MetaXpress® 6 Software Guide

Using Modify Image Tools in CME

Date Revised 07/13/15   Version B
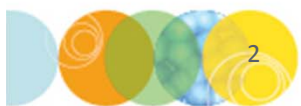
Chapter Purpose

The purpose of this chapter is to describe the **Modify Image** tools available in the **Custom Module Editor** (CME) plugin.

Modify Image tools can be used to modify a grayscale (8 or 16-Bit) image. The newly created grayscale image can be modified further or used to detect objects of interest using a **Find Objects** or **Application Modules Objects** step.

MOLECULAR DEVICES

Ribbon: Modify Image Tools

Click here for a drop-down menu of **Modify Image** tools

Click on the appropriate icon

Clicking on a **Modify Image** tool icon will add a card on the panel to the left

Modify Image Tools Descriptions

There are 3 different classes of modify image tools: **Arithmetic**, **Morphological**, and **Special**

ARITHMETIC	
ADD	Combines the intensity values of each corresponding pixel in two images
ADD CONSTANT	Adds a user-specified intensity value to each pixel in the image
SUBTRACT	Subtracts the intensity values of each corresponding pixel in one image from the other
MULTIPLY	Multiplies intensity values of each corresponding pixel in two images
MULTIPLY CONSTANT	Multiplies a user-specified intensity value to each pixel in the image
DIVIDE	Divides the intensity values of each corresponding pixel in one image by the other
MAXIMUM	Compares the intensity values of corresponding pixels in two images and displays the higher of the two values in the resulting image
MINIMUM	Compares the intensity values of corresponding pixels in two images and displays the lower of the two values in the resulting image

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Modify Image Tools Descriptions

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MORPHOLOGICAL	
ERODE	Grows dark areas and shrinks bright areas
DILATE	Grows bright areas and shrinks dark areas
OPEN	Removes parts of bright areas where the filter shape and size does not fit
CLOSE	Removes parts of dark areas where the filter shape and size does not fit
OPEN-CLOSE / CLOSE-OPEN	Combines Open and Close filters in sequential order to correct for both bright and dark noise spots
CENTER FILTER	Combines Open-Close and Close-Open filters for more robust noise reduction
GRADIENT	Highlights the boundaries, or outlines, between the bright and dark regions in an image
INVERT	Inverses the image histogram so dark pixels become bright and bright pixels become dark
TOP HAT	Finds small bright spots based on a filter shape and size
BOTTOM HAT	Finds small dark spots based on a filter shape and size

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MOLECULAR DEVICES

Modify Image Tools Descriptions

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MORPHOLOGICAL CONT.	
HDOME	Finds bright spots where the relative intensity values are equal to or higher than the threshold value specified
HBASIN	Finds dark spots where the relative intensity values are equal to or lower than the threshold value specified
REGIONAL MAXIMUM	Displays a bright spot for all peaks in intensity (a pixel or group of pixels of a constant intensity value completely surrounded by lower intensity pixels)
REGIONAL MINIMUM	Displays a bright spot for all valleys in intensity (a pixel or group of pixels of a constant intensity value completely surrounded by higher intensity pixels)
HOLES	Finds and, optionally, fills light or dark holes in an image and displays them as bright areas
BORDER OBJECTS	Intensifies or suppresses bright or dark objects that touch the edge of the image

