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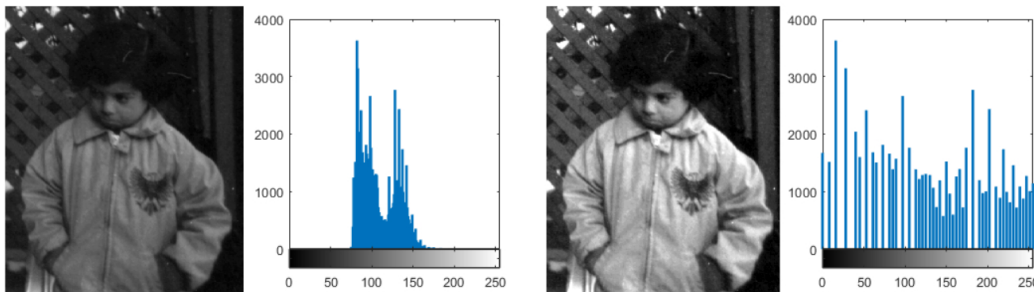
## Contrast Adjustment

R2019b

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

<a href="#">imadjust</a>	Adjust image intensity values or colormap
<a href="#">imadjustn</a>	Adjust intensity values in N-D volumetric image
<a href="#">imcontrast</a>	Adjust Contrast tool
<a href="#">imsharpen</a>	Sharpen image using unsharp masking
<a href="#">imflatfield</a>	2-D image flat-field correction
<a href="#">imlocalbrihten</a>	Brighten low-light image
<a href="#">imreducehaze</a>	Reduce atmospheric haze
<a href="#">locallapfilt</a>	Fast local Laplacian filtering of images
<a href="#">localcontrast</a>	Edge-aware local contrast manipulation of images
<a href="#">localtonemap</a>	Render HDR image for viewing while enhancing local contrast
<a href="#">histeq</a>	Enhance contrast using histogram equalization
<a href="#">adapthisteq</a>	Contrast-limited adaptive histogram equalization (CLAHE)
<a href="#">imhistmatch</a>	Adjust histogram of 2-D image to match histogram of reference image
<a href="#">imhistmatchn</a>	Adjust histogram of N-D image to match histogram of reference image
<a href="#">decorrstretch</a>	Apply decorrelation stretch to multichannel image
<a href="#">stretchlim</a>	Find limits to contrast stretch image
<a href="#">intlut</a>	Convert integer values using lookup table
<a href="#">imnoise</a>	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

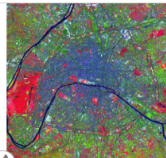
Decorrelation stretching enhances the color separation of an image to improve visual interpretation and make feature discrimination easier.

### Featured Examples



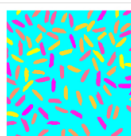
#### Contrast Enhancement Techniques

Adjust the contrast of grayscale and color images using three techniques: intensity value mapping, histogram equalization, and contrast-limited



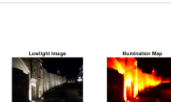
#### Enhancing Multispectral Color Composite Images

Some basic image composition and enhancement techniques, such as contrast and decorrelation stretching, for use with multispectral



#### Correct Nonuniform Illumination and Analyze Foreground Objects

Perform image preprocessing such as morphological opening and contrast adjustment. Then, create a binary image and compute statistics



#### Low-Light Image Enhancement

Use haze removal techniques to enhance the dynamic range of low-light images.

How useful was this information?



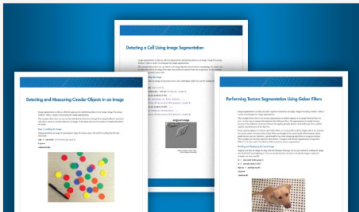


**Image Processing Toolbox Documentation**

- Functions and Other Reference
- Release Notes
- PDF Documentation

**Support**

- MATLAB Answers
- Installation Help
- Bug Reports
- Product Requirements
- Software Downloads



**Image Segmentation and Thresholding Code Examples**  
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