27/8/202

Thứ
Ngày . . No.

Toán tử Sobel
NĐ thị Histogram

2	2	4	5	5
6	2	5	4	5
7	4	7	7	3
7	6	2	3	6
4	3	6	2	7

Bài tập tuần 3.

Câu 1.

Mức xám mới = 4. (Histogram)

	2	3	4	5	6	7
n(k)	5	3	4	4	4	5
cdf(k)	5	8	12	16	20	25
S(k)	0	0,45	1,05	1,35	2,25	3
		0	1	1	2	3

$$S(2) = \frac{(cdf_{(k)} - cdf_{(k)min})}{M \times N - cdf_{(k)min}} \times (L-1) = \frac{(5-5)}{25-5} \times (4-1) = 0$$

$$S(3) = \frac{(cdf_{(k)} - cdf_{(k)min})}{M \times N - cdf_{(k)min}} \times (L-1) = \frac{8-5}{25-5} \times 3 = +0,45$$

$$S(4) = \frac{cdf_{(k)} - cdf_{min}}{M \times N - cdf_{min}} \times (L-1) = \frac{12-5}{25-5} \times 3 = 1,05$$

KOKUYO

6	2	4	5	5
7	4	5	4	5
		7		

$$cdf(5) = \frac{16-5}{25-5} \times 3 = \frac{5}{20} \times 3 = 1,35$$

$$cdf(6) = \frac{20-5}{25-5} \times 3 = \frac{15}{20} \times 3 = 2,25$$

$$cdf(7) = \frac{25-5}{25-5} \times 3 = \frac{20}{20} \times 3 = 3$$

Câu 2.