MOLECULAR DEVICES

Modify Image Tools Descriptions

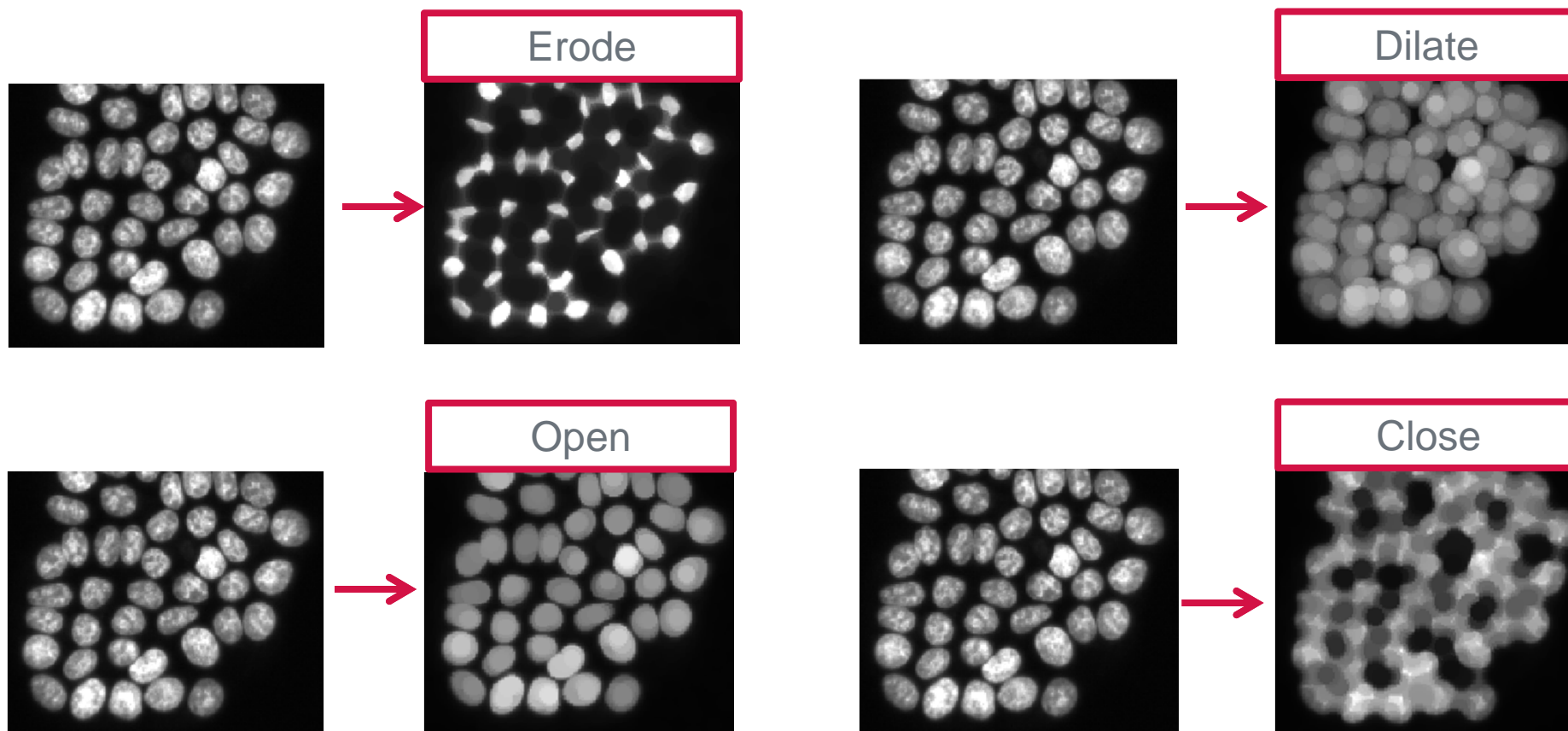There are 3 different classes of modify image tools: **Arithmetic**, **Morphological**, and **Special**

