

# Image Enhancement

- The process of making an image more **interpretable** for a particular application
- Types of enhancement
  - Radiometric and geometric correction
  - Radiometric enhancement
  - Spatial enhancement
  - Spectral enhancement
  - Others...
- Display vs. file enhancement

# Radiometric Enhancement

- Contrast stretching
- Histogram equalization
- Histogram match

Figure 6-1: Histograms of Radiometrically Enhanced Data

( $j$  and  $k$  are reference points)

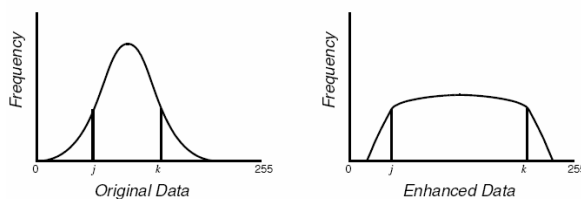
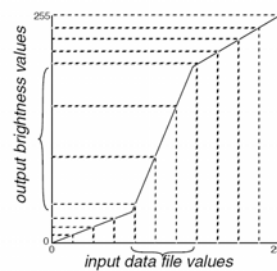


Figure 6-2: Graph of a Lookup Table



# Contrast Stretching

- Linear
- Nonlinear
- Piecewise linear

Figure 6-3: Enhancement with Lookup Tables

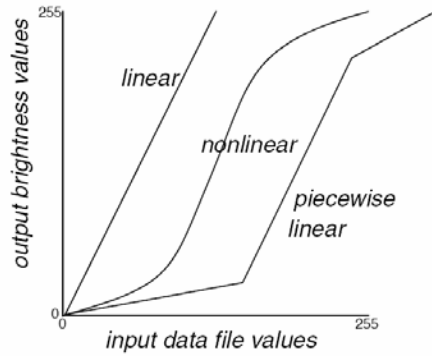
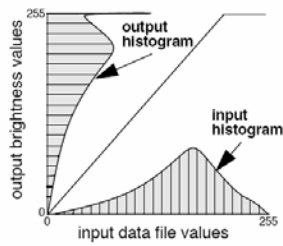
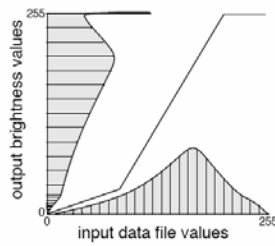


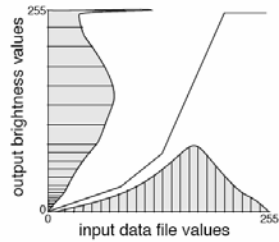
Figure 6-6: Contrast Stretch Using Lookup Tables, and Effect on Histogram



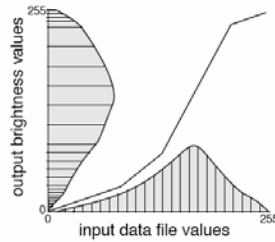
1. Linear stretch. Values are clipped at 255.



2. A breakpoint is added to the linear function, redistributing the contrast.



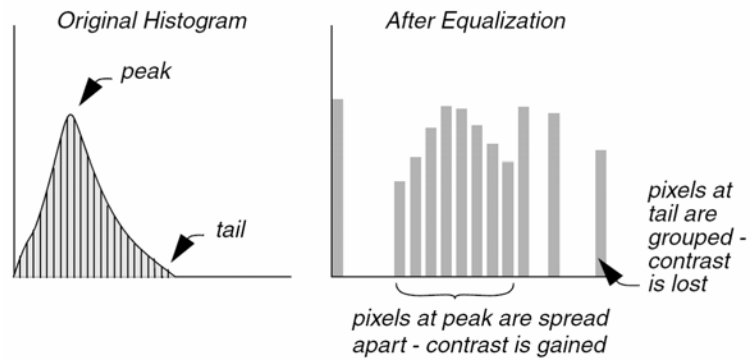
3. Another breakpoint added. Contrast at the peak of the histogram continues to increase.



4. The breakpoint at the top of the function is moved so that values are not clipped.

# Histogram Equalization

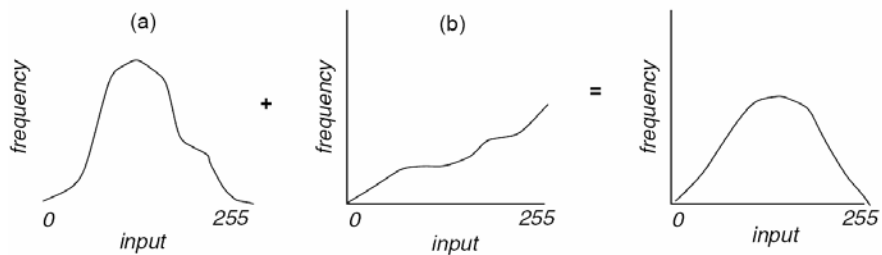
Figure 6-7: Histogram Equalization



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# Histogram Matching

Figure 6-10: Histogram Matching



Source histogram (a), mapped through the lookup table (b), approximates model histogram (c).