$L = 6$

	2	3	4	5	6	7
$h(k)$	5	3	4	4	4	5
$cdf(k)$	5	8	12	16	20	25
$s(q)$	0	1	2	3	4	5

$$s(2) = \frac{5-5}{25-5} \times 5 = 0$$

$$s(3) = \frac{8-5}{25-5} \times 5 = 0,75$$ 3/20

$S(4) = \frac{12-5}{25-5} \times (6-1) = 1,75.$

$S(6) = \frac{16-5}{25-5} \times 5 = 2,75.$

$S(2) = \frac{20-5}{25-5} \times 5 = 3,75.$

$S(7) = \frac{25-5}{25-5} \times 5 = 5.$

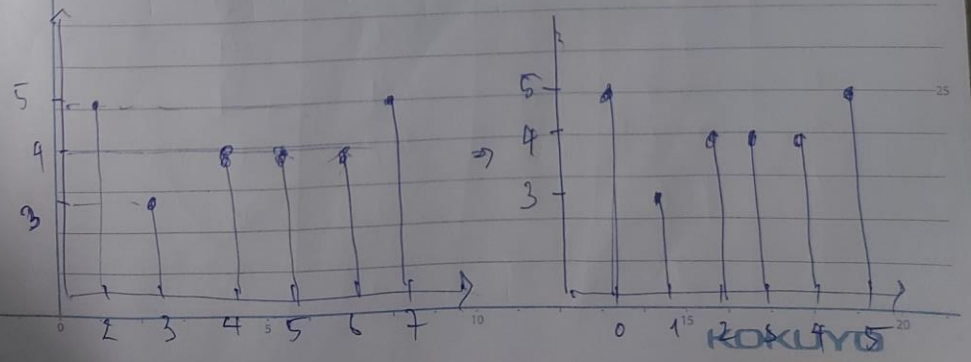
Thứ tự cân =

2	2	4	5	5
6	2	5	4	5
7	4	7	7	3
7	6	2	3	6
4	3	6	2	7

⇒

Sau khi cân =

0	0	2	3	3
4	0	3	2	2
5	2	5	5	1
5	4	0	1	4
2	1	4	0	5

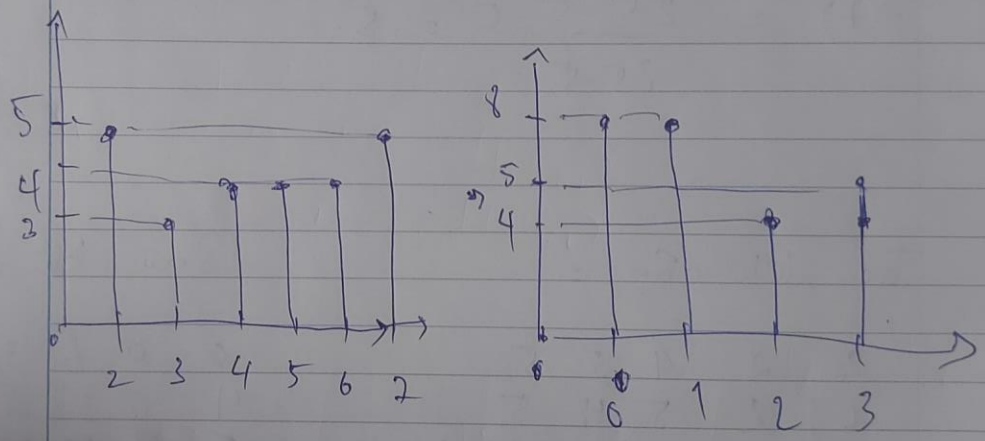


Câu 1

Thứ
Ngày . . No.

Trc khi cân = Histogram Sau khi cân =

2	2	4	5	5		0	0	1	1	1
6	2	5	4	5		2	0	1	1	1
7	4	7	7	3	⇒	3	1	3	3	0
7	6	2	3	6		3	2	0	0	2
4	3	6	2	7		1	0	2	0	3



Thứ
Ngày . . No.

Câu 3 ~~4~~ STT 46

Ma trận 47

7	1	2	6	1
1	3	4	1	5
2	7	7	5	7
1	4	1	7	5
5	3	4	2	7

(47) Bảng tần số làm xuất hiện của điểm ảnh ~~trong~~ ma trận I

r_i	0	1	2	3	4	5	6	7
$h(r_i)$	0	6	3	2	3	4	1	6
$cdf(r_i)$	0	6	9	11	14	18	19	25
$H(r_i)$	0	42	63	77	98	126	133	175

Với $H(r_i) = (L-1) cdf_{r_i} = (8-1) cdf(r_i)$

$= 7 . cdf(r_i)$.

Bảng thống kê ma trận điểm ảnh 46

r_i	0	1	2	3	4	5	6	7
$n(r_i)$ hi	0	0	5	3	4	4	4	5
cdf(r_i)	0	0	5	8	12	16	20	25
H(r_i)	0	0	35	56	84	112	140	175

