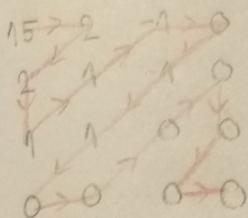


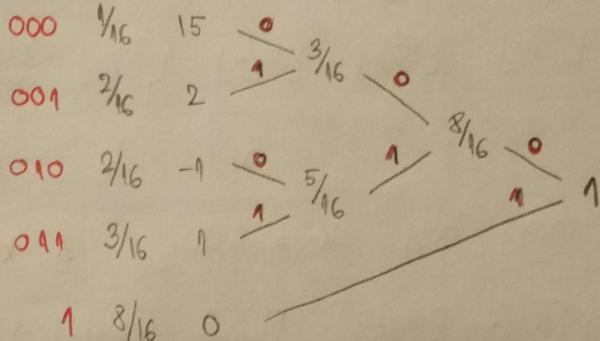
ZADATAK 1

zig-zag sljed:

15 2 2 1 1 -1 0 -1 1 0 0 0 0 0 0 0  
 000 001 001 011 011 010 1 010 011 1 1 1 1 1 1 1

Huffman:

ukupno: 16 brojeva :  
 1 - 15  $\Rightarrow \frac{1}{16}$   
 2 - 2  $\Rightarrow \frac{2}{16}$   
 3 - 1  $\Rightarrow \frac{3}{16}$   
 2 - -1  $\Rightarrow \frac{2}{16}$   
 8 - 0  $\Rightarrow \frac{8}{16}$



stupanj kompresije:

$$\text{kompresija} = \frac{\text{veličina prije}}{\text{veličina sad}} = \frac{16}{4} = 4$$

← smjer čitanja

ulazni simboli u rasponu [-128, 127]  $\rightarrow$  8 bitova za pohranu jednog broja

$$16 \text{ brojeva} * 1 \text{ B} = 16 \text{ B}$$

Huffman: 32 znakmenke  
 1 znakmenka = 1 bit  $32 \text{ b} = 4 \text{ B}$

ZADATAK 2rezolucija:  $10080 \times 4320$ 

RGB prikaz

$$1 \text{ px} = 8 \text{ b} = 1 \text{ B}$$

$$120 \text{ okv/s}$$

brzina nekomprimiranog prenosu:

$$V = \frac{10080 \cdot 4320 \cdot 3 \cdot 1 \text{ B} \cdot 120}{1 \text{ s}} = 15676416000 \text{ B/s} = 14950,1953 \text{ MB/s}$$

$$\text{kompresija} = \frac{V_{\text{stara}}}{V_{\text{nova}}} = \frac{14950,1953 \text{ MB/s}}{37,45 \text{ MB/s}} = 399,20$$

### ZADATAK 3

0 5 10 15 24 4 5 8       $k=5$

a) min. bitova?

→ najveći broj:  $24 = 11000_2$       5 bitova

b) izlazni niz  $L_2$

$\lfloor \frac{0}{5} \rfloor \quad \lfloor \frac{5}{5} \rfloor \quad \lfloor \frac{10}{5} \rfloor \quad \lfloor \frac{15}{5} \rfloor \quad \lfloor \frac{24}{5} \rfloor \quad \lfloor \frac{4}{5} \rfloor \quad \lfloor \frac{5}{5} \rfloor \quad \lfloor \frac{8}{5} \rfloor$

0      1      2      3      4      0      1      1

max broj:  $4 = 100_2$       3 bita

$\lceil \frac{0}{5} \rceil \quad \lceil \frac{5}{5} \rceil \quad \lceil \frac{10}{5} \rceil \quad \lceil \frac{15}{5} \rceil \quad \lceil \frac{24}{5} \rceil \quad \lceil \frac{4}{5} \rceil \quad \lceil \frac{5}{5} \rceil \quad \lceil \frac{8}{5} \rceil$

0      1      2      4      5      1      1      2

max broj:  $5 = 101_2$       3 bita

c) restaurirani nizovi

0 1 2 3 4 0 1 1      - najmanje cijelo \* korak

0 5 10 15 20 0 5 5

- - - - - - - - - -

0 1 2 4 5 1 1 2      - najveće cijelo \* korak

0 5 10 20 25 5 5 10

d) duljina kvantiziranog niza = 16 b       $k=?$

broj elemenata = 8

1 element =  $\frac{16}{8} = 2$  b      max  $\rightarrow 11 = 3$

max broj 24:  $k=3$  (nakon kvantizacije)

$k=8$

ZADATAK 4

tekuci blok:

20 20  
1 20

referentni blok:

		$d=1$	$d=2$	$d=3$	$d=4$	$d=5$	$d=6$	$d=7$	$d=8$
1	15	2	21	4	3	15	4	4	4
1	5	2	21	4	3	15	4	4	4

1 1 3 2 10 1 17 6 6 4

1 1 4 19 8 8 1 19 9 4

$d = \text{max displacement}$

$$\text{ORT: } S = (d+1)/2 = 4$$

MSE

veličina prekorca = 4

1	2	4	1	19	18	17	3	9	4
1	4	4	4	17	2	20	1	24	4

1 5 0 2 19 19 0 1 15 3

1 4 1 1 3 8 0 1 10 3

1 4 1 1 3 8 0 1 10 3

1 4 1 1 3 8 0 1 10 3

$$(1) \text{ MSE}_1 = \frac{1}{4} [(20-19)^2 + (20-18)^2 + (1-17)^2 + (20-2)^2] = 146,25$$