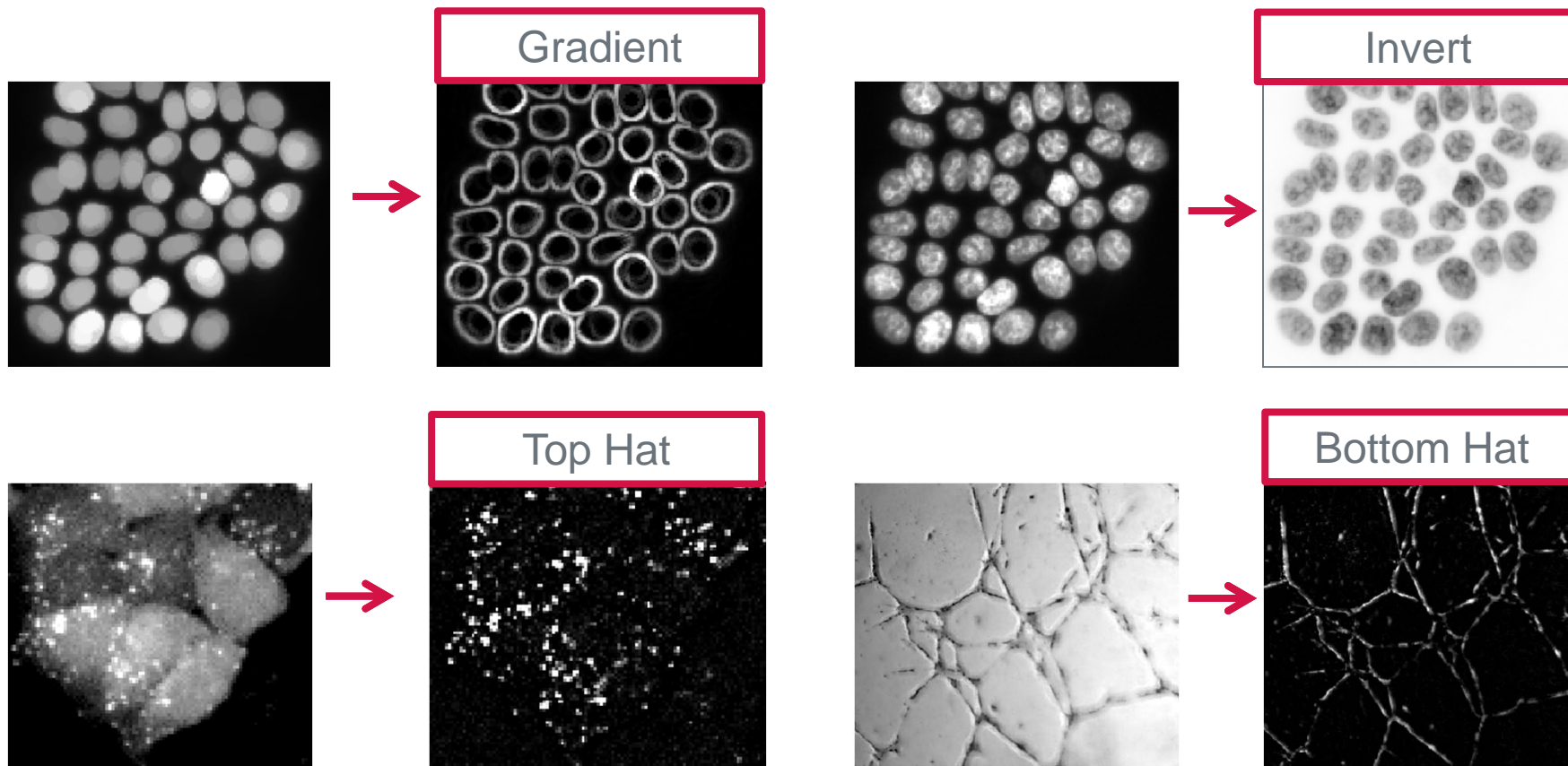| SPECIAL	
AVERAGE FILTER	Reduces the amount of variation between intensity values in adjacent pixels
COLOR SEPARATE RGB	Separates a color image into red, green, and blue components
COLOR SEPARATE HSL	Separates a color image into hue, saturations, and luminosity components
COLOR SEPARATE CEI-LAB	A non-linear color separation technique designed to better mimic human vision
GAUSSIAN FILTER	Smoothes and blurs an image by a user-defined factor (sigma)
LOG FILTER	Laplacian of Gaussian, useful for finding areas or objects of a specific size
DISTANCE	Creates a 16-bit grayscale image from a binary mask image where the intensity value indicates the distance, measured in pixels, to the nearest white pixel in the original binary image
MASK TO IMAGE	Convert a segmentation mask to an image so that it can be used with the Modify Image tools

