leq d(\bar{r}, \bar{c}) + d(\bar{r}, \bar{c}') \\ d(\bar{c}, \bar{c}') - d(\bar{r}, \bar{c}) &< d(\bar{r}, \bar{c}') \end{aligned}$$

Singleton bound

$$n-k+1 \geq d_{\min}$$

$$d_{\text{HDS}} = n-k+1$$

HDS - Maximum distance separability

$$\bar{c} = (u_1 \dots u_k, p_{k+1} \dots p_n)$$

$$\bar{c}' = (u_1' \dots u_k', p_{k+1}' \dots p_n')$$

$$\sum_{i=1}^k u_i \neq \sum_{i=1}^k u_i'$$

$$p_{k+1} \dots p_n \neq p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{i=1}^k u_i + p_{k+1} \dots p_n \neq \sum_{i=1}^k u_i' + p_{k+1}' \dots p_n'$$

$$\sum_{$$