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UTS_Pengolahan Citra Digital

Soal 1

Citra

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

Mask

0	-1	0
-1	4	-1
0	-1	0

Perkalian Baris pertama

$$6 = (4*0) + (4*(-1)) + (3*0) + (6*(-1)) + (6*4) + (5*(-1)) + (5*0) + (6*(-1)) + (6*0)$$

$$= 3$$

$$5 = (4*0) + (3*(-1)) + (5*0) + (6*(-1)) + (5*4) + (5*(-1)) + (6*0) + (6*(-1)) + (6*0)$$

$$= 0$$

$$5 = (3*0) + (5*(-1)) + (4*0) + (5*(-1)) + (5*4) + (2*(-1)) + (6*0) + (6*(-1)) + (2*0)$$

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

$$= 2$$

Perkalian Baris Kedua

$$6 = (6*0) + (6*(-1)) + (5*0) + (5*(-1)) + (6*4) + (6*(-1)) + (6*0) + (7*(-1)) + (5*0)$$

$$= 0$$

$$6 = (6*0) + (5*(-1)) + (5*0) + (6*(-1)) + (6*4) + (6*(-1)) + (7*0) + (5*(-1)) + (5*0)$$

$$= 2$$

$$6 = (5*0)+(5*(-1))+(2*0)+(6*(-1))+(6*4)+(2*(-1))+(5*0)+(5*(-1))+(3*0)$$

$$= 6$$

Perkalian baris ketiga

$$7 = (5*0)+(6*(-1))+(6*0)+(6*(-1))+(7*4)+(5*(-1))+(3*0)+(5*(-1))+(2*0)$$

$$= 6$$

$$5 = (6*0)+(6*(-1))+(6*0)+(7*(-1))+(5*4)+(5*(-1))+(5*0)+(2*(-1))+(4*0)$$

$$= 0$$

$$5 = (6*0)+(6*(-1))+(2*0)+(5*(-1))+(5*4)+(3*(-1))+(2*0)+(4*(-1))+(4*0)$$

$$= 2$$

Maka Hasilnya adalah :

4	4	3	5	4
6	3	0	2	2
5	0	2	6	2
6	6	0	2	3
3	5	2	4	4

Hasil Pembuktian dengan Octave :

```

Command Window
Command Window
h =

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

f =

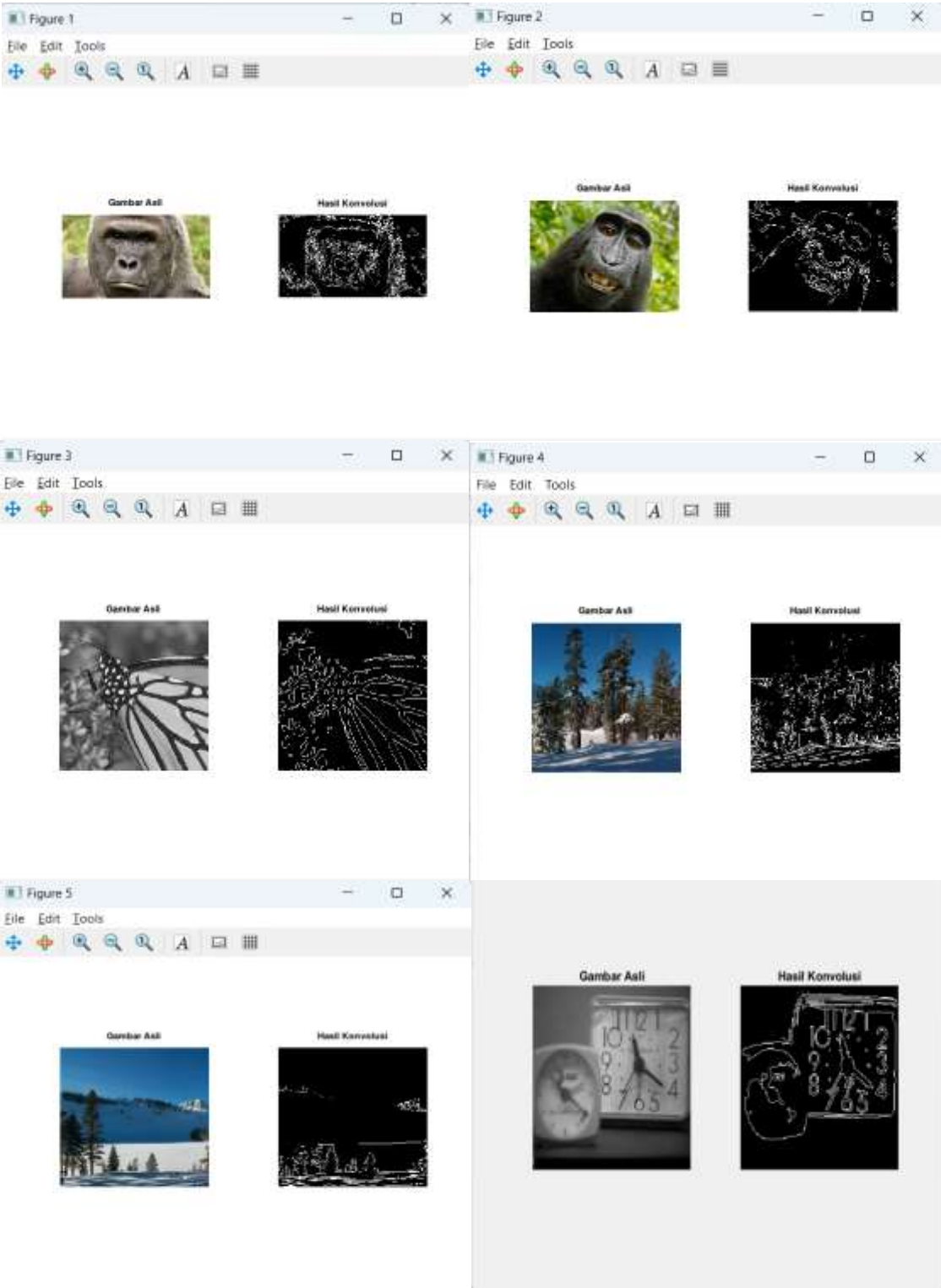
    0   -1    0
   -1    4   -1
    0   -1    0

HasilKovolusi =

    6    3   -2    8    9
    9    3    0    2   -3
    2    0    2    6   -3
    9    6    0    2    1
    1    8   -6    5    9