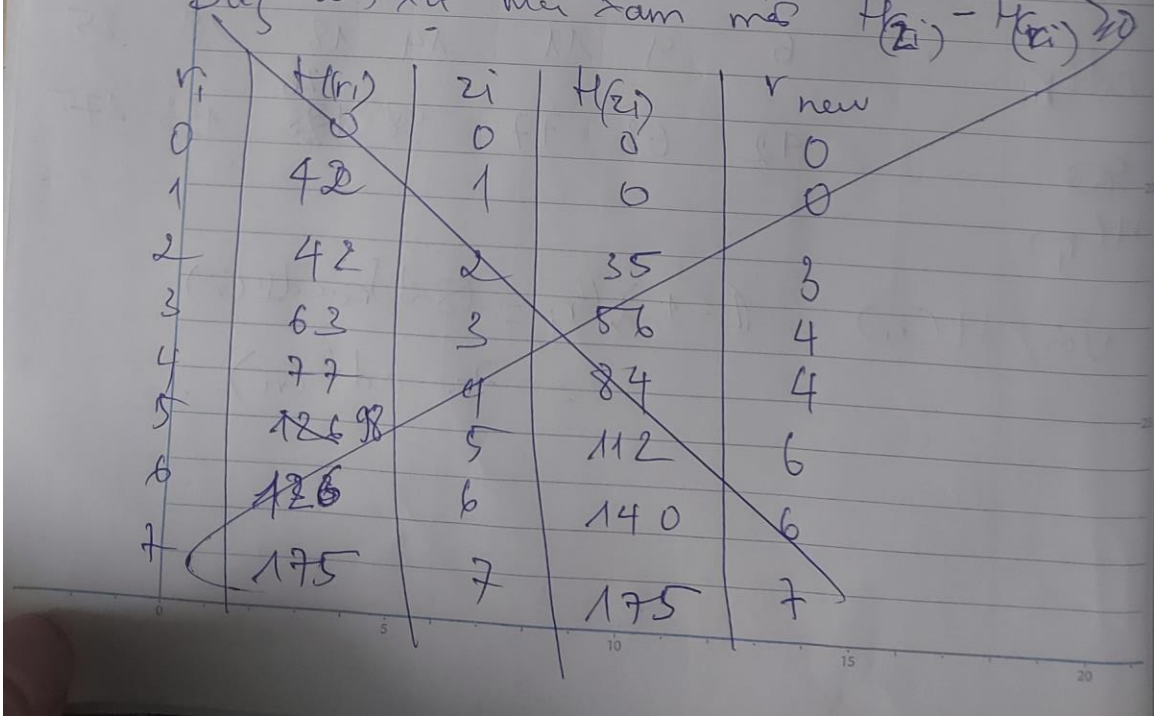
Vì $H(r_i) = (L-1) \times cdf(z_i)$

$= (8-1) \times cdf(z_i)$

$= 7 \times cdf(z_i)$

Bảng ánh xạ mức xám mới $H(z_i) - H(r_i) \geq 0$

r_i	H(r_i)	z_i	H(z_i)	r_{new}
0	0	0	0	0
1	42	1	0	0
2	42	2	35	3
3	63	3	56	4
4	77	4	84	4
5	126	5	112	6
6	126	6	140	6
7	175	7	175	7



Bảng thống kê mức xám ~~của~~ thì Histogram mới đúng.

r_i	0	3	4	6	7
$n_{(r_i)}$					

Bảng làm đúng. ($H_{(z_i)} - H_{(r_i)} \geq 0$)

r_i	$H_{(r_i)}$	z_i	$H_{(z_i)}$	r_{new}
0	0	0	0	0
1	~~40~~ 0	1	42	1
2	35	2	63	1
3	56	3	77	2
4	84	4	98	4
5	112	5	126	5
6	140	6	133	7
7	175	7	175	7

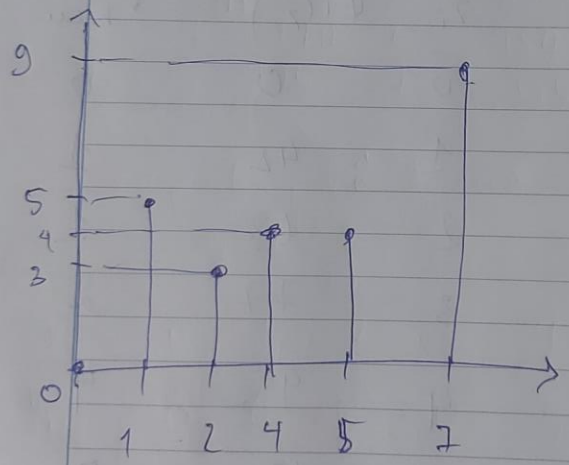
Trang 1/4 - Mã đề thi 018

2	2			
6	2	4	5	5
7	4	5	4	5

Thứ
Ngày . . No.

Bảng thống kê mức độ ảnh ma trận 4b

r_i	0	1	2	3	4	5	6	7
$n(r_i)$	0	5	3	0	4	4	0	9



Câu 4.

STT : 46.

Ma trận : 48.

