

Most of the following functions are part Matlab's Image Processing Toolbox (IPT). See Matlab help for more information.

Loading and Saving Images

imread – Loads image data. It supports a variety of common file formats.

imwrite – Saves image data. It supports a variety of common file formats.

Displaying Images

image – Displays an M-by-N-by-1 matrix of binary and color mapped image data or a M-by-N-by-3 matrix of RGB image data. This is not an *IPT* function.

imshow – Displays a binary (black and white), grayscale or RGB. The *imshow* function accepts matrix or file name arguments. The **data must be correctly normalized** according to the data type.

Appropriate values are between 0 and 1 (type double), 0 and 255 (type uint8) or 0 and 65535 (type uint16). The *imshow* function automatically suppresses axis tic labeling.

imagesc – Scales and displays an arbitrary matrix as an image using the current color map. Automatically scales single channel (M-by-N-by-1 matrices) to the figure's color map. The *imagesc* function may work better than *imshow* with grayscale images that are not normalized.

imtool – Displays the image in Image Tool window allowing interactive exploration.

Color Map Functions

See also the *colormapeditor* tool and the *colormap* reference page for a list of built-in named color maps and their corresponding functions. Colormaps are figure (as opposed to axis) properties and the property is *Colormap* (not *colormap*, which is a function).

colormap – Sets or gets the current color map.

rbgplot – Plots the specified color map as three colored lines of intensity versus value. Poorly documented.

cmunique – Eliminate duplicate colors in a color map; convert a grayscale or true color image to an indexed image.

rbgplot – Plots the specified color map as three colored lines of intensity versus value. Poorly documented.

imapprox – Approximate an indexed image using fewer colors.

Image Conversion Functions

Use *makecform* and *applycform* to convert between a wide variety of color spaces including 1931 CIE XYZ, 1976 lab, standard RGB (IEC 61966-2-1), cmyk (the standard used by most printers), hsv (the most intuitive) and many others. See color space conversions help for more information.

ind2rgb – Converts an indexed image (like a .gif) into an RGB image.

rgb2ind – Converts an image from RGB form to index (color map) form.

ind2gray – Converts an indexed image (like a .gif) into a gray scale image.

rgb2gray – Converts an RGB image into a gray scale image (weighting factors are the same as those used for NTSC conversion).

rgb2hsv – Converts a RGB image or colormap into a HSV image or colormap.

hsv2rgb – Converts a HSV image or colormap into a RGB image or colormap.

rgb2ntsc – Converts a RGB image or colormap into a NTSC (YIQ) image or colormap.

ntsc2rgb – Converts a NTSC (YIQ) image or colormap into a RGB image or colormap.

im2type – Converts between image data types by applying appropriate scaling and type conversions.

The *type* can be: uint8, int8, int16, uint16, single or double.

Miscellaneous Functions

edge – Finds the edges of a gray scale image.

fspecial – Creates a pixel spread function (PSF).

imfilter – Applies a PSF to an image.

imnoise – Adds noise to an image.

imadjust – Adjusts the intensity of an image.

imresize – Resizes an image.

Projection (CT) Transformation Functions

phantom(SIZE) – Produces a brain like SIZE by SIZE pixel image of for experimentation.

radon(imgData, theta) – Performs a Radon transform (projection) on an image. This is like doing a 1st generation (parallel beam) CT scan.

iradon(projData, theta, interp, filter) – Performs an inverse Radon transformation to reconstruct an image from radon projection data. This is what has to be done to “raw” 1st generation CT data prior to display. Reconstruction parameters include (defaults in bold):

theta – Either a vector of equally spaced angles or an angular step size.

interp – Interpolation type ('nearest', '**linear**', 'spline' or 'cubic').

filter – Filter type ('**Ram-Lak**', 'Shepp-Logan', 'Cosine', 'Hamming', 'Hann' or 'None').

fanbeam(imgData, distance) – Performs a fanbeam transform (projection) on an image. This is like doing a 3rd generation (fan beam) CT scan.

ifanbeam(imgData, distance) – Performs an inverse fanbeam transformation on an image. This is what has to be done to “raw” 3rd generation CT data prior to display.

Deconvolution (deblurring) Functions

deconvblind – Returns an estimated pixel spread function (PSF).

deconvwnr, *deconvlucy* and *deconvreg* – Deconvolutes using a PSF.