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Matkul : Pengolahan Citra Digital

Soal no 1

Matriks yang dibuat:  $f=[3 \ 9 \ 5 \ 5 \ 3; 9 \ 3 \ 3 \ 9 \ 9; 9 \ 5 \ 5 \ 3 \ 5; 3 \ 3 \ 9 \ 9 \ 3; 5 \ 3 \ 9 \ 5 \ 9]$

3	9	5	5	3
9	3	3	9	9
9	5	5	3	5
3	3	9	9	3
5	3	9	5	9

Mask :

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

Hasil Konvolusi : HasilKonvolusi= $\text{conv2}(f, \text{mask}, 'same')$

Baris Pertama

$$3 = (3.0) + (9.(-1)) + (5.0) + (9.(-1)) + (3.4) + (3.((-1))) + (9.0) + (5.((-1))) + (5.0) = -14$$

$$3 = (9.0) + (5.(-1)) + (5.0) + (3.(-1)) + (3.4) + (9.((-1))) + (5.0) + (5.((-1))) + (3.0) = -10$$

$$9 = (5.0) + (5.(-1)) + (3.0) + (3.(-1)) + (9.4) + (9.((-1))) + (5.0) + (3.((-1))) + (5.0) = 16$$

Baris Kedua

$$5 = (9.0) + (3.(-1)) + (3.0) + (9.(-1)) + (5.4) + (5.((-1))) + (3.0) + (3.((-1))) + (9.0) = 0$$

$$5 = (3.0) + (3.(-1)) + (9.0) + (5.(-1)) + (5.4) + (3.((-1))) + (3.0) + (9.((-1))) + (9.0) = 0$$

$$3 = (3.0) + (9.(-1)) + (9.0) + (5.(-1)) + (3.4) + (5.((-1))) + (9.0) + (9.((-1))) + (3.0) = -16$$

Baris Ketiga

$$3 = (9.0) + (5.(-1)) + (5.0) + (3.(-1)) + (3.4) + (9.((-1))) + (5.0) + (3.((-1))) + (9.0) = -8$$

$$9 = (5.0) + (5.(-1)) + (3.0) + (3.(-1)) + (9.4) + (9.((-1))) + (3.0) + (9.((-1))) + (5.0) = 10$$

$$9 = (5.0) + (3.(-1)) + (5.0) + (9.(-1)) + (9.4) + (3.((-1))) + (9.0) + (5.((-1))) + (9.0) = 16$$