2	6	7	2	7
6	5	4	4	5
3	6	6	5	5
3	6	6	7	6
2	1	6	6	1

Thống kê Ma trận 46

r_i	0	1	2	3	4	5	6	7
$n(r_i)$	0	0	5	3	4	4	4	5
$cdf(r_i)$	0	0	5	8	12	16	20	25
$H(r_i)$	0	0	35	56	84	112	140	175

Với $H(r_i) = (L-1) * cdf(r_i) = (8-1) * cdf(r_i)$
$= 7 * cdf(r_i)$

Thống kê ma trận 48

z_i	0	1	2	3	4	5	6	7
$n(z_i)$	0	2	3	2	2	4	9	13
$cdf(z_i)$	0	2	5	7	9	13	22	25
$H(z_i)$	0	14	35	49	63	91	154	175

Với $H(z_i) = (L-1) * cdf(z_i) = (8-1) * cdf(z_i)$
$= 7 * cdf(z_i)$

2	2	4	5	5
6	2	5	4	5
7	4			

Bảng số xa ĐK: $H_{(i)} - H_i \geq 0$

r_i	$H(r_i)$	z_i	$H(z_i)$	r_{new}
0	0	0	0	0
1	35	1	14	1
2	56	2	35	2
3	84	3	49	4
4	112	4	63	5
5	140	5	91	6
6	175	6	154	6
7		7	175	7

Bảng thống kê ma trận 4 6. sau matching.

r_i	0	1	2	3	4	5	6	7
$h(r_i)$	0	0	5	0	3	4	8	5

Câu 5.

$K_0 = 0,\ K_1 = 0,9$

$K_2 = 0,\ K_3 = 3,5$

$K_4 = 1,4.$

Gọi độ sáng TB.

$$m = \sum_{K=0}^{L-1} r_K \cdot P(r_K)$$

Chỉ số tương phản

$$\delta^2 = \sum_{K=0}^{L-1} (r_K - m)^2 \cdot p(r_K).$$

Ma trận đầu vào.

2	2	4
6	2	5
7	4	7

Bảng thống kê mức xám.

r_i	2	4	5	6	7.
$n(r_i)$	3	2	1	1	2
$P(r_i)$	$\frac{1}{3}$	$\frac{2}{9}$	$\frac{1}{9}$	$\frac{1}{9}$	$\frac{2}{9}$

$$m_I = \frac{2 \cdot 3 + 4 \cdot 2 + 5 \cdot 1 + 6 \cdot 1 + 7 \cdot 2}{9}$$

$$= \frac{39}{9}$$

$$\sigma_I^2 = \left(2 - \frac{39}{9}\right)^2 \cdot \frac{1}{3} + \left(4 - \frac{39}{9}\right)^2 \cdot \frac{2}{9}$$

$$+ \left(5 - \frac{39}{9}\right)^2 \cdot \frac{1}{9} + \left(6 - \frac{39}{9}\right) \cdot \frac{1}{9}$$

$$+ \left(7 - \frac{39}{9}\right) \cdot \frac{2}{9}$$

$$= \frac{34}{9} \approx 3,778$$

Đặt cửa sổ 3x3 lần lượt vào các ảnh tại $f(x,y) \in I$, ta có các vùng cục bộ như sau.

2.2

$S(0,0) = \begin{matrix} 0 & 0 & 0 \\ 0 & 2 & 2 \\ 0 & 6 & 2 \end{matrix} \Rightarrow$

r_S	0	2	6
$n(r_S)$	5	3	1
$p(r_S)$	$\frac{5}{9}$	$\frac{3}{9}$	$\frac{1}{9}$

$$m_S = \frac{0.5 + 2.3 + 6.1}{9}$$

$$= \frac{12}{9} \approx 1,33.$$

$$\delta_S^2 = \left(0 - \frac{16}{9}\right)^2 \cdot \frac{5}{9} + \left(2 - \frac{16}{9}\right)^2 \cdot \frac{3}{9} + \left(6 - \frac{16}{9}\right)^2 \cdot \frac{1}{9}$$

$$= \frac{304}{81} \approx 3,75.$$

Đkiện: $\begin{cases} k_0 \cdot m_I \leq m_S \leq k_1 \cdot m_I \\ k_2 \cdot \delta_I^2 \leq \delta_S^2 \leq k_3 \cdot \delta_{gI}^2 \end{cases}$

$\Leftrightarrow \begin{cases} 0 \cdot \frac{39}{9} \leq m_S \leq 0,9 \cdot \frac{39}{9} \\ 0 \cdot \frac{34}{9} \leq \delta^2 \leq 3,5 \cdot \frac{34}{9} \end{cases}$