```

Hasil Konvolusi Gambar



2. Diketahui citra RGB 24 bit berukuran 5x5 piksel berikut:

R = 50 G = 65 B = 50	R = 40 G = 40 B = 55	R = 90 G = 90 B = 90	R = 80 G = 50 B = 50	R = 50 G = 30 B = 40
R = 40 G = 80 B = 30	R = 50 G = 80 B = 50	R = 40 G = 90 B = 80	R = 20 G = 20 B = 50	R = 50 G = 60 B = 70
R = 80 G = 60 B = 40	R = 70 G = 70 B = 70	R = 80 G = 90 B = 70	R = 10 G = 70 B = 10	R = 80 G = 50 B = 80
R = 50 G = 90 B = 70	R = 40 G = 60 B = 50	R = 70 G = 70 B = 70	R = 60 G = 20 B = 40	R = 50 G = 80 B = 50
R = 60 G = 60 B = 60	R = 40 G = 60 B = 80	R = 80 G = 80 B = 80	R = 70 G = 60 B = 50	R = 90 G = 80 B = 70

- Ubahlah citra tersebut sehingga menjadi citra grayscale menggunakan persamaan $fo = 1/3 * (R + G + B)$ (Nilai: 20)
- Ubahlah citra fo (citra grayscale tersebut) menjadi citra negasinya (Nilai: 10)
- Bila pada citra fo dilakukan pemfilteran dengan filter rata-rata (nilai piksel yang dipinggir tidak di proses), bagaimana citra hasilnya? (Nilai: 20)
- Bila pada citra fo dilakukan pemfilteran dengan filter median (nilai piksel yang dipinggir tidak di proses), bagaimana citra hasilnya? (Nilai: 20)

Jawaban

- a. Program matlabnya

```
% Citra RGB awal
R = [50, 40, 90, 80, 50;
     40, 50, 40, 20, 50;
     80, 70, 80, 10, 80;
     50, 40, 70, 60, 50;
     60, 40, 80, 70, 90];

G = [65, 40, 90, 50, 30;
     80, 80, 90, 20, 60;
     60, 70, 90, 70, 50;
     90, 60, 70, 20, 80;
     60, 60, 80, 60, 80];

B = [50, 55, 90, 50, 40;
     30, 50, 80, 50, 70;
     40, 70, 70, 10, 80;
     70, 50, 70, 40, 50;
     60, 80, 80, 50, 70];

% Menghitung citra
grayscale(soal a)fo = (1/3) * (R
+ G + B);
subplot(4,1,1); imshow(fo, []); title('citra grayscale');
```

Hasilnya ;

fo =

55	45	90	60	40
50	60	70	30	60
60	70	80	30	70
70	50	70	40	60
60	60	80	60	80

b. Program matlabnya

```
% Citra RGB awal
R = [50, 40, 90, 80, 50;
     40, 50, 40, 20, 50;
     80, 70, 80, 10, 80;
     50, 40, 70, 60, 50;
     60, 40, 80, 70, 90];

G = [65, 40, 90, 50, 30;
     80, 80, 90, 20, 60;
     60, 70, 90, 70, 50;
     90, 60, 70, 20, 80;
     60, 60, 80, 60, 80];

B = [50, 55, 90, 50, 40;
     30, 50, 80, 50, 70;
     40, 70, 70, 10, 80;
     70, 50, 70, 40, 50;
     60, 80, 80, 50, 70];

% Menghitung citra
grayscale(soal a)fo = (1/3) * (R
+ G + B);
subplot(4,1,1); imshow(fo, []); title('citra grayscale');

% Mengubah ke citra negasi(soal b)
% Menghitung nilai
maksimummax_value =
max(fo(:));

% Menghitung citra negatif
citra_negatif = max_value -
fo;

% Menampilkan citra negatif
subplot(4,1,2); imshow(citra_negatif, []); title('citra negatif');
```

hasilnya ;

```
citra_negatif =  
  
    35    45     0    30    50  
    40    30    20    60    30  
    30    20    10    60    20  
    20    40    20    50    30  
    30    30    10    30    10
```