(2)  $S=4$  horizontalno

$$\text{lijovo: } \text{MSE}_2 = \frac{1}{4} (19^2 + 18^2 + 0^2 + 16^2) = 235,25$$

$$\text{desno: } \text{MSE}_2 = \frac{1}{4} (11^2 + 16^2 + (-23)^2 + 16^2) = 290,5$$

min:  $\text{MSE}_1$

(3)  $S=4$  vertikalno

$$\text{gore: } \text{MSE}_3 = \frac{1}{4} (16^2 + 17^2 + (-3)^2 + 17^2) = 210,75$$

$$\text{dolje: } \text{MSE}_3 = \frac{1}{4} (17^2 + 12^2 + (-2)^2 + 12^2) = 145,25$$

min:  $\text{MSE}_3$  dolje

(4)  $S=S/2=2$  horizontalno

$$\text{lijovo: } \text{MSE}_4 = \frac{1}{4} (19^2 + 19^2 + 0^2 + 19^2) = 270,75$$

$$\text{desno: } \text{MSE}_4 = \frac{1}{4} (20^2 + 19^2 + 1^2 + 19^2) = 280,75$$

min:  $\text{MSE}_3$  dolje

(5)  $S=2$  vertikalno

$$\text{MSE}_5 = \frac{1}{4} (1^2 + 1^2 + (-2)^2 + 12^2) = 37,5$$

min:  $\text{MSE}_5$

(6)  $S=S/2=1$  horizontalno

$$\text{lijovo: } \text{MSE}_6 = \frac{1}{4} (18^2 + 1^2 + 0^2 + 17^2) = 153,5$$

$$\text{desno: } \text{MSE}_6 = \frac{1}{4} (1^2 + 20^2 + (-7)^2 + 20^2) = 212,5$$

min:  $\text{MSE}_5$

(7)  $S=1$  vertikalno

$$\text{gore: } \text{MSE}_7 = \frac{1}{4} (3^2 + 18^2 + (-18)^2 + 1^2) = 164,5$$

$$\text{dolje: } \text{MSE}_7 = \frac{1}{4} (17^2 + 12^2 + (-2)^2 + 12^2) = 145,25$$

min:  $\text{MSE}_5$

vektor pomača: 0, -2

broj pretraživanja: 12

1	5	2	21	4	3	15	4	4	4
1	5	2	21	4	3	15	4	4	4
1	1	3	2	10	1	17	6	6	4
1	1	4	19	8	8	1	19	9	4

$$d=8$$

$$MSE$$

$$\log_2 d = \lfloor \log_2 d \rfloor - 1 = 4$$

1	2	4	1	19	18	17	3	9	4
1	4	4	4	17	2	20	1	24	4
1	5	0	2	19	19	0	1	15	3
1	4	1	1	3	8	0	1	10	3
1	4	1	1	3	8	0	1	10	3
1	4	1	1	3	8	0	1	10	3
1	4	1	1	3	8	0	1	10	3
1	4	1	1	3	8	0	1	10	3

$$20 \quad 20$$

$$1 \quad 20$$

$$(1) \quad MSE_1 = 146,25$$

$$(2) \quad S=4$$

$$\text{gore} \quad MSE_2 = 210,75$$

$$\text{lijewo} \quad MSE_2 = 235,25$$

$$\text{desno} \quad MSE_2 = 290,5$$

$$\text{dolje} \quad MSE_2 = 145,25$$

min:  $MSE_2$  dolje

$$(3) \quad S=4$$

$$\text{lijewo} \quad MSE_3 = \frac{1}{4} (19^2 + 16^2 + 0^2 + 16^2) = 218,25$$

$$\text{desno} \quad MSE_3 = \frac{1}{4} (10^2 + 17^2 + 0^2 + 16^2) = 161,25$$

min:  $MSE_3$  dolje

$$(4) \quad S=S/2=2$$

$$\text{lijewo} \quad MSE_4 = 270,75$$

$$\text{gore} \quad MSE_4 = 37,5$$

$$\text{desno} \quad MSE_4 = 280,75$$

min:  $MSE_4$  gore

$$(5) \quad S=2$$

$$\text{lijewo:} \quad MSE_5 = \frac{1}{4} (20^2 + 18^2 + 0^2 + 19^2) = 271,25$$

$$\text{desno:} \quad MSE_5 = \frac{1}{4} (20^2 + 19^2 + 1^2 + 19^2) = 280,75$$

min:  $MSE_5$  gore

$$(6) \quad S=S/2=1$$

$$\text{gore lijewo:} \quad MSE_6 = \frac{1}{4} (16^2 + 3^2 + (-1)^2 + 1^2) = 66,75$$

$$\text{gore:} \quad MSE_6 = 164,5$$

$$\text{gore desno:} \quad MSE_6 = \frac{1}{4} (18^2 + 0^2 + (-18)^2 + 20^2) = 262$$

$$\text{desno:} \quad MSE_6 = 212,5$$

$$\text{dolje desno:} \quad MSE_6 = \frac{1}{4} (12^2 + 20^2 + (-7)^2 + 20^2) = 248,25$$

min:  $MSE_6$  gore

$$\text{dolje:} \quad MSE_6 = 145,25$$

$$\text{dolje lijevo:} \quad MSE_6 = \frac{1}{4} (19^2 + 17^2 + 0^2 + 17^2) = 234,75$$

vektor pomaka: 0, -2

$$\text{lijewo:} \quad 153,5$$

broj pretraživanja: 20