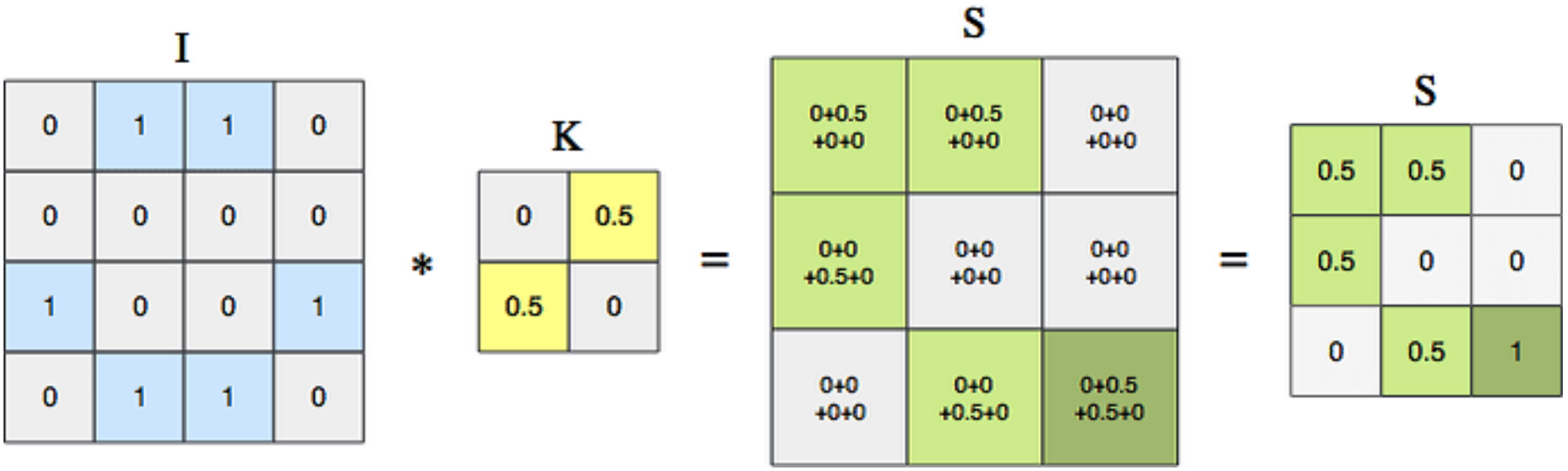
Alati za modifikaciju i korekciju slika

Aleksandar Anžel 1025/2018
Matematički fakultet
Univerzitet u Beogradu

Konvolucija



Zamućivanje konvolucijom

Gauß filter

$$\frac{1}{256}\begin{bmatrix} 1 & 4 & 6 & 4 & 1 \\ 4 & 16 & 24 & 16 & 4 \\ 6 & 24 & 36 & 24 & 6 \\ 4 & 16 & 24 & 16 & 4 \\ 1 & 4 & 6 & 4 & 1 \end{bmatrix}$$

