SNS COLLEGE OF ENGINEERING

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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 : A model of image degradation/ restoration process

A model of image degradation/ restoration process

As Fig. 5.1 shows, the degradation process is modeled in this chapter as a degradation function that, together with an additive noise term, operates on an input image $f(x, y)$ to produce a degraded image $g(x, y)$. Given $g(x, y)$, some knowledge about the degradation function H, and some knowledge about the additive noise term $\eta(x, y)$, the objective of restoration is to obtain an estimate $\hat{f}(x, y)$ of the original image. We want the estimate to be as close as possible to the original input image and, in general, the more we know about H and η, the closer $\hat{f}(x, y)$ will be to $f(x, y)$. The restoration approach used throughout most of this chapter is based on various types of image restoration filters.

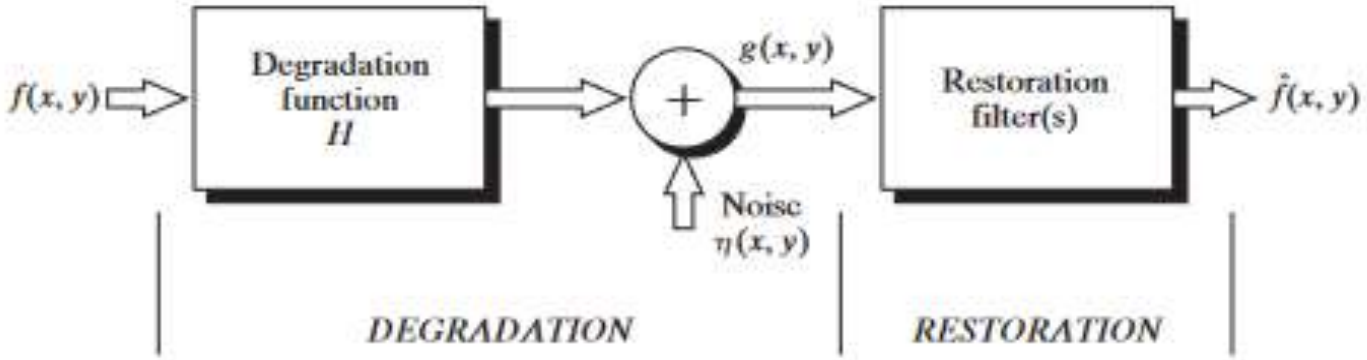

FIGURE 5.1 A model of the image degradation/ restoration process.

It is shown in Section 5.5 that if H is a linear, position-invariant process, then the degraded image is given in the *spatial domain* by

$$g(x, y) = h(x, y) \star f(x, y) + \eta(x, y) \qquad (5.1\text{-}1)$$

where $h(x, y)$ is the spatial representation of the degradation function and, as in Chapter 4, the symbol "$\star$" indicates convolution. We know from the discussion in Section 4.6.6 that convolution in the spatial domain is analogous to multiplication in the frequency domain, so we may write the model in Eq. (5.1-1) in an equivalent *frequency domain* representation:

$$G(u, v) = H(u, v)F(u, v) + N(u, v) \qquad (5.1\text{-}2)$$

where the terms in capital letters are the Fourier transforms of the corresponding terms in Eq. (5.1-1). These two equations are the bases for most of the restoration material in this chapter.

In the following three sections, we assume that H is the identity operator, and we deal only with degradations due to noise. Beginning in Section 5.6 we consider a number of important image degradations functions and look at several methods for image restoration in the presence of both H and η.

Any Query????

Thank you……