$\Leftrightarrow \begin{cases} 0 \leq m_S \leq 3,4 \\ 0 \leq \delta^2 \leq 13,22 \end{cases}$

$\Leftrightarrow \begin{cases} 0 \leq 1,33 \leq 3,4 \\ 0 \leq 3,75 \leq 13,22 \end{cases}$

$\rightarrow f(0,0) = \text{round}(C.f(0,0))$

$= \text{round}(1,4 \cdot 2)$

$= \text{round}(2,8) = 3$

$S(0,1) = \begin{matrix} 0 & 0 & 0 & 0 & 2 & 4 & 5 & 6 \\ 2 & 2 & 4 & \Rightarrow n_s & 3 & 3 & 1 & 1 & 1 \\ 6 & 2 & 5 & p(r_s) & \frac{3}{9} & \frac{3}{9} & \frac{1}{9} & \frac{1}{9} & \frac{1}{9} \end{matrix}$

$m_S = \dfrac{0.3 + 2*3 + 4.1 + 5.1 + 6.1}{9}$

$= \dfrac{21}{9} \approx 2,33.$

$S_S^2 = \left(0 - \frac{21}{9}\right)^2 \cdot \frac{1}{3} + \left(2 - \frac{21}{9}\right)^2 \frac{1}{3} + \left(4 - \frac{21}{9}\right)^2 \frac{1}{9}$

$+ \left(5 - \frac{21}{9}\right)^2 \cdot \frac{1}{9} + \left(6 - \frac{21}{9}\right)^2 \cdot \frac{1}{9}.$

$= \frac{218}{27} \approx 8,074$

AD ~~ĐK~~ ĐK $\begin{cases} k_0 \cdot m_I \le m_S \le k_1 \cdot m_I \\ k_2 \cdot \delta_I^2 \le \delta_S^2 \le k_3 \cdot \delta_I^2 \end{cases}$

$\Leftrightarrow \begin{cases} 0 \cdot \frac{40}{9} \le \frac{21}{9} \le 0{,}9 \cdot \frac{40}{9} \end{cases}$

$\Leftrightarrow \begin{cases} 0 \le 2{,}33 \le 3{,}4 \\ 0 \le 8{,}074 \le 13{,}22 \end{cases}$

$\Rightarrow f(0,1) = \text{round}(c \cdot f(0,1))$

$= \text{round}(1{,}4 \cdot 2)$

$= \text{round}(2{,}8) = 3$

$S(0,2) = \begin{matrix} 0 & 0 & 0 \\ 2 & 4 & 0 \\ 2 & 5 & 0 \end{matrix} \Rightarrow \begin{matrix} r_S & 0 & 2 & 4 & 5 \\ n_{(r_S)} & 5 & 2 & 1 & 1 \\ p(r_S) & \frac{5}{9} & \frac{2}{9} & \frac{1}{9} & \frac{1}{9} \end{matrix}$

$m_S = \frac{0.5 + 2.2 + 4.1 + 5.1}{9} = \frac{13}{9} \approx 1{,}44.$

$\delta_S^2 = \left(0 - \frac{13}{9}\right)^2 \cdot \frac{5}{9} + \left(2 - \frac{13}{9}\right)^2 \cdot \frac{2}{9} + \left(4 - \frac{13}{9}\right)^2 \cdot \frac{1}{9}$

$+ \left(5 - \frac{13}{9}\right)^2 \cdot \frac{1}{9} \approx 2.38$

~~ĐK~~ ĐK $0 \le 1{,}44 \le 3{,}4$

$0 \le 2{,}38 \le 13{,}22$ 1,4.