Gauß filter

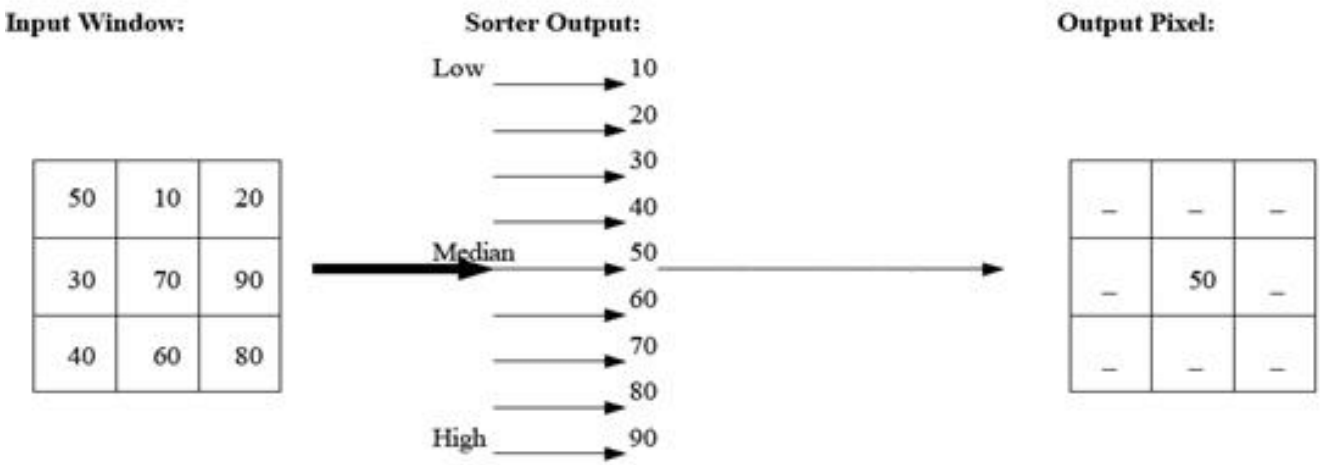
Prosek filter

$$\frac{1}{9}\begin{bmatrix} 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 \end{bmatrix}$$

Prosek filter

Zamućivanje medijanom

Medijana filter



Medijana filter

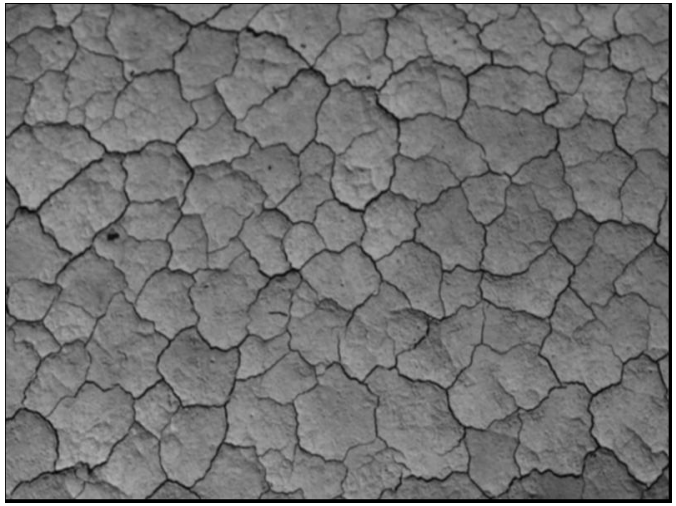
Poređenje

Gauß

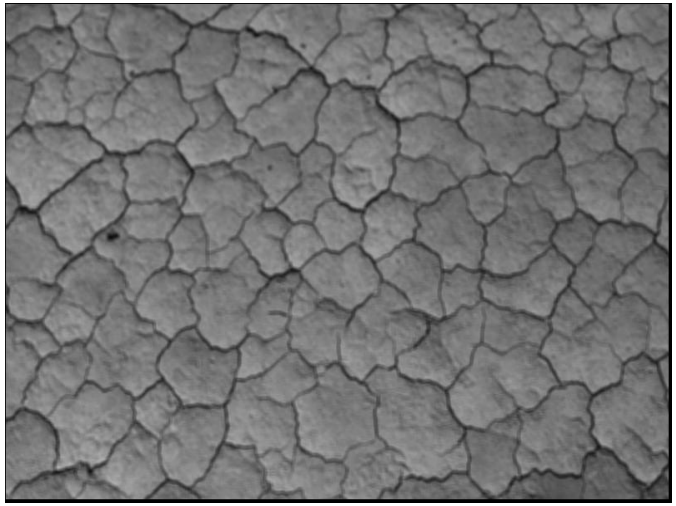
Prosek

Medijana

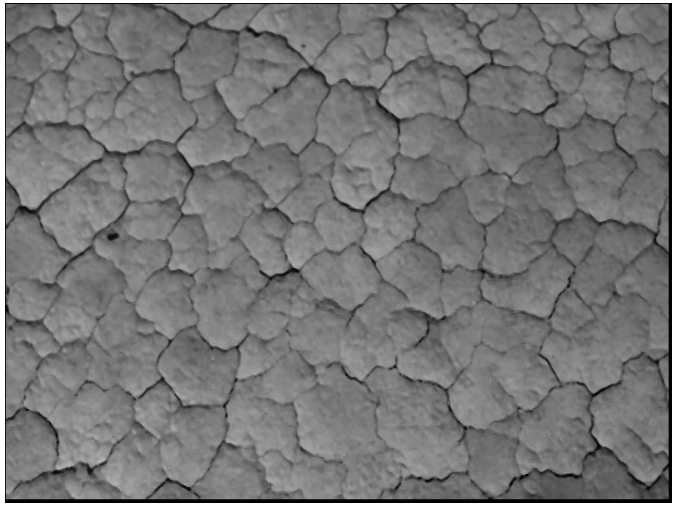
Poređenje



Gauß



Prosek



Medijana

Poređenje

Gauß

Prosek

Medijana

Primena

- Zamućivanje
- Otklanjanje šuma
- Pretprocesiranje (detektovanje ivica)