### Hasil pembuktian di Octave

```
# Octave 9.1.0, Fri Apr 05 00:17:13 2024 GMT <unknown@WIN-HST2VUP2MQ0>
f=[3 9 5 5 3; 9 3 3 9 9; 9 5 5 3 5; 3 3 9 9 3; 5 3 9 5 9]
mask=[0 -1 0; -1 4 -1; 0 -1 0]
HasilKonvolusi=conv2(f,mask,'same')
```

```
>> f=[3 9 5 5 3; 9 3 3 9 9; 9 5 5 3 5; 3 3 9 9 3; 5 3 9 5 9]
f =
```

```

  3   9   5   5   3
  9   3   3   9   9
  9   5   5   3   5
  3   3   9   9   3
  5   3   9   5   9
```

```
>> mask=[0 -1 0; -1 4 -1; 0 -1 0]
mask =
```

```

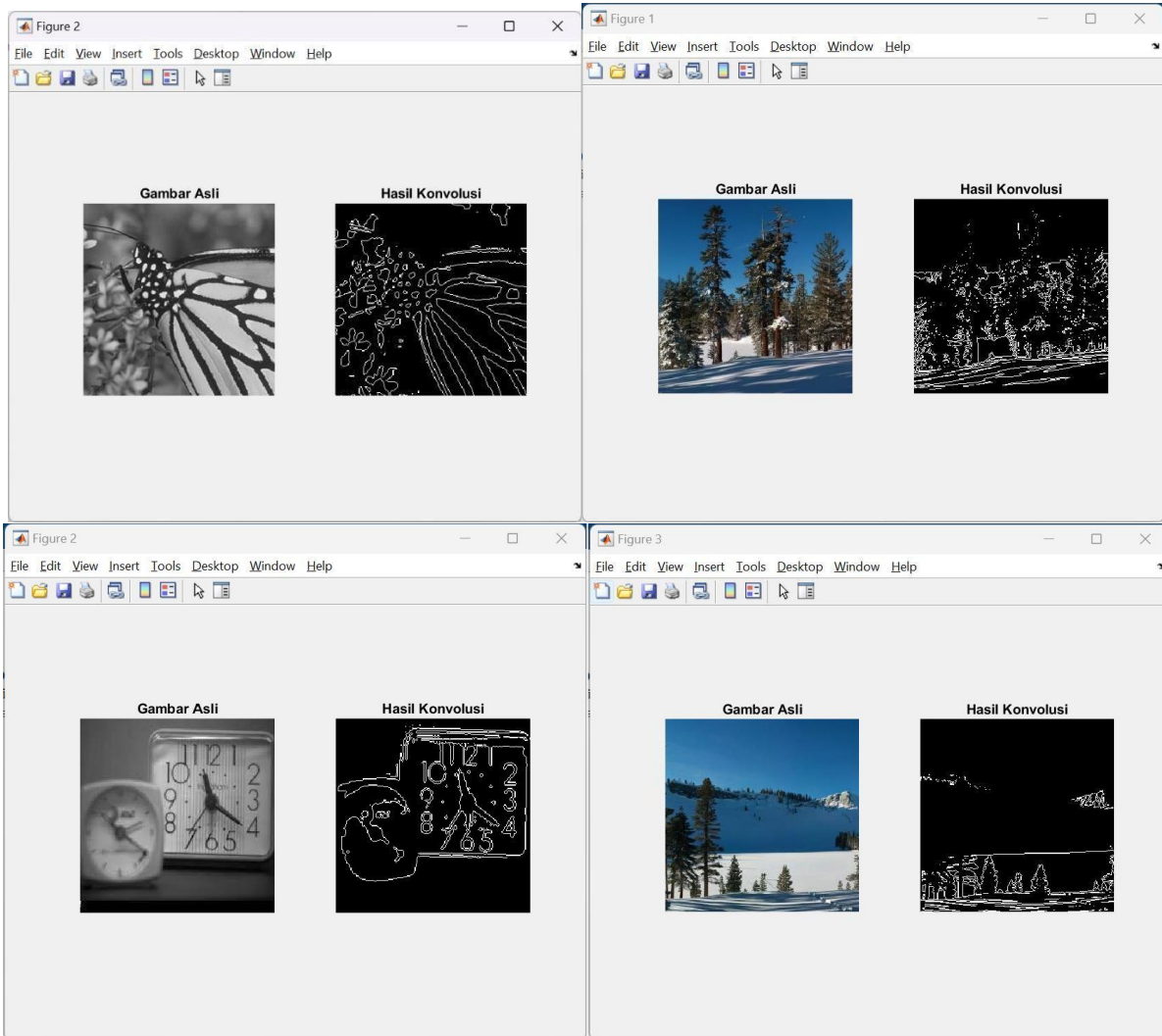
  0  -1   0
 -1   4  -1
  0  -1   0
```

```
>> HasilKonvolusi=conv2(f,mask,'same')
HasilKonvolusi =
```

```

 -6   25   3   3  -2
 21  -14  -10  16  19
 19   0   0 -16   5
 -5  -8  10  16 -11
 14  -5  19  -7  28
```

## Konvolusi gambar



## Soal no 2

### 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 maksimum  
max_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 di proses), 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 maksimum
```

```
max_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 di proses), 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 maksimum
```

```
max_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