$f(0,2) = \text{round}(c \cdot f(0,2)) = 2 \cdot \text{round}(2.4)$

$= 2 \cdot 2 = 4$

$S(1,0) = \begin{matrix} 0 & 2 & 2 \\ 6 & 6 & 2 \\ 0 & 7 & 4 \end{matrix}$

r_s	0	2	4	6	7
n_{r_s}	3	3	1	1	1
$p(r_s)$	$\frac{3}{9}$	$\frac{3}{9}$	$\frac{1}{9}$	$\frac{1}{9}$	$\frac{1}{9}$

$m_s = \frac{0.3 + 2.3 + 4.1 + 6.1 + 7.1}{9}$

$= \frac{23}{9} \approx 2,55.$

$\delta_9^2 = \left(0 - \frac{23}{9}\right)^2 \cdot \frac{1}{3} + \left(2 - \frac{23}{9}\right)^2 \cdot \frac{1}{3} + \left(4 - \frac{23}{9}\right)^2 \cdot \frac{1}{9}$

$+ \left(6 - \frac{23}{9}\right)^2 \cdot \frac{1}{9} + \left(7 - \frac{23}{9}\right)^2 \cdot \frac{1}{9}$

$= \frac{488}{81} \approx 6,024.$

$tk. \begin{cases} 0 \leq 2,55 \leq 3,4 \\ 0 \leq 6,024 \leq 13,22 \end{cases}$

$t(1,0) = \text{round}(c.t(1,0)) = \text{round}(1,4 \cdot 6) = 8,4. = 8$

$S(1,1) = \begin{matrix} 2 & 2 & 4 \\ 6 & 2 & 5 \\ 7 & 4 & 7 \end{matrix}$

r_s	2	4	5	6	7
$n_{(r_s)}$	3	2	1	1	2
$p(r_s)$	$\frac{1}{3}$	$\frac{2}{9}$	$\frac{1}{9}$	$\frac{1}{9}$	$\frac{2}{9}$

$m_x = \frac{2.3 + 4.2 + 5.1 + 6.1 + 7.1}{9} = \frac{32}{9} \approx 3,55$

$\delta^2 = \left(2 - \frac{32}{9}\right)^2 \cdot \frac{1}{3} + \left(4 - \frac{32}{9}\right)^2 \cdot \frac{2}{9} + \left(5 - \frac{32}{9}\right)^2 \cdot \frac{1}{9} + \left(6 - \frac{32}{9}\right)^2 \frac{1}{9}$

$+ \left(7 - \frac{32}{9}\right)^2 \cdot \frac{2}{9} = \frac{355}{81} \approx 4,38.$

ĐK: $\begin{cases} 0 \leq 3,55 \leq 3,4 \\ 0 \leq 4,38 \leq 13,22 \end{cases}$ (o tlm)

$\Rightarrow$ = cập nhật cỡ độ sáng tại v.t.v $f(1,1)$

$S(1,2) = \begin{matrix} 2 & 4 & 0 \\ 2 & 5 & 0 \\ 4 & 7 & 0 \end{matrix} \Rightarrow \begin{matrix} r_S & 0 & 2 & 4 & 5 & 7 \\ n_{(r_S)} & 3 & 2 & 2 & 1 & 1 \\ p(r_S) & \frac{1}{3} & \frac{2}{9} & \frac{2}{9} & \frac{1}{9} & \frac{1}{9} \end{matrix}$

$m_S = \frac{0.3 + 2.2 + 4.2 + 5.1 + 7.1}{9}$

$= \frac{24}{9} \approx 2,66.$

$\delta_S^2 = \left(0 - \frac{24}{9}\right)^2 \cdot \frac{1}{3} + \left(2 - \frac{24}{9}\right)^2 \cdot \frac{2}{9} + \left(4 - \frac{24}{9}\right)^2 \cdot \frac{2}{9}$

$+ \left(5 - \frac{24}{9}\right)^2 \cdot \frac{1}{9} + \left(7 - \frac{24}{9}\right)^2 \cdot \frac{1}{9}$

$= \frac{50}{9} \approx 5,55.$

ĐK $\begin{cases} 0 \leq 2,66 \leq 3,9 \\ 0 \leq 5,55 \leq 13,22 \end{cases} \Rightarrow f(1,2) = \text{lomd}(C.f(1,2))$

