

Date  
01/02/22



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Department of Computer Science

## Digital Image Processing Practical - 3

Aim -

Aim - 2D linear convolution, Circular convolution between two 2D matrices

Description -

a) 2D linear convolution - Weights of the convolution kernel is taken and each value from the neighbourhood is multiplied with its opposite on matrix  $g = w * f$

convolution kernel (w)	Rotate 180	Input image (f)	Output image g
$\begin{bmatrix} 1 & -1 & -1 \\ 1 & 2 & -1 \\ 1 & 1 & 1 \end{bmatrix}$	$\begin{bmatrix} 1 & 1 & 1 \\ -1 & 2 & 1 \\ -1 & -1 & 1 \end{bmatrix} \times$	$\begin{bmatrix} 2 & 2 & 2 & 3 \\ 2 & 1 & 3 & 3 \\ 2 & 2 & 1 & 2 \\ 1 & 3 & 2 & 2 \end{bmatrix}$	$\begin{bmatrix} 5 & 4 & 4 & -2 \\ 9 & 6 & 14 & 5 \\ 11 & 7 & 6 & 5 \\ 9 & 12 & 8 & 5 \end{bmatrix}$

b) Circular convolution between two 2D matrices - Circular convolution is defined for periodic signals, in which both input and output image should be same size,  $y = x(m,n) \otimes h(m,n) = A \times h'$

$x(m,n) = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$  &  $h(m,n) = \begin{bmatrix} 3 & 4 \\ 4 & 3 \end{bmatrix}$

$H_0 = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$ ,  $H_1 = \begin{bmatrix} 3 & 4 \\ 4 & 3 \end{bmatrix}$        $A = \begin{bmatrix} H_0 & H_1 \\ H_1 & H_0 \end{bmatrix} = \begin{bmatrix} \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix} & \begin{bmatrix} 3 & 4 \\ 4 & 3 \end{bmatrix} \\ \begin{bmatrix} 3 & 4 \\ 4 & 3 \end{bmatrix} & \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix} \end{bmatrix}$

$Y = \begin{bmatrix} 12 & 3 & 4 \\ 2 & 1 & 4 & 3 \\ 3 & 4 & 1 & 2 \\ 4 & 3 & 2 & 1 \end{bmatrix} \times \begin{bmatrix} 5 \\ 6 \\ 7 \\ 8 \end{bmatrix} = \begin{bmatrix} 70 \\ 68 \\ 62 \\ 60 \end{bmatrix} \rightarrow \begin{bmatrix} 70 & 68 \\ 62 & 60 \end{bmatrix}$   
Output image

pract3.sce (E:\fffiles\college pracs and projects\DIP\pract3.sce) - SciNotes

File Edit Format Options Window Execute ?

pract3.sce (E:\fffiles\college pracs and projects\DIP\pract3.sce) - SciNotes

pract3.sce

```
1 clc;
2 disp('Neeraj-Appari-I073');
3 x=[22,2;3,42];
4 h=[15,6;72,8];
5
6 X = fft(x);
7 H = fft(h);
8 Y=X.*H;
9
10 g = conv2(x,h);
11 y = ifft(Y);
12
13 disp('linear-conversion-:',g);
14 disp('circular-conversion-:',y);
15
```

Line 15, Column 0.

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09:48  
01-02-2022

File Browser

File ?

E:\ffiles\college pracs and projects\DIP\

DIP

1st.txt

contrast\_stretch\_SCG.jpg

gamma\_transformed0.1.jpg

gamma\_transformed0.5.jpg

gamma\_transformed1.2.jpg

gamma\_transformed2.2.jpg

gray.py

Image Processing Chapters.pdf

lnk.txt

Negative\_SCG.png

p1-a.py

p1-b.py

p1-c.py

p2-a.py

p2-c.py

pract3.sce

pract4.sce

pract5.sce

SCG003s.jpg

SCG003s1.jpg

SCG003sgray.jpg

sclab-6.1.1\_x64.exe

With\_background\_SCG.png

Without\_background\_SCG.png

File/directory filter

☐ Case sensitive ☐ Regular expression

Scilab 6.1.1 Console

"Neeraj Appari T073"

"linear conversion :"

330.    162.    12.

1629.   968.   268.

216.    3048.   336.

"circular conversion :"

894.    3210.

1897.   968.

-->

Variable Browser

Name	Value	Type	Visibility	Memory
H	[101, 73; ~...	Double	local	240 B
X	[69, -19; -2...	Double	local	240 B
Y	[6.97e+03,...	Double	local	240 B
ans	1x1	Boolean	local	212 B
g	3x3	Double	local	280 B
h	[15, 6; 72, 8]	Double	local	240 B
x	[22, 2; 3, 42]	Double	local	240 B
y	[894, 3.21...	Double	local	240 B

Command History

--// --01/02/2022 09:45:33 --//

News feed

News feed unavailable.

Windows Taskbar

Type here to search

Taskbar Icons

System Tray