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Qus 1:- To perform the linear filtering using Convolution in an image?

Ans:- Object :- To perform linear filtering using Convolution in an image.

Software :- MATLAB

Theory :- Linear filtering of an image is accomplished through an Operation called Convolution. Convolution is a neighborhood operation in which each output pixel is the weight sum of neighborhood output.

for example :-

$$A = \begin{bmatrix} 17 & 24 & 1 & 8 & 15 \\ 23 & 5 & 7 & 14 & 16 \\ 4 & 6 & 13 & 20 & 22 \\ 10 & 12 & 19 & 21 & 3 \\ 11 & 18 & 25 & 2 & 9 \end{bmatrix}$$

and the Convolution Kernel is

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$$h = \begin{bmatrix} 8 & 1 & 6 \\ 3 & 5 & 7 \\ 4 & 9 & 2 \end{bmatrix}$$

The following figure shows how to Compute (2,4) o/p pixel using using these steps:-

① Rotate the Convolution Kernel 180 degree about its center element.

② Side the Centere element of the Convolution Kernel so that it lies on top of the (2,4)

③ Multiply each weight in the rotated Convolution kernel by the pixel of it corresponds

④ Sum the individual product from Step 3.

Hence the (2,4) output pixel is:-

$1 \cdot 2 + 8 \cdot 9 + 15 \cdot 4 + 7 \cdot 7 + 14 \cdot 5 + 16 \cdot 3 + 1 \cdot 3 + 12 \cdot 6 + 20 \cdot 1 + 22 \cdot 8 = 575$

value of output

17	24	1^2	8^4	15^1	
23	5	7^7	14^5	16^3	Center of Kernel
4	6	13^6	20^1	22^8	
10	12	19	21	3	
11	18	25	2	9	

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Program:-

```
clc;
Clear
all;
Close
all;
imgetfile;
I = imread(ans);
imshow(I);
Hm = fspecial('motion', 20, 45);
MotionBlur =
imfilter(I, Hm, 'replicate'); figure;
imshow(MotionBlur);
Hb
fspecial('disk', 10);
blurred = imfilter(I, Hb, 'replate');
figure;
imshow(blurred);
```

Result:- We perform the linear filtering using convolution in an image.

Qu (2) What is the next step in image processing after compression

Ans (2) Morphological processing.

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Qus (22) What is the step that is performed before color image processing is image processing.

Ans (c) Image Restoration.

Qus (23) How many number of steps are involved in image processing.

Ans (c) 11

Qus (24) What is the expanded form of JPEG?
Ans (b) Joint photographic Experts group.

Qus (25) what is the following steps deal with tools for extracting image components those are useful in the representation and description of shape?

Ans (b) ~~Representation & description~~
Ans (d) Morphological processing.

Qus (26) How is array operation carried out involving one or more image?
Ans (b) pixel by pixel

Qu(27) Region of Interest (ROI) Operation is Commonly called as —

Ans (b) Masking?

Qu(28) Image processing approaches Operating directly on pixels of input image work directly in —

Ans (b) Spatial domain.

Qu(29) What does the total number of pixels in the region defines?

Ans (b) Area.

Qu(30) What of following measures are not used to describe a region?

Ans (c) Number of pixels alone.

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