- c. Bila pada citra fo dilakukan pemfilteran dengan filter rata-rata (nilai piksel yang dipinggir tidak diproses), bagaimana citra hasilnya?

```
% Citra RGB awal  
R = [50, 40, 90, 80, 50;  
     40, 50, 40, 20, 50;  
     80, 70, 80, 10, 80;  
     50, 40, 70, 60, 50;  
     60, 40, 80, 70, 90];  
  
G = [65, 40, 90, 50, 30;  
     80, 80, 90, 20, 60;  
     60, 70, 90, 70, 50;  
     90, 60, 70, 20, 80;  
     60, 60, 80, 60, 80];  
  
B = [50, 55, 90, 50, 40;  
     30, 50, 80, 50, 70;  
     40, 70, 70, 10, 80;  
     70, 50, 70, 40, 50;  
     60, 80, 80, 50, 70];  
  
% Menghitung citra  
grayscale(soal a)fo = (1/3) * (R  
+ G + B);  
subplot(4,1,1); imshow(fo, []); title('citra grayscale');  
  
% Mengubah ke citra negasi(soal b)  
% Menghitung nilai  
maksimummax_value =  
max(fo(:));  
  
% Menghitung citra negatif  
citra_negatif = max_value -  
fo;  
  
% Menampilkan citra negatif  
subplot(4,1,2); imshow(citra_negatif, []); title('citra negatif');  
  
% Melakukan pemfilteran dengan filter rata-  
rata(soal c)filter_rata_rata = fspecial('average',  
[3 3]);  
% Membuat filter rata-rata 3x3
```

```

hasil_rata_rata = filter2(filter_rata_rata, fo, 'same');
subplot(4,1,3); imshow(hasil_rata_rata, []); title('filter rata-
rata');

```

hasilnya adalah :

```

hasil_rata_rata =

    23.3333    41.1111    39.4444    38.8889    21.1111
    37.7778    64.4444    59.4444    58.8889    32.2222
    40.0000    64.4444    55.5556    56.6667    32.2222
    41.1111    66.6667    60.0000    63.3333    37.7778
    26.6667    43.3333    40.0000    43.3333    26.6667

```

- d. Bila pada citra fo dilakukan pemfilteran dengan filter median (nilai piksel yang dipinggir tidak diproses), bagaimana citra hasilnya?

```

% Citra RGB awal
R = [50, 40, 90, 80, 50;
     40, 50, 40, 20, 50;
     80, 70, 80, 10, 80;
     50, 40, 70, 60, 50;
     60, 40, 80, 70, 90];

G = [65, 40, 90, 50, 30;
     80, 80, 90, 20, 60;
     60, 70, 90, 70, 50;
     90, 60, 70, 20, 80;
     60, 60, 80, 60, 80];

B = [50, 55, 90, 50, 40;
     30, 50, 80, 50, 70;
     40, 70, 70, 10, 80;
     70, 50, 70, 40, 50;
     60, 80, 80, 50, 70];

% Menghitung citra
grayscale(soal a)fo = (1/3) *
(R + G + B);
subplot(4,1,1); imshow(fo, []); title('citra grayscale');

% Mengubah ke citra negasi(soal b)
% Menghitung nilai
maksimummax_value =
max(fo(:));

% Menghitung citra
negatif citra_negatif =
max_value - fo;

% Menampilkan citra negatif
subplot(4,1,2); imshow(citra_negatif, []); title('citra negatif');

% Melakukan pemfilteran dengan filter rata-rata
filter_rata_rata = fspecial('average', [3 3]); % Membuat filter
rata-rata 3x3
hasil_rata_rata = filter2(filter_rata_rata, fo, 'same');

```

```
subplot(4,1,3); imshow(hasil_rata_rata, []); title('filter rata-  
rata');
```

```
% Melakukan pemfilteran dengan filter median  
hasil_median = medfilt2(fo, [3 3]);  
subplot(4,1,4); imshow(hasil_median, []); title('filter median')
```

```
hasil_median =
```

0	50	45	40	0
50	60	60	60	30
50	70	60	60	30
60	70	60	70	40
0	60	50	60	0

Hasil dari citra yang ditampilkan adalah