$= \text{lomd}(1,7 . 5)$

$= 7,0$

0	2	4	5	5
7	4	5	4	5
1		7	0	

$S(2,9) = \begin{matrix} 0 & 6 & 2 \\ 0 & 7 & 4 \\ 0 & 0 & 0 \end{matrix} \Rightarrow \begin{matrix} 0 & 2 & 4 & 6 & 7 \\ 5 & 1 & 1 & 1 & 1 \\ p(r_S) & \frac{5}{9} & \frac{1}{9} & \frac{1}{9} & \frac{1}{9} & \frac{1}{9} \end{matrix}$

$m_S = \frac{0.5 + 2.1 + 4.1 + 6.1 + 7.1}{9}$

$= \frac{19}{9} \approx 2,11$

$\delta_S^2 = \left(0 - \frac{19}{9}\right)^2 \cdot \frac{5}{9} + \left(2 - \frac{19}{9}\right)^2 \cdot \frac{1}{9}$

$+ \left(4 - \frac{19}{9}\right)^2 \cdot \frac{1}{9} + \left(6 - \frac{19}{9}\right)^2 \cdot \frac{1}{9} + \left(7 - \frac{19}{9}\right)^2 \cdot \frac{1}{9}$

$= \frac{584}{81} \approx 7,209.$

$f(2,0) = \text{round}(c \times f(2,0))$

$= \text{round}(1,4 \times 7)$

$= 10.$

$S(2,1) = \begin{matrix} 6 & 2 & 5 \\ 7 & 4 & 7 \\ 0 & 0 & 0 \end{matrix} \Rightarrow \begin{matrix} r_S & 0 & 2 & 4 & 5 & 6 & 7 \\ n_{r_S} & 3 & 1 & 1 & 1 & 1 & 2 \\ p(r_S) & \frac{1}{3} & \frac{1}{9} & \frac{1}{9} & \frac{1}{9} & \frac{1}{9} & \frac{2}{9} \end{matrix}$

$m_S = \frac{0.3 + 2.1 + 4.1 + 5.1 + 6.1 + 7.2}{9} = \frac{31}{9} \approx$

$$\sigma_S^2 = \left(0 - \frac{31}{9}\right)^2 \cdot \frac{1}{3} + \left(2 - \frac{31}{9}\right)^2 \cdot \frac{1}{9} + \left(4 - \frac{31}{9}\right)^2 \cdot \frac{1}{9}$$
$$+ \left(5 - \frac{31}{9}\right)^2 \cdot \frac{1}{9} + \left(6 - \frac{31}{9}\right)^2 \cdot \frac{1}{9} + \left(7 - \frac{31}{9}\right)^2 \cdot \frac{2}{9}$$
$$= \frac{650}{81} \approx 8{,}024$$

HK: $0 \leq 3{,}4 \leq 3{,}4$
$0 \leq 8{,}024 \leq 13{,}22$

$f(2,1) = \text{round}(C \times f(2,1))$
$= \text{round}(1{,}4 \cdot 4)$
$= 6$

$S(2,2) =$
2 5 0
4 7 0
0 0 0

r_S	0	2	4	5	7
$n(r_S)$	5	1	1	1	1
$p(r_S)$	$\frac{5}{9}$	$\frac{1}{9}$	$\frac{1}{9}$	$\frac{1}{9}$	$\frac{1}{9}$

$$m_S = \frac{0 \cdot 5 + 2 \cdot 1 + 4 \cdot 1 + 5 \cdot 1 + 7 \cdot 1}{9} = \frac{18}{9} = 2$$

$$\sigma_S^2 = (0-2)^2 \cdot \frac{5}{9} + (2-2)^2 \cdot \frac{1}{9} + (4-2)^2 \cdot \frac{1}{9} + (5-2)^2 \cdot \frac{1}{9}$$
$$+ (7-2)^2 \cdot \frac{1}{9} = \frac{49}{9} \approx 5{,}44$$

HK: $0 \leq 2 \leq 3{,}4$
$0 \leq 5{,}44 \leq 13{,}22$

$f(2,2) = \text{round}(C \cdot f(2,2)) = \text{round}(1{,}9 \cdot 7)$
$= 10$

2	2	4	5	5
6	2	5	4	5
7	4	7		

Thứ
Ngày . . No.

Ma trận ảnh sau khi xử lý Histogram cục bộ

3	3	6
8	2	7
10	6	10