SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE NAME : 19EC513 – IMAGE PROCESSING AND COMPUTER VISION

III YEAR / V SEMESTER

Unit II- **IMAGE ENHANCEMENT AND RESTORATION**

Topic : Constrained least mean square filtering

Constrained least mean square filtering

The LEAST_SQUARES_FILTER function reduces degradation and noise in an image based on the mean and variance of the degradation and noise. This is also known as a *constrained least squares filter*.

If the degraded image is modeled in the spatial domain by

$$g = Hf + \eta$$

the constrained least squares filter seeks to find the minimum of

$$\sum_x \sum_y (\nabla^2 f(x, y))^2$$

subject to the constraint

$$\|g - H\hat{f}\|^2 = \|\eta\|^2$$

The solution to this problem is given by the following equation

$$\hat{F}(u, v) = \left(\frac{\bar{H}(u, v)}{|H(u, v)|^2 + \gamma |P(u, v)|^2} \right) G(u, v)$$

Constrained least mean square filtering / 19EC513/ IMAGE PROCESSING AND COMPUTER VISION /Mr.S.HARIBABU/ECE/SNSCE

Original image — Blurred — Filtered with LEAST_SQUARES_FILTER

Geometric Transformation

Geometric transformation is a fundamental technique used in image processing that involves manipulating the spatial arrangement of pixels in an image. It is used to modify the geometric properties of an image, such as its size, shape, position, and orientation. The following are some of the basic concepts of geometric transformation in image processing:

1.Transformation Functions: Transformation functions are mathematical functions used to modify the geometric properties of an image. These functions map the coordinates of each pixel in an image to new coordinates based on a specified transformation rule. Some of the commonly used transformation functions include scaling, rotation, translation, and shearing.

2.Coordinate System: A coordinate system is a reference system used to define the spatial location of pixels in an image. In digital image processing, the most commonly used coordinate system is the Cartesian coordinate system, which uses two perpendicular axes (x and y) to represent the horizontal and vertical positions of pixels in an image.

3.Interpolation: Interpolation is the process of estimating the pixel values of an image at locations that are not explicitly defined. This is necessary when transforming an image since the new coordinates may not coincide with the original pixel positions. Interpolation algorithms are used to estimate the pixel values at the new locations based on the surrounding pixel values.

Any Query????

Thank you……