Detektovanje ivica konvolucijom

Sobel filter

$$G_x = \begin{bmatrix} -1 & 0 & 1 \\ -2 & 0 & -2 \\ -1 & 0 & 1 \end{bmatrix}$$

$$G_y = \begin{bmatrix} 1 & 2 & 1 \\ 0 & 0 & 0 \\ -1 & -2 & 1 \end{bmatrix}$$

Sobel filter

Prewitt filter

$$G_x = \begin{bmatrix} -1 & 0 & 1 \\ -1 & 0 & 1 \\ -1 & 0 & 1 \end{bmatrix}$$

$$G_y = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 0 & 0 \\ -1 & -1 & -1 \end{bmatrix}$$

Prewitt filter

Roberts filter

$$G_x = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$$

$$G_y = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$$

Roberts filter

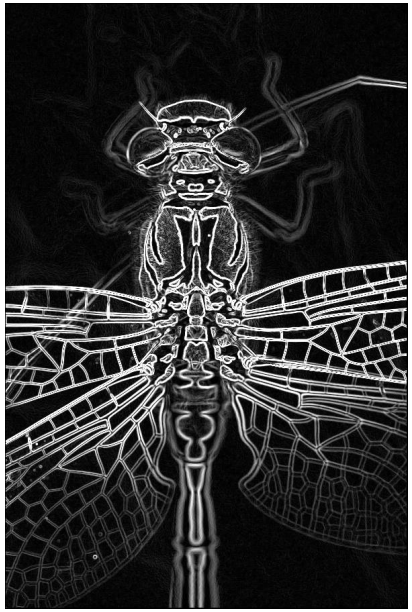
Poređenje

Sobel

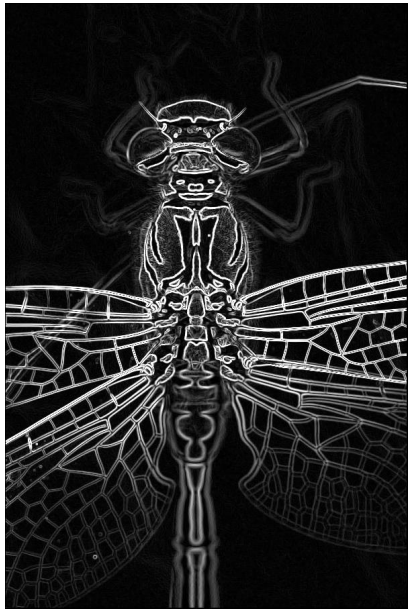
Prewitt

Roberts

Poređenje



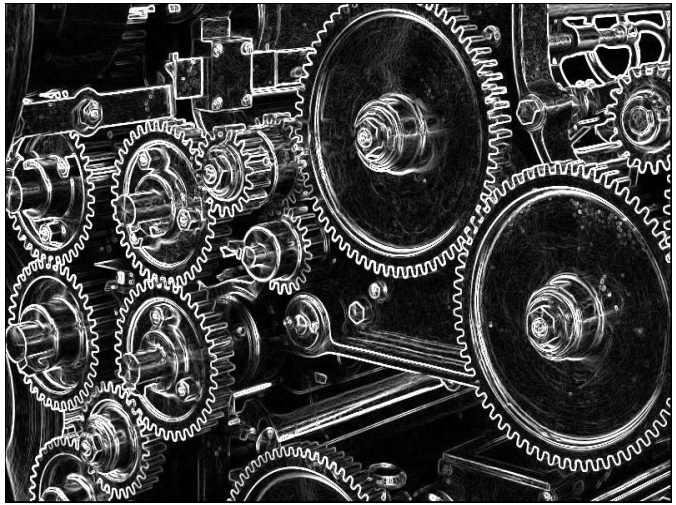
Sobel



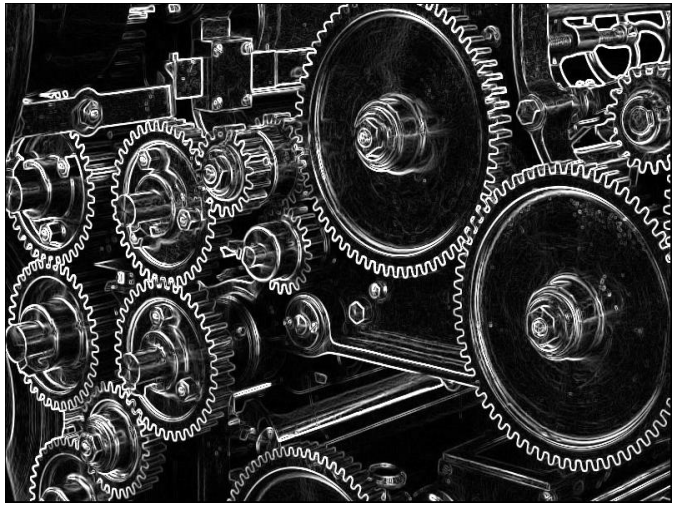
Prewitt

Roberts

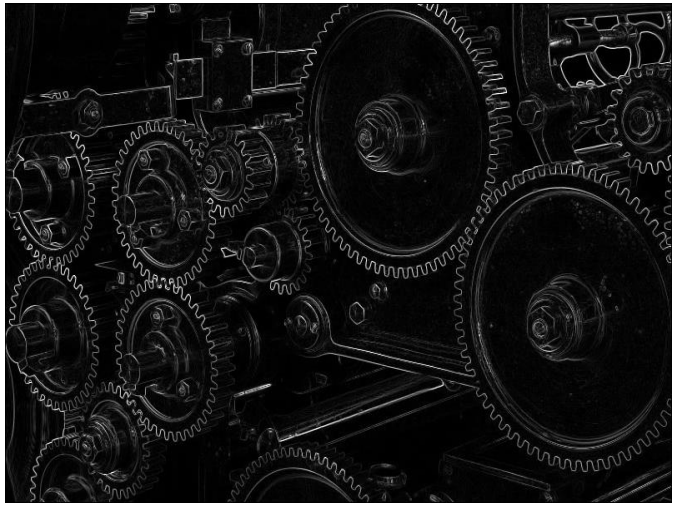
Poređenje



Sobel



Prewitt



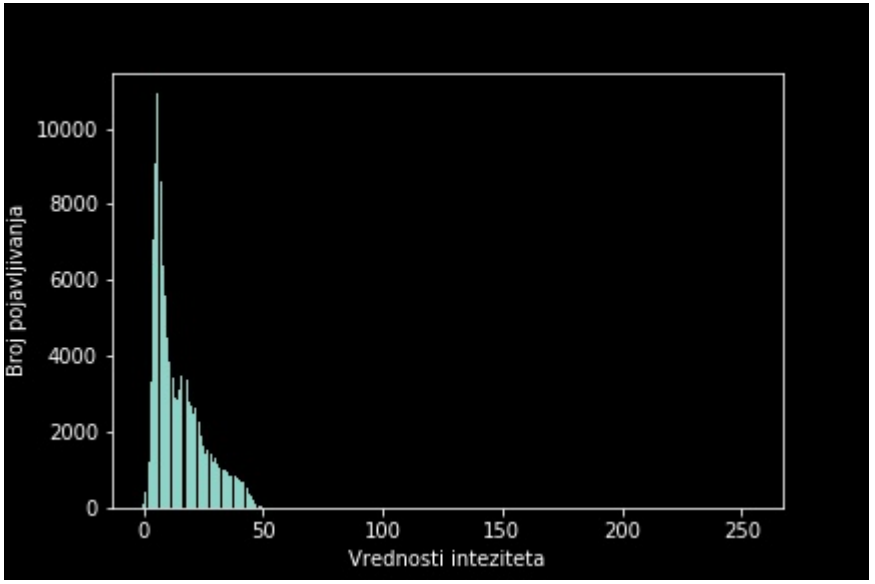
Roberts

Primena

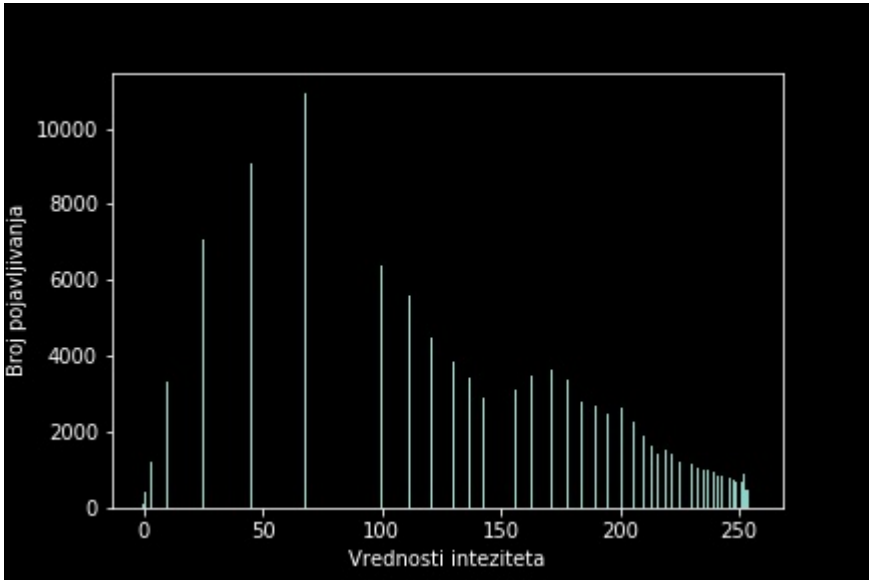
- Automobilska industrija
- Medicina
- Robotic vision

