

Lectures #14

Estimation By Modeling

Minimum Mean Square Error Filtering

Color Image Processing

Turbulence Model



a) b)
c) d)

Figure 1. Illustration of the atmospheric turbulence model

a) Negligible turbulence; b) severe $k=0.0025$; c) mild $k=0.001$; d) low $k=0.00025$.

(Digital Image Processing, 2nd E, by Gonzalez, Richard.)

Blurring



a)

b)

Figure 2. a) original image; b) blurred with time degradation function.

(Digital Image Processing, 2nd E, by Gonzalez, Richard).

Filtering

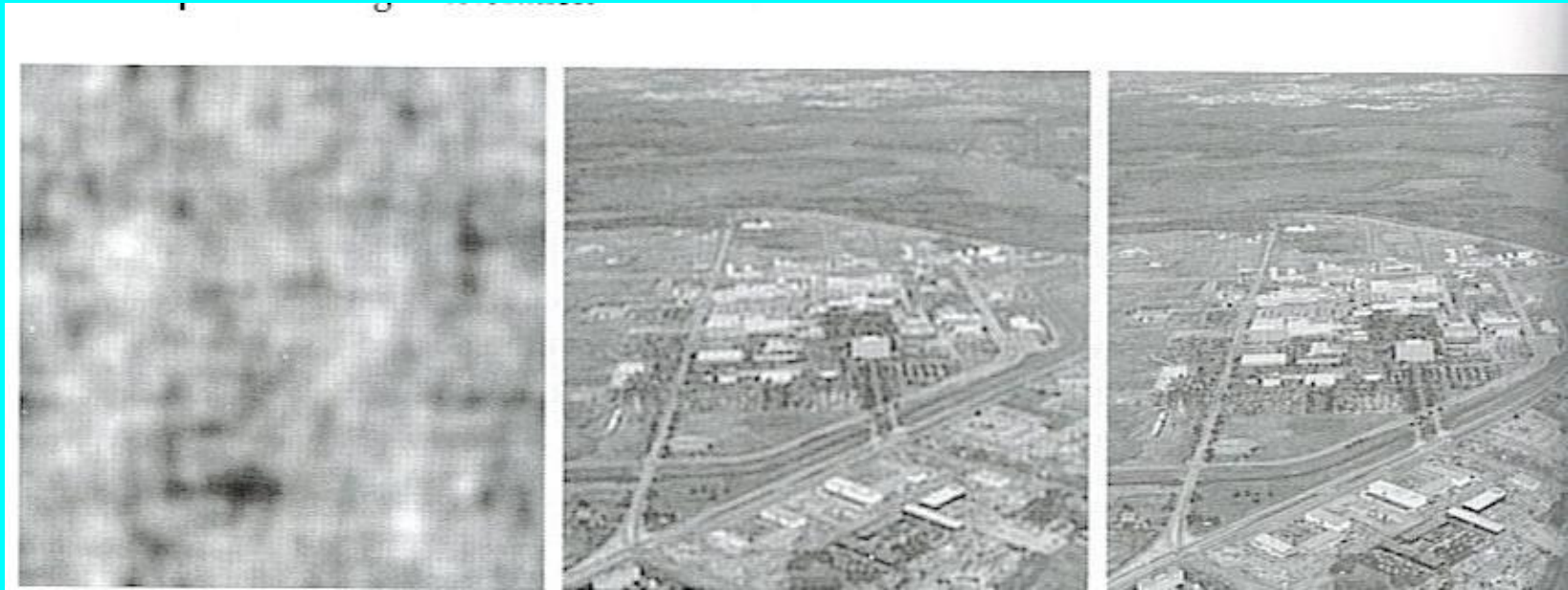


Figure 3. most left) full inverse filtering of Fig.1b); most right) result of Wiener filter.

(Digital Image Processing, 2nd E, by Gonzalez, Richard).

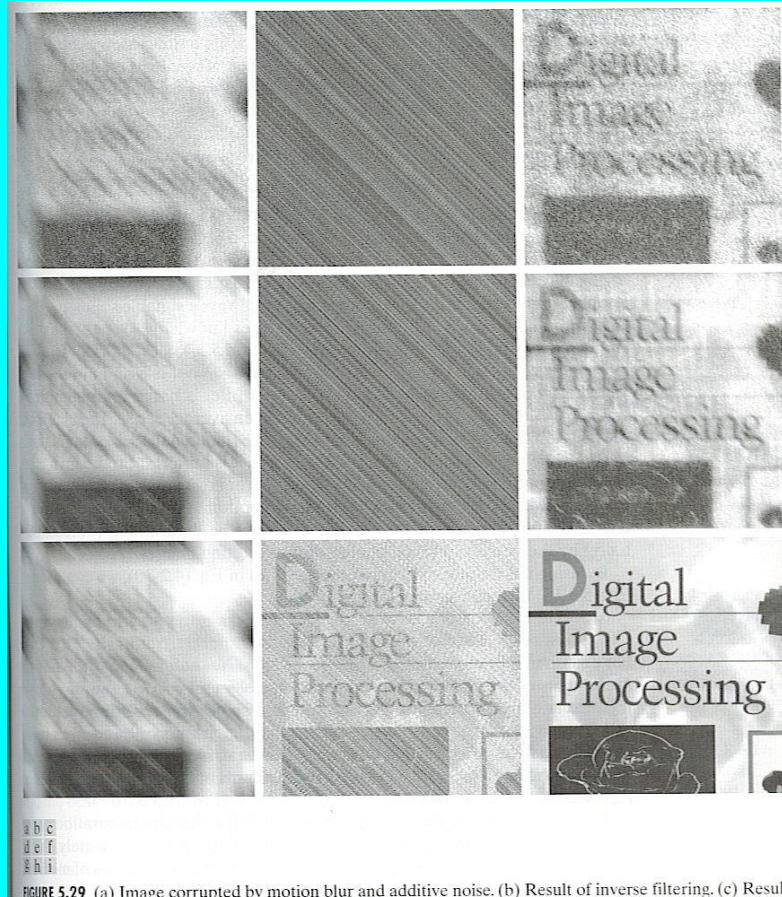


Figure 4. Image Corrupter by motion blur and adaptive noise.

(Digital Image Processing, 2nd E, by Gonzalez, Richard).

Filtering

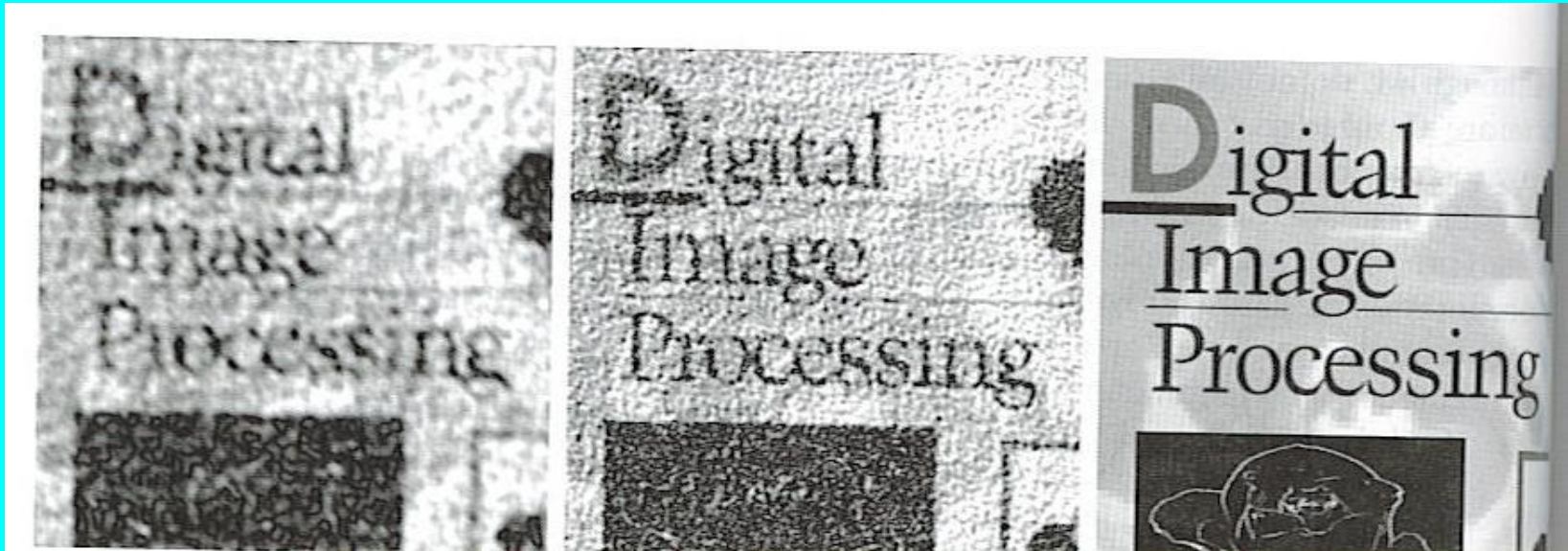
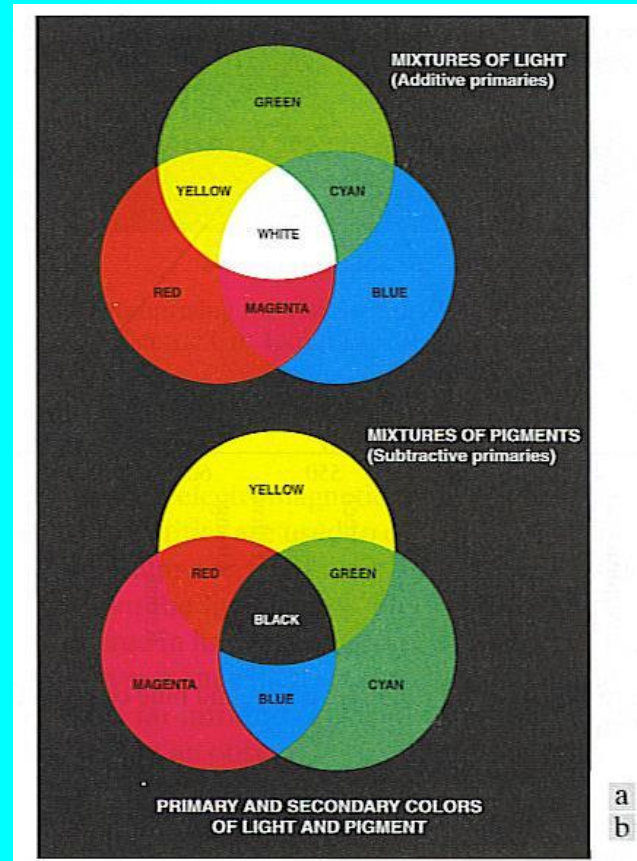


Figure 5. Results of constrained least square filtering.

(Digital Image Processing, 2nd E, by Gonzalez, Richard).

Color Imaging Models



- **Figure 6. Primary and secondary colors of the RGB model.** (Digital Image Processing, 2nd E, by Gonzalez, Richard).

Color Imaging Models

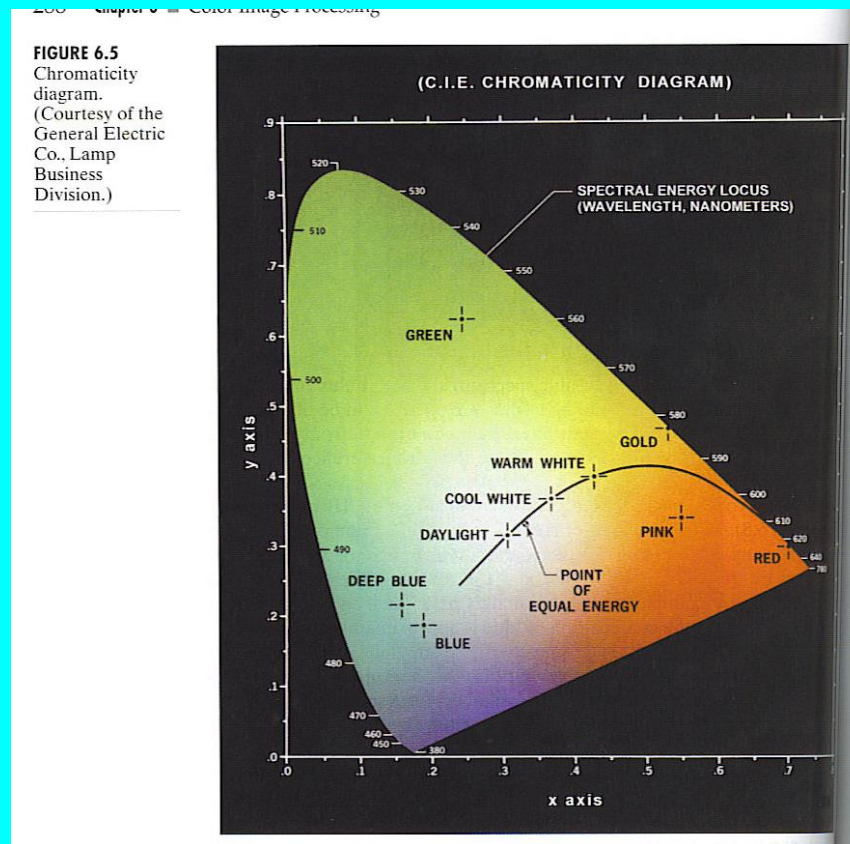


Figure 7. Chromaticity diagram. A straight line between every pair of inner points, in the diagram, defines all the different colors that could be obtained by combining additively the colors of the end points. (Digital Image Processing, 2nd E, by Gonzalez, Richard).

Color Imaging Models

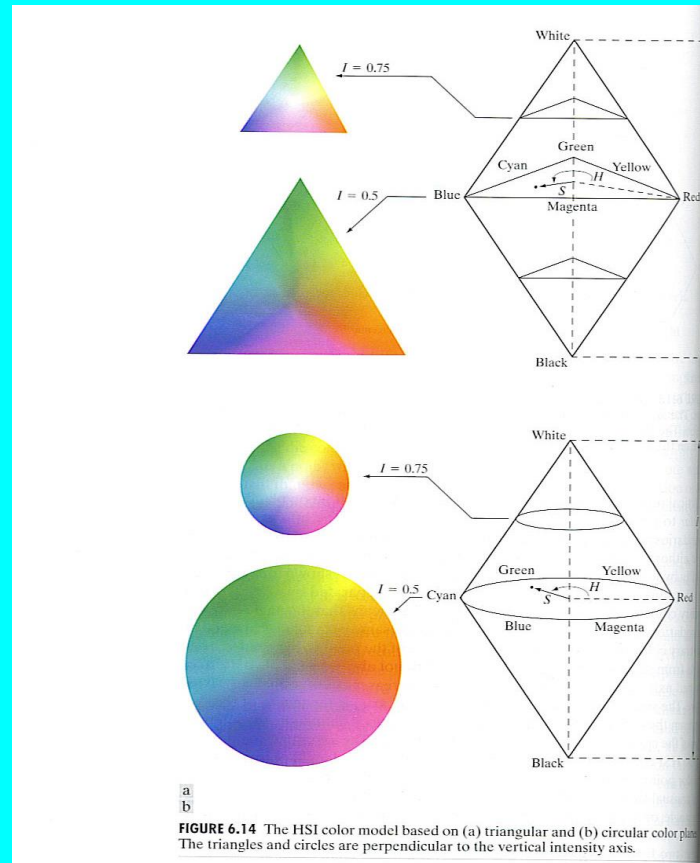


Figure 7. Hue Saturation Intensity model.

Color Imaging Models

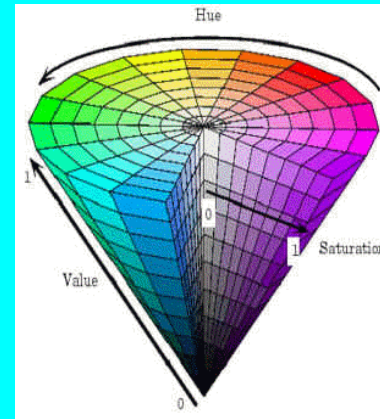
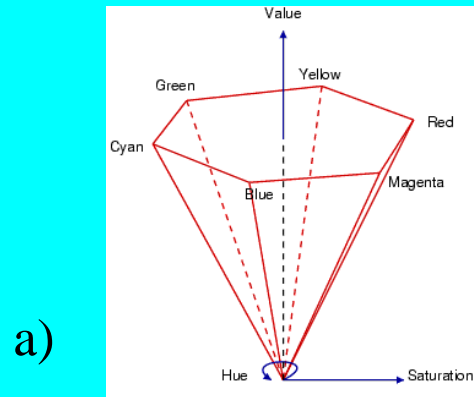


Figure 6 a). and Figure (b) a view of the HSV color model.

HSV - Hue, Saturation, and Value

The Value represents intensity of a color, which is decoupled from the color information in the represented image. The hue and saturation components are intimately related to the way human eye perceives color resulting in image processing algorithms with physiological basis.

Felzenszwalb, Huttenlocher, " **Efficient Graph-Based Image segmentation**", Int. Journal of Computer Vision, Volume 59, Number 2, September 2004.