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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=conv2 (f,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

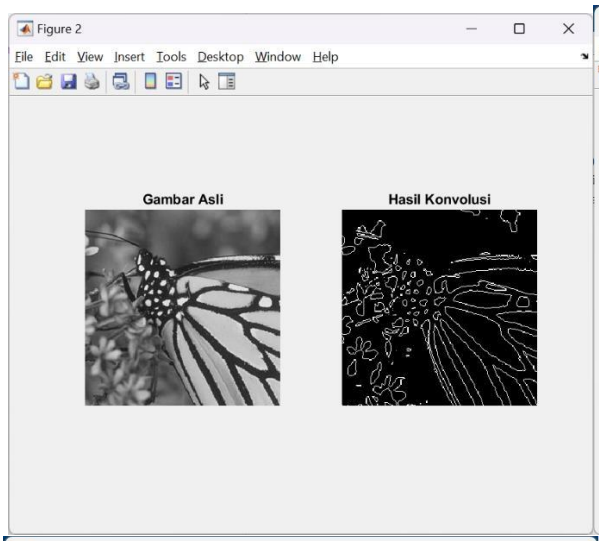
```
# Octave 9.1.0, Fri Apr 05 00:17:13 2024 GMT <unknown@WIN-HST2VUP2MQ0>
f=[3 9 5 5 3; 9 3 3 9 9; 9 5 5 3 5; 3 3 9 9 3; 5 3 9 5 9]
mask=[0 -1 0; -1 4 -1; 0 -1 0]
HasilKonvolusi=conv2(f,mask,'same')
```

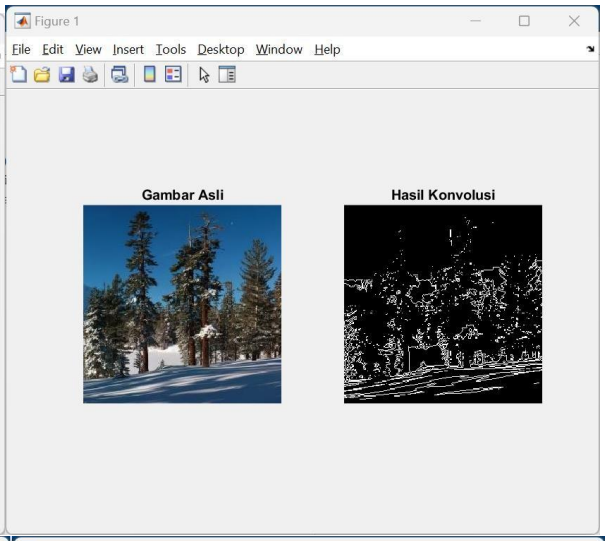
```
>> f=[3 9 5 5 3; 9 3 3 9 9; 9 5 5 3 5; 3 3 9 9 3; 5 3 9 5 9]
f =

   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
```

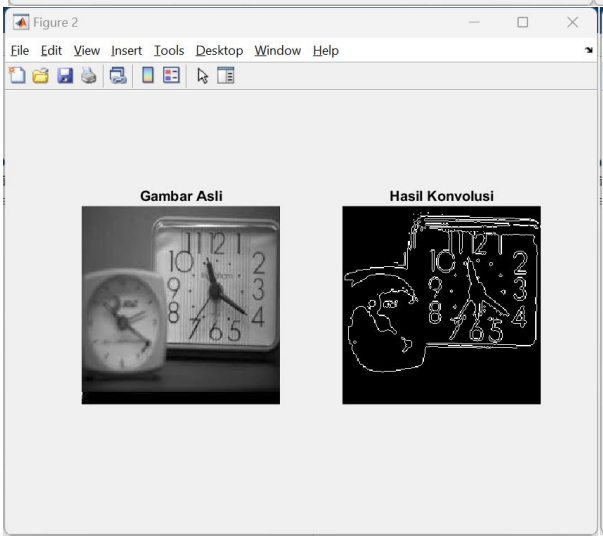
```
>> mask=[0 -1 0; -1 4 -1; 0 -1 0]
mask =

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

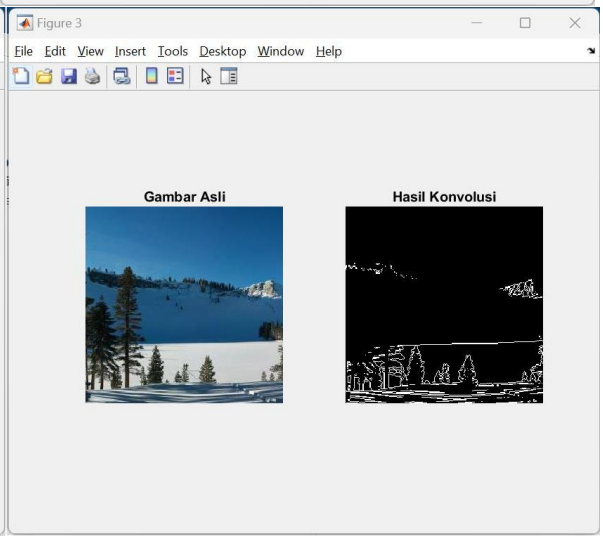
```
>> HasilKonvolusi=conv2(f,mask,'same')
HasilKonvolusi =

   -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 medianhasil_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