

IPSDK 1.7- Main image processing algorithms

Arithmetic image operations	Modules containing arithmetic operations on images, pixel by pixel	version
Addition	Addition of 2 images (or image and scalar)	0-1-0-1
Abs	Computation of the absolute value of an image, pixel by pixel algorithm	0-1-0-1
Blending	Blending of 2 images	0-1-0-1
Bounding	Algorithm allowing to bound image values to a given range algorithm	0-1-0-1
Cartesian to polar	cartesian to polar coordinates transformation	1-5-0-0
Divide	Division of 2 images	0-1-0-1
Formula	Generation of an image using a formula string	1-5-0-0
L1Norm	L1 norm of two or three images	0-1-0-1
L2Norm	L2 (euclidian) norm of two or three images	0-1-0-1
LinearCombination	Linear combination of 2 images	0-1-0-4
MaxAbs	Maximum of the absolute values of 2 images, pixel by pixel	0-1-0-1
Maximum	Maximum of 2 images, pixel by pixel algorithm	0-1-0-1
Minimum	Minimum of 2 images, pixel by pixel algorithm	0-1-0-1
Multiplication	Multiplication of 2 images (or image and scalar)	0-1-0-1
MultiplyAddScalar	Process an operation of type AX+B with X an input image	1-0-0-0
Polar to Cartesian	polar to cartesian coordinates transformation	1-5-0-0
Rounding	Round values of a floating point image algorithm	0-1-0-1
Square root	Computation of the square root of an image	0-1-0-1
Square	Computation of the square of an image	0-1-0-1
Subtraction	Subtraction of 2 images (or image and scalar)	0-1-0-1
Logical image operations	Modules containing bitwise operations on images, pixel by pixel	
Bitwise and	Bitwise and operation on 2 input images	0-1-0-1
Bitwise nand	Bitwise nand operation on 2 input images	0-1-0-1
Bitwise nor	Bitwise nor operation on 2 input images	0-1-0-1
Bitwise not	Bitwise not operation on one input image	0-1-0-1
Bitwise nxor	Bitwise nxor operation on 2 input images	0-1-0-1
Bitwise or	Bitwise or operation on 2 input images	0-1-0-1
Bitwise exclusive or	Bitwise exclusive or operation on 2 input images	0-1-0-1
Logical not	Logical not on binary images	0-1-0-5
Mask filter (one input image)	Mask filter, computing an output image for which each pixel equals to either corresponding pixel in input image or 0, depending on whether corresponding input mask image pixel equals 1 or 0 algorithm	0-1-0-1
Mask filter (two input images)	Mask filter, computing an output image for which each pixel equals to corresponding pixel in either first or second input image, depending on whether corresponding input mask image pixel equals 1 or 0 algorithm	0-1-0-1
Utility image processing algorithms	Modules containing binarization operations on images	
Image comparison	Algorithm allowing to compare two images	0-1-0-1
Image conversion	Algorithm allowing to convert an image to a given type	0-1-0-1
Image copy	Algorithm allowing to copy an image	0-1-0-1
Image erasing	Algorithm allowing to erase values of an image	0-1-0-1
Image uniform random initialization	Algorithm filling an image with uniform random sampled values	0-1-0-1
Image normal random initialization	Algorithm filling an image with normal random sampled values	1-0-0-0
Image sequences append	Algorithm concatenating two images sequences	1-3-0-0
ROI insertion	Algorithm inserting a given ROI into an image	1-3-0-0
ROI extraction	Algorithm extracting a given ROI from an image	1-3-0-0
Extract image values	Extraction of values at specific coordinates into image	1-4-0-0
Color image operations	Utility image processing algorithm modules	
lightness	Lightness computation for an input RGB color image	0-1-0-1
RGB to YUV	Convert a RGB color image to a YUV color image algorithm	0-1-0-1
YUV to RGB	Convert a YUV color image to a RGB color image algorithm	0-1-0-1
Binarization algorithms	Image binarization algorithm modules	
Simple Threshold	Algorithm allowing to convert an image to a binary image using a range of greylevel	0-1-0-1
TopHat	TopHat binary threshold	0-1-0-3
Adaptative Threshold 2d	Binarize an input image according an adaptative threshold based on the pixel's neighbourhood	1-1-0-0
Kapur Threshold	Kapur binary threshold on one image	1-1-0-0
Kittler Threshold	Kittler binary threshold on one image	1-1-0-0
IsoDataThreshold	Isodata binary threshold on one image	1-6-0-0
Hysteresis Threshold	Hysteresis threshold on one image	1-6-0-0
Adaptative Threshold 3d	Binarize an input 3d image according an adaptative threshold based on the voxel's neighbourhood	1-6-0-0
Otsu Threshold	Algorithm allowing to convert an image to a binary image using a range automatically computed by the otsu method	0-1-0-1
Greyscale transform algorithms	Image greyscale transform algorithm modules	