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MOLECULAR DEVICES
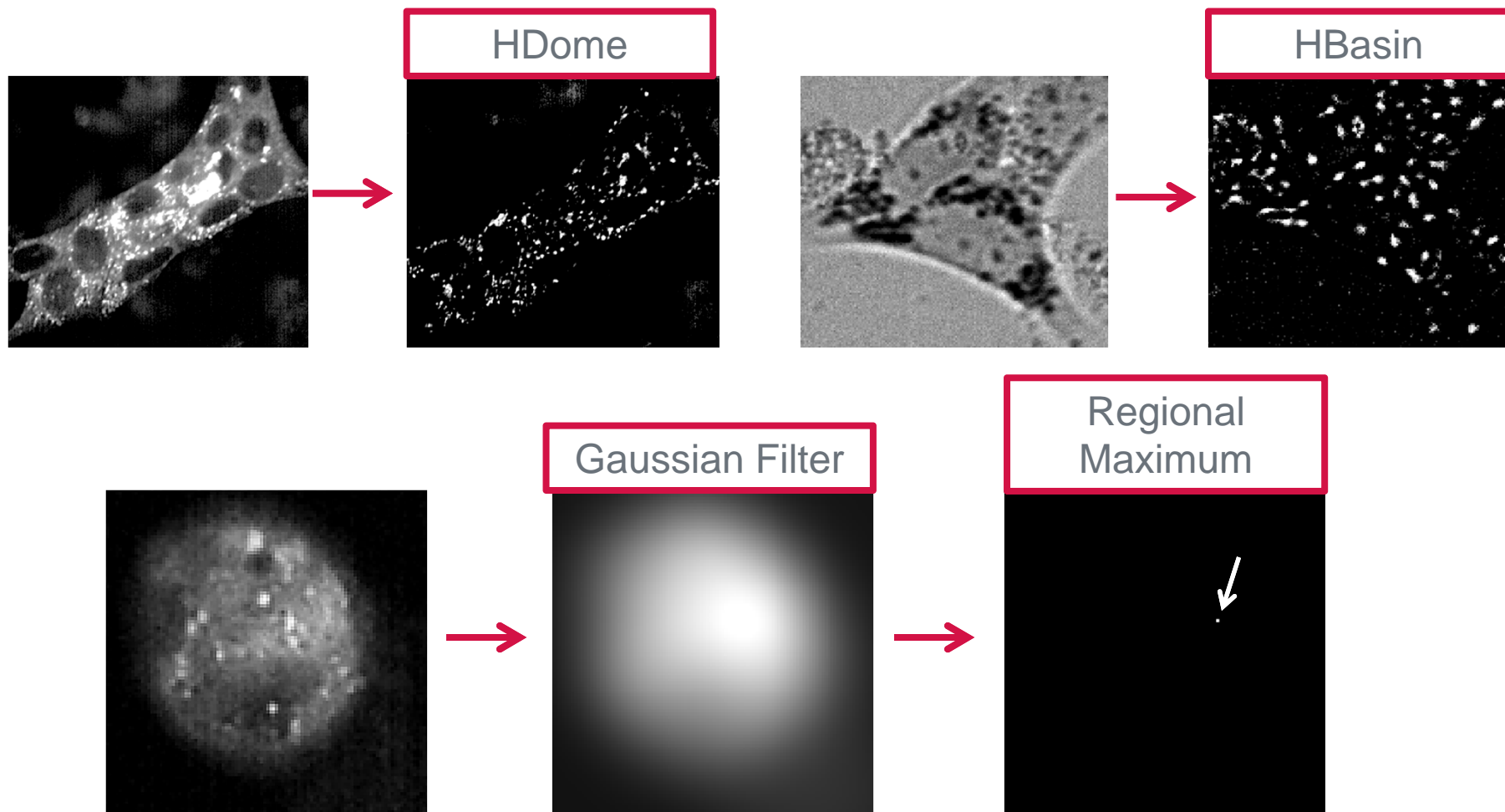