Korekcija slika pomoću histograma inteziteta piksela

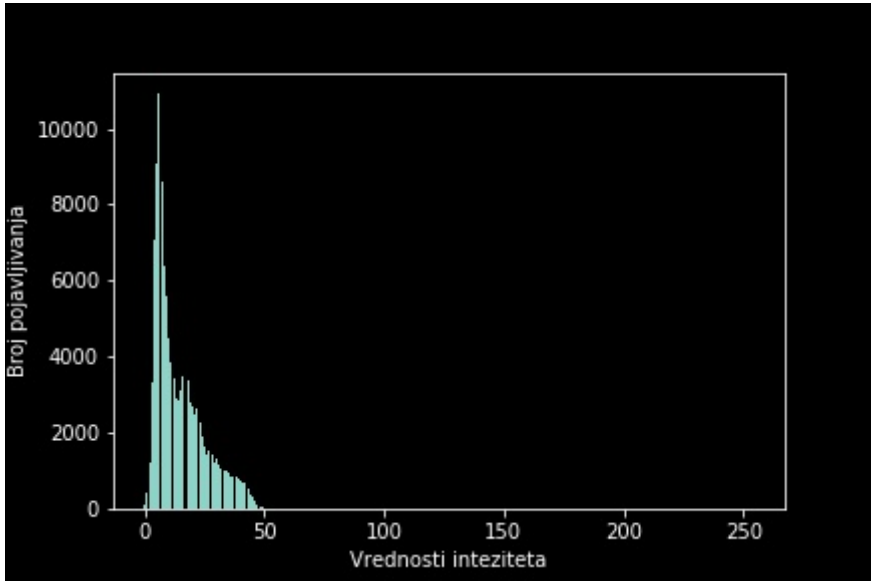
Histogram inteziteta piksela

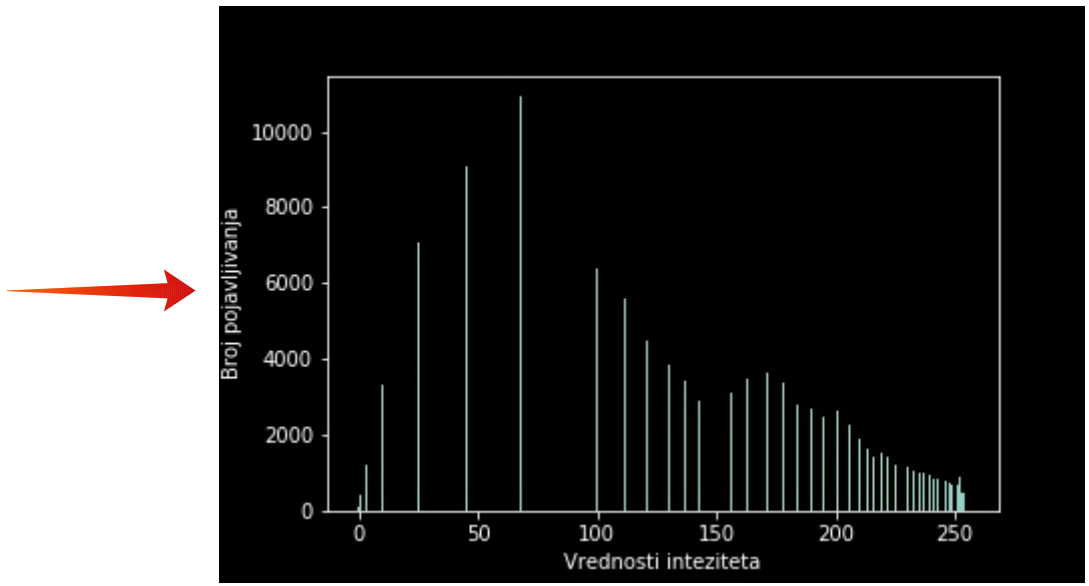


Histogram inteziteta piksela



Histogram inteziteta piksela





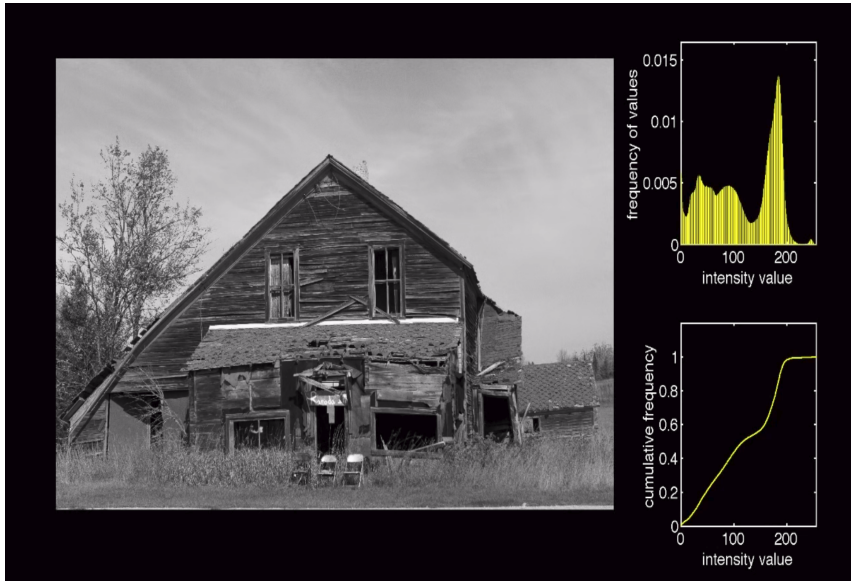
Funkcija transfera

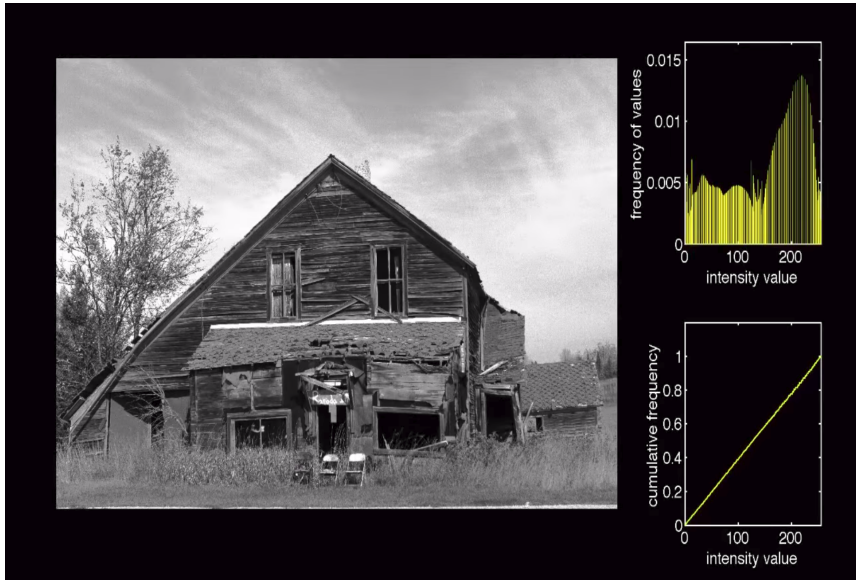
$$p_x(i) = p(x = i) = \frac{n_i}{n}$$

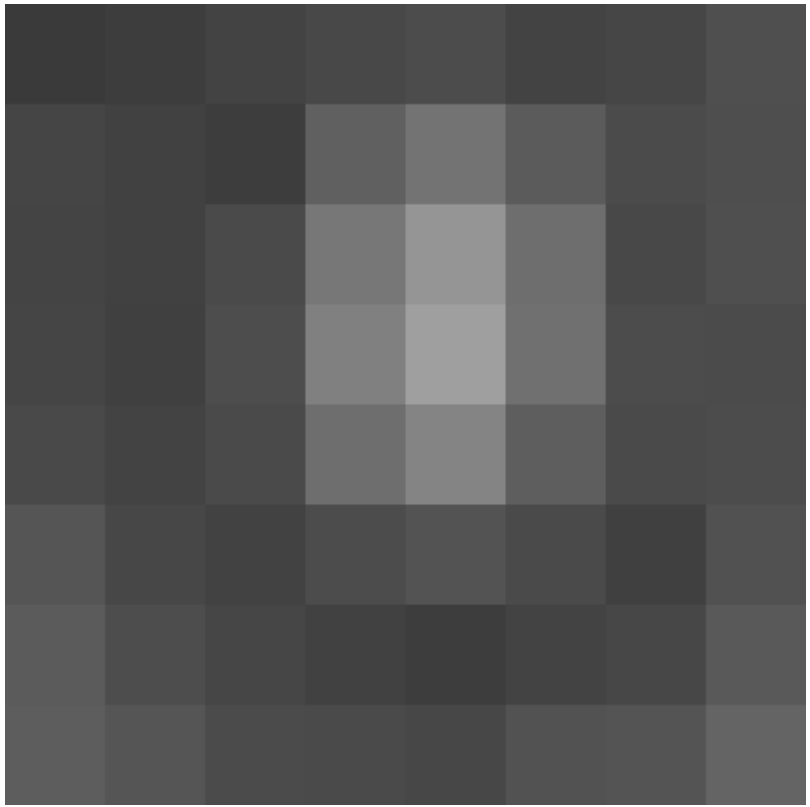
$$cdf_x(i) = \sum_{j=0}^{i} p_x(j)$$

$$h(v) = round\left(\frac{L-1}{n} * cdf(v)\right)$$

Kumulativna funkcija distribucije