Histogram equalization	Computes an output image associated to histogram equalization of an input image	0-1-0-1
Equalization LUT computation	Computes look up table used to equalize an histogram	0-1-0-1
LUT Transformation	Application of a look-up table on an input image algorithm	0-1-0-1
Normalization	Normalizes the intensity of an image from an optional given input range to a given output range	0-1-0-1
Smart paraboloid shading correction	Corrects an input image for shading, and normalize output image so that it fits an expected dynamic range	1-4-0-0
Smart Shading correction	Corrects an input image for shading, and normalize output image so that it fits an expected dynamic range	0-1-0-2
MatchHistogram	Adjust an image histogram using a reference histogram (or image)	1-0-0-0
MatchStats	Adjust image statistics using reference statistics (or image)	1-0-0-0
InvertImg	Algorithm allowing to invert 2d or 3d image intensity	1-2-0-0
Paraboloid shading correction	Computes a shading-corrected image, taking a paraboloid as the white image	1-4-0-0
Shading correction	Computes a shading-corrected image	0-1-0-2
Forward Discrete Fourier Transform	forward Discrete Fourier Transform for an input image	1-5-0-0
Backward Discrete Fourier Transform	backward Discrete Fourier Transform for an input image	1-5-0-0
Color mapping	Generates an output color image by applying a color map on a grey level input image	1-6-0-0
Index Compacting	Re-indexes the labels (or class indices) in order to use a minimum range of values	1-7-0-0
Image standardization	Standardizes an image	1-5-0-0
Morphological algorithms		
Erosion	Generic algorithm for image erosion	0-1-0-3
Boundary	Algorithm allowing to extract boundary of a binary image	0-1-0-1
RemoveBorder	Removal of connected components in contact with image borders in binary images	1-1-0-0
FillHole	hole filling algorithm for binary images	1-1-0-0
Closing	Algorithm for image closing	0-1-0-3
Opening	Algorithm for image opening	0-1-0-3
Morphological Gradient	Gradient computation on an image using morphological operations	0-1-0-3
Dilatation	Generic algorithm for image dilatation	0-1-0-3
Distance map	Exact distance map transform of binary image	0-1-0-4
ConnectedComponent	Connected component image labeling algorithm	0-1-0-5
BinaryReconstruction	Binary reconstruction of an input image with a marker image	0-1-0-5
GreyReconstruction	Grey reconstruction of an input image with a marker image	1-2-0-0

Generic Seeded Distance Map	generic version of seeded distance map algorithm	1-1-0-0
Seeded Distance Map	automatic version of seeded distance map algorithm	1-1-0-0
LocalExtrema	extraction of local extrema from an image	1-2-0-0
DilateLocalExtrema	extraction of dilated local extrema from an image	1-2-0-0
RemoveSmallShape	removal of small connected component in binary or label 2d/3d image	1-1-0-0
KeepBigShape	keep only the big connected components in binary or label 2d image	1-6-0-0
SeededWatershed	seeded watershed algorithm	1-2-0-0
WatersheBinarySeparation	Binary separation algorithm based on watershed transformation	1-2-0-0
WatersheGreySeparation	Greyscale separation algorithm based on watershed transformation	1-2-0-0
MaxPropagation	Propagation of maxima	0-1-0-5
MinPropagation	Propagation of minima	0-1-0-5
Filtering algorithms		
high-pass filter	high-pass filter algorithm	0-1-0-4
mean filter	Smooth an input image computing local mean of pixels	0-1-0-1
gaussian filter	Smooth an input image convolving it with a Gaussian kernel	0-1-0-1
gaussian gradient	Compute gradients of an input image convolving it with Gaussian kernels	0-1-0-1
convolution	Compute convolution of an input image with a kernel	0-1-0-1
anisotropic Diffusion	Anisotropic diffusion smoothing filter algorithm for 2d/3d images	1-3-0-0
median	Median filter algorithm	0-1-0-4
unsharp mask	Unsharp mask image filter algorithm	0-1-0-4
Bilateral smoothing	Bilateral filter algorithm	0-1-0-4
Separated Bilateral smoothing	Fast approximated version of bilateral filter algorithm	1-0-0-0
LaplacianDog	Laplacian difference of gaussian approximation	0-1-0-4
Laplacian DoG deblur	2d image deblur algorithm using Laplacian kernels based on a difference of Gaussian approximation	1-0-0-0
Patch-based bilateral smoothing	Denoises image using patch-based bilateral filter algorithm	1-4-0-0
Pearson colocalization mapping	builds the Pearson's colocalization map computing the Pearson correlation coefficient on each pixel	1-6-0-0
Richardson-Lucy deblur	2d image deblur algorithm using Laplacian kernels based on the Richardson-Lucy algorithm	1-0-0-0
Normalized Cross-Correlation	Computes the Normalized Cross Correlation between an image and a kernel	1-0-0-0
Despeckle Filtering	Smooths the input image replacing aberrant values by the neighbourhood's mean intensity	1-5-0-0
Band-pass frequency filtering	Filters an image in Fourier domain by selecting a frequency range	1-6-0-0
Multiscale vessel enhancement	Multiscale vessel enhancement using Frangi's approach	1-7-0-0
Sobel gradient	Compute gradients of an input image using a Sobel kernel	1-4-0-0
Statistic algorithms		
kurtosis	Local image kurtosis computation	0-1-0-3
skewness	Local image skewness computation	0-1-0-3
variance	Local image variance computation	0-1-0-3
local entropy	local entropy	0-1-0-4
local energy	local energy	1-5-0-0
local histogram module	local histogram module	1-5-0-0
Law's texture energy measures	Law's texture energy measures	1-5-0-0
Global measures		
histogram	Computes the histogram of an image	0-1-0-1
Masked histogram	Computes the histogram of the portion of an image (portion is defined by a mask image)	1-5-0-0
XProjection	Statistical information on x image data projection	1-0-0-0
YProjection	Statistical information on y image data projection	1-0-0-0
Seq Projection	measure of common statistics indicators in the image sequence	1-0-0-0
Similarity Measurement	Similarity measurement on a image (PSNR, SSD)	1-0-0-0
Gaussian Noise Measurement	Gaussian noise measurement on an image	1-0-0-0
ParaboloidingFit2d	Fitting of a paraboloid with a 2d image seen as a 3d surface (with the pixel intensities as the heights)	1-4-0-0
Pearson Correlation Coefficient	computes the Pearson correlation coefficient in the image	1-6-0-0
Statistics (Min, max, mean stddev)	Measure of common statistics indicators in the image (mean, max, etc.) algorithm	0-1-0-1
Masked statistics (Min, max, mean stddev)	Masked version of measure of common statistics indicators in the image (mean, max, etc.) algorithm	1-0-0-0
Kernel density estimation	algorithm allowing to estimate probability density function of an image	1-5-0-0
Feature detection		
Canny edges 2D detector	Extracts edges in a 2D image	1-4-0-0
Canny surfaces 3D detector	Extracts surfaces in a 3D image	1-4-0-0
Local Extrema Extraction	Finds the local extrema in an image	1-0-0-0
Harris Corners	Extracts the corners in an image	1-4-0-0
Hough Lines	Detects lines in image using Hough algorithm	1-7-0-0
Hough Circles	Detects circles in image using Hough algorithm	1-0-0-0
Shape Analysis		
Shape Analysis 2d	Shape 2d analysis and measurement algorithm	1-0-0-0
Shape Analysis 3d	Shape 3d analysis and measurement algorithm	1-2-0-0
Label Analysis 2d	Connected component 2d analysis and measurement algorithm	1-7-0-0
Label Analysis 3d	Connected component 3d analysis and measurement algorithm	1-7-0-0
Shape Filtering 2d	Shape 2d filtering algorithm	1-0-0-0
Shape Filtering 3d	Shape 3d filtering algorithm	1-2-0-0
Shape Segmentation		
Label Shape Extraction 2d	Shape extraction from label 2d image	1-0-0-0
Label Shape Extraction 3d	Shape extraction from label 3d image	1-2-0-0
Shape to Label image 2d	Creation of a label 2d image from a collection of shape	1-4-0-0
Shape to Label image 3d	Creation of a label3d image from a collection of shape	1-4-0-0
Registration		
Extract grey signed features	Extraction of grey signed features from image	1-4-0-0
Registration from grey signed features	Compute motion transform linking two sets of grey signed features	1-4-0-0
Image grey signed features registration	Computation of motion transform linking two images based on a grey signed features algorithm	1-4-0-0
Tracking step	Tracking stage for intensity based registration 2d algorithm	1-5-0-0
Training step	Training stage for intensity based registration 2d algorithm	1-5-0-0
Registration tracker	Intensity based 2d registration tracker	1-5-0-0
Classification		
PCA image reduction	reduces temporal dimensionality of an image using PCA	1-6-0-0
K-Means	classifies an image using k-means algorithm	1-5-0-0
Geometric transformation		
Image zoom	Algorithm resizing an image using a given interpolation method	1-3-0-0
Image regular resampling along z-axis	Algorithm resampling along z-axis a 3d image with regularly spaced z-plans	1-5-0-0
Image custom resampling along z-axis	Algorithm resampling along z-axis a 3d image with irregularly spaced z-plans	1-5-0-0
Image flipping	Algorithm flipping input image along one of its axis	1-5-0-0
Image cylinder unrolling	Algorithm unfolding a cylinder contained in a 3D input image into a 2D output image	1-5-0-0
Image ring unrolling	Algorithm allowing ring surface unrolling	1-6-0-0
Image warping	Algorithm allowing to apply a motion transformation warping operation on an image	1-6-0-0