SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

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 : Inverse filtering

INVERSE FILTER

Inverse filtering is a technique used in image processing to restore an image that has been degraded by a known distortion, typically due to blurring or noise introduced during the acquisition process.

$$g(x,y) = h(x,y) * f(x,y) + n(x,y)$$

where:

- $g(x,y)$ is the degraded image,
- $h(x,y)$ is the degradation function (such as a blur kernel),
- $f(x,y)$ is the original image,
- $n(x,y)$ is noise, and
- $*$ denotes convolution.

INVERSE FILTER

In the Frequency Domain

Convolution in the spatial domain translates to multiplication in the frequency domain. Using the Fourier transform, the equation becomes:

$$G(u,v) = H(u,v) \cdot F(u,v) + N(u,v)$$

where:

- G(u,v), H(u,v) and F(u,v) are the Fourier transforms of g(x,y), h(x,y) and f(x,y) respectively
- N(u,v) represents the noise in the frequency domain.
- To restore the original image, inverse filtering tries to undo the degradation by dividing the frequency components of the degraded image by the degradation function:

$$\hat{F}(u,v) = \frac{G(u,v)}{H(u,v)}$$

INVERSE FILTER

This process gives an estimate F^(u,v) of the original image's frequency components, which can be inverse-transformed to obtain the restored image in the spatial domain.

$$G(u,v) = H(u,v) \cdot F(u,v) + N(u,v)$$

$$\hat{F}(u,v) = \frac{G(u,v)}{H(u,v)}$$

Any Query????

Thank you……