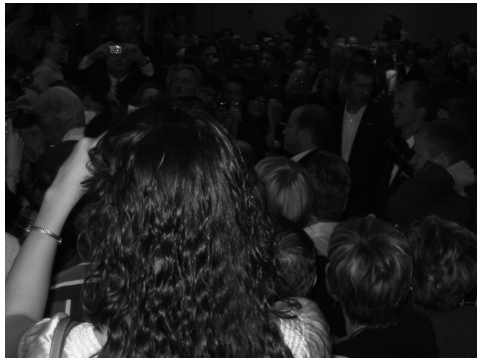


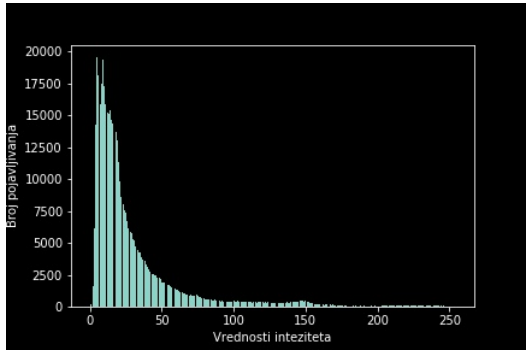


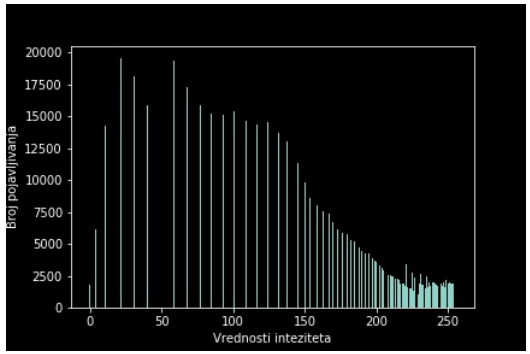


v (intezitet piksela)	Broj piksela	cdf (v)	h(v)
52	1	1	0
55	3	4	12
58	2	6	20
59	3	9	32
60	1	10	36
61	4	14	53
62	1	15	57
63	2	17	65
64	2	19	73
65	3	22	85
...	...	...	...

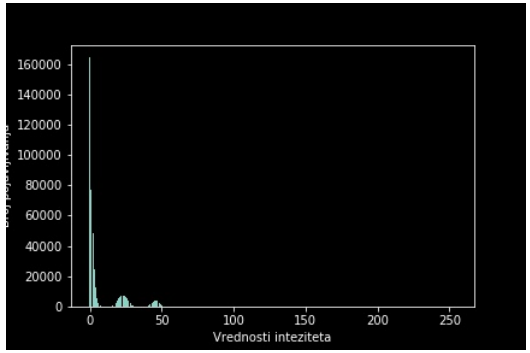
Poređenje

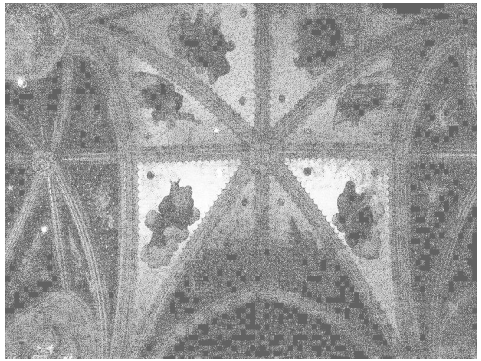


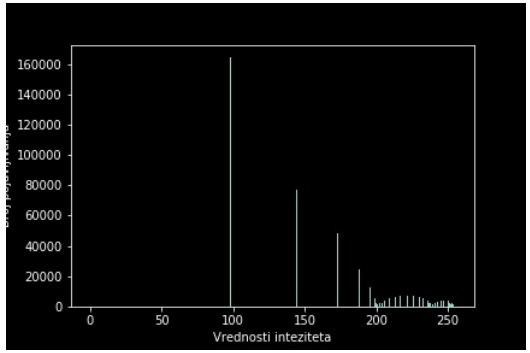

20000
17500
15000
12500
10000
7500
5000
2500
0
Broj pojavljivanja
0
50
100
150
200
250
Vrednosti inteziteta


20000
17500
15000
12500
10000
7500
5000
2500
0
Broj pojavljivanja
0
50
100
150
200
250
Vrednosti inteziteta

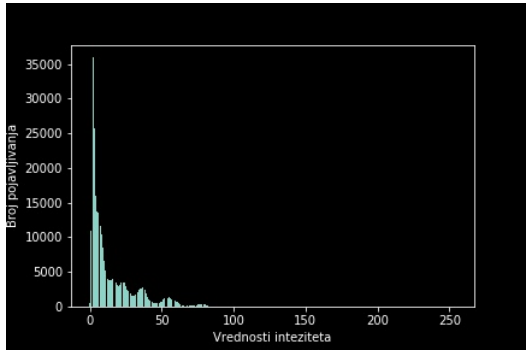
Poređenje

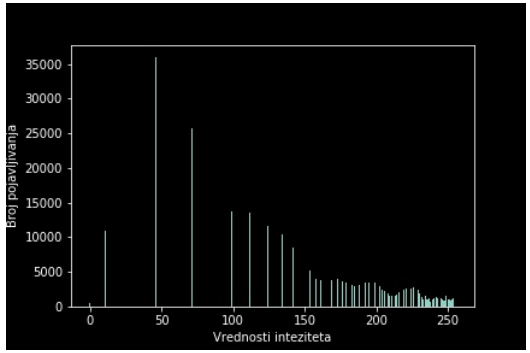

160000
140000
120000
100000
80000
60000
40000
20000
0
0
50
100
150
200
250
Vrednosti inteziteta




160000
140000
120000
100000
80000
60000
40000
20000
0
0
50
100
150
200
250
Vrednosti inteziteta

Poređenje


Broj pojavljivanja
35000
30000
25000
20000
15000
10000
5000
0
0
50
100
150
200
250
Vrednosti inteziteta


Broj pojavljivanja
35000
30000
25000
20000
15000
10000
5000
0
0
50
100
150
200
250
Vrednosti inteziteta

Primena

- Korekcija medicinskih snimaka
- Korekcija slika nebeskih tela (svemirska industrija)
- Korekcija slika dobijenih dronovima (vojna industrija)

Hvala na pažnji!