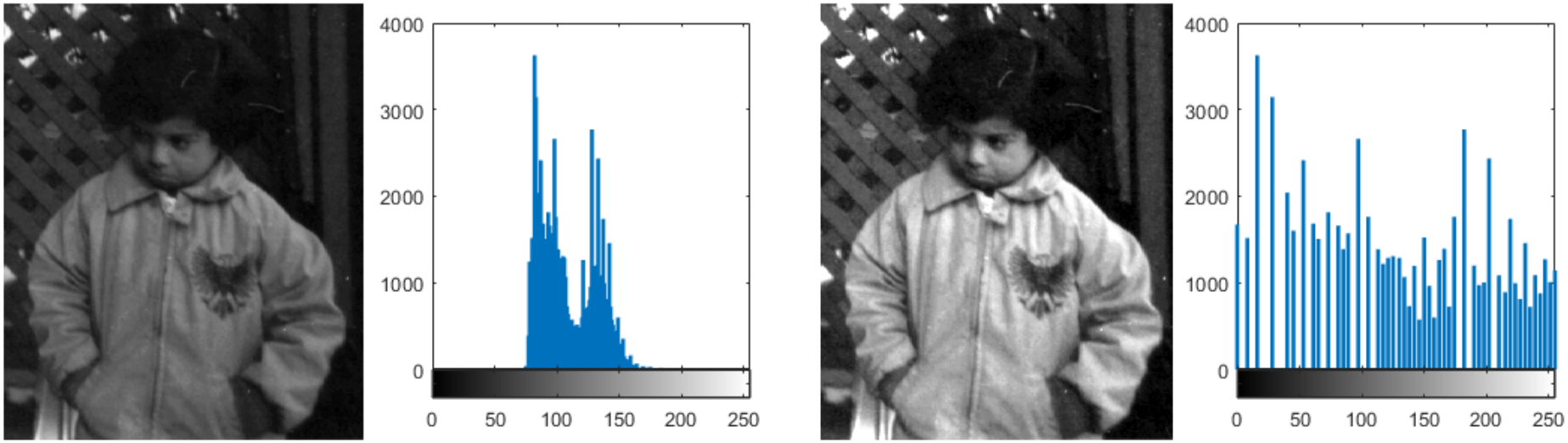
Contrast Adjustment

Contrast adjustment, histogram equalization, decorrelation stretching

Contrast adjustment remaps image intensity values to the full display range of the data type. An image with good contrast has sharp differences between black and white.

To illustrate, the image on the left has poor contrast, with intensity values limited to the middle portion of the range. The image on the right has higher contrast, with intensity values that fill the entire intensity range [0, 255]. In the high contrast image, highlights look brighter and shadows look darker.



The functions described in this section apply primarily to grayscale images. However, some of these functions can be applied to color images as well. For information about how these functions work with color images, see the reference pages for the individual functions.

Functions

`imadjust`	Adjust image intensity values or colormap
`imadjustn`	Adjust intensity values in N-D volumetric image
`imcontrast`	Adjust Contrast tool
`imsharpen`	Sharpen image using unsharp masking
`imflatfield`	2-D image flat-field correction
`imreducehaze`	Reduce atmospheric haze
`locallapfilt`	Fast local Laplacian filtering of images
`localcontrast`	Edge-aware local contrast manipulation of images

localtonemap	Render HDR image for viewing while enhancing local contrast
histeq	Enhance contrast using histogram equalization
adapthisteq	Contrast-limited adaptive histogram equalization (CLAHE)
imhistmatch	Adjust histogram of 2-D image to match histogram of reference image
imhistmatchn	Adjust histogram of N-D image to match histogram of reference image
decorrstretch	Apply decorrelation stretch to multichannel image
stretchlim	Find limits to contrast stretch image
intlut	Convert integer values using lookup table
imnoise	Add noise to image

Topics

Gamma Correction
Gamma correction enables nonlinear mapping of intensity values during contrast adjustment.

Interactive Contrast Adjustment
The Adjust Contrast tool in Image Viewer app enables interactive contrast and brightness adjustment.

Adjust Image Contrast in Image Viewer App
You can adjust image contrast by manipulating the histogram of intensity values or by setting the window and level.

Specify Contrast Adjustment Limits
You can specify the range of the input and output values. Optionally, you can set the range automatically based on a histogram of the image.

Adjust Image Intensity Values to Specified Range
This example shows how to increase the contrast in a grayscale image by remapping the data values to fill the entire available intensity range [0, 255].

Histogram Equalization
Histogram equalization adjusts image intensity automatically by mapping the histogram of the output images to a specified histogram.

Adaptive Histogram Equalization
Adaptive histogram equalization adjusts image intensity in small regions in the image.

Enhance Color Separation Using Decorrelation Stretching
Decorrelation stretching enhances the color separation of an image to improve visual interpretation and make feature discrimination easier.

Featured Examples

Contrast Enhancement Techniques

This example shows how to adjust the contrast of grayscale and color images using three techniques: intensity value mapping, histogram

Enhancing Multispectral Color Composite Images

This example shows some basic image composition and enhancement techniques, such as contrast and decorrelation

Correct Nonuniform Illumination and Analyze Foreground Objects

This example shows how to perform image preprocessing such as morphological opening and contrast adjustment. Then, create a binary

Low-Light Image Enhancement

This example shows how to use haze removal techniques to enhance the dynamic range of low-light images.