Image Processing

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18-5B7

Assignment No. 02 Unit No. 02 Date : CSE-B

1) What is image enhancement? What are the different approaches for image enhancement?

A. Image enhancement: It technique is to improve the quality for an image even if the degradation is available. This can be achieved by increasing the dominance of some features or decreasing the ambiguity b/w different regions.

Image enhancement approaches: It approaches fall into two broad categories.

i) Spatial domain methods

ii) Frequency domain methods

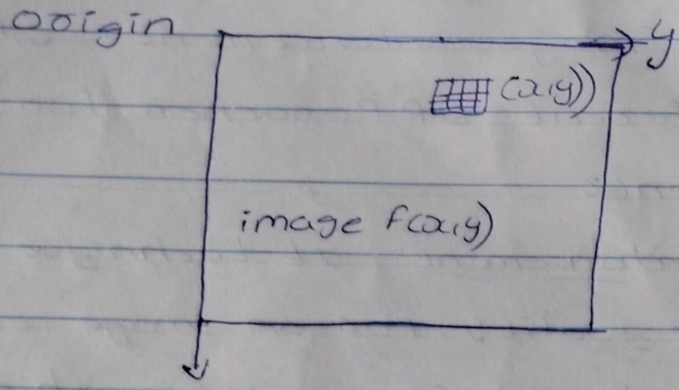
i) Spatial domain:- The term spatial domain refers to the aggregate of pixels composing an image.

-> The spatial domain process will be denoted by the expression.

$$g(x,y) = T[f(x,y)]$$

where $f(x,y)$ is the input image $g(x,y)$ is the proceed images and T is an operator on f, defined over some neighbourhood of (x,y)

-> The following figure shows the basic implement of spatial domain on a single image



-> A 3x3 neighbourhood about a point (x,y) in an image in the spatial domain.

ii) frequency domain method: -> filtering in the frequency domain are based on modifying on the Fourier transform of an image.

2) what is meant by histogram equalization?

A: histogram equalization:- -> let the variable 'r' represent the gray level of the image to be enhanced.

-> we assume that 'r' has been normalization to the interval (0, L-1) with r=0 representing black and r= L-1 representing white.

-> for any r, the conditions then transformations of the transform, $s = T(r)$

where $0 \le r \le L-1$

-> It produces an intensity, output levels for every pixel in the input image intensity r.

-> Assume that the transformation func(r) stasifies the following conditions

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a) $T(v)$ is single-valued and monotonically incorease function in the intconal $0 \le v \le L-1$

b) $0 \le T(v) \le l-1$ foo $0 \le v \le L-1$

$$P(s) = P_v(v(dv/ds))$$

A toansfoormation function of Pooticular impootance in image Poocessing has the foorm.

$$s = T(v) = \int_0^v P_r(\omega)\, d\omega$$

where ω is the dummy vaoiable integoation

3) what aoe intensity toansfoormation functions?

A: Intensity toansfoormation functions:- theoe aoe 3 basic types of functions used foequently foo image enhancement lineoand identify toansfoormations. logaoithmic log and inveose log toansfoomations.

-> It is included in the goaph only foo the completenetion.

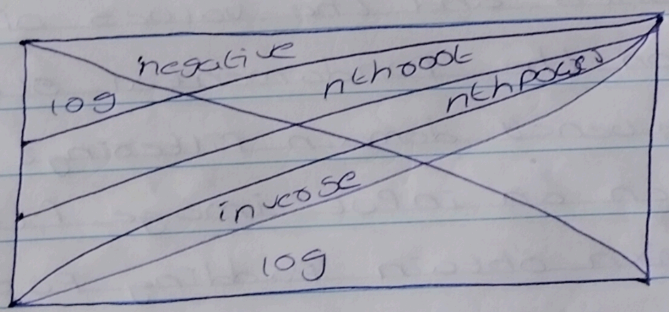

Image Negatives: The negative of an image with goay levels in the oange $(0, L-1)$ is obtained by using the negative toansfoomation which is given by the expoession

$$s = L-1-v$$

-> Reversing the intensity levels of an image in the manner produces the equivalent of the Photographic negative.

Log transformations:- The general form of the log transformation is $s = c\log(1+u)$ where c is a constant and it is assumed that $u \geq 0$

-> The shape of the log curve show that this transformation maps a narrow range of low gray feel values in the input image into a wider range of output values.

Power law transformation:- It moves have the basic form.

$s = cr^2$

where c and r are positive.

constants and the values of $u < 1$

4) Mention the fundamental steps involved in frequency domain filtering?

A. Given an input image f(x,y) of size Mxn obtain Padding Parameter P and Q typically P = 2M and Q = 2N

-> from a Paddied image fp(x,y) of size Mxn, obtain Padding Parameter.

-> Multiply fp(x,y) by $(-1)^{nth}$ to length of it transformations.

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-> compute the DFT, $F(u,v)$ of the image from step 3.

-> Generate a real symmetric filter function (u,v) of size $P \times q$ with center of coordination $(P/2, Q/2)$.

-> from the Product $G(u,v) = M(u,v)$ $F(u,0)$ ussing array multiplication.

-> obtain the processed result images $SP(x,y) =$ real (IDFT} {$G(u,v)$}

$\{-1\}^{x+y}$

-> obtain the final processed result $g(x,y)$ by extracting the $M \times N$ region from the top left quadrant of $g\,P(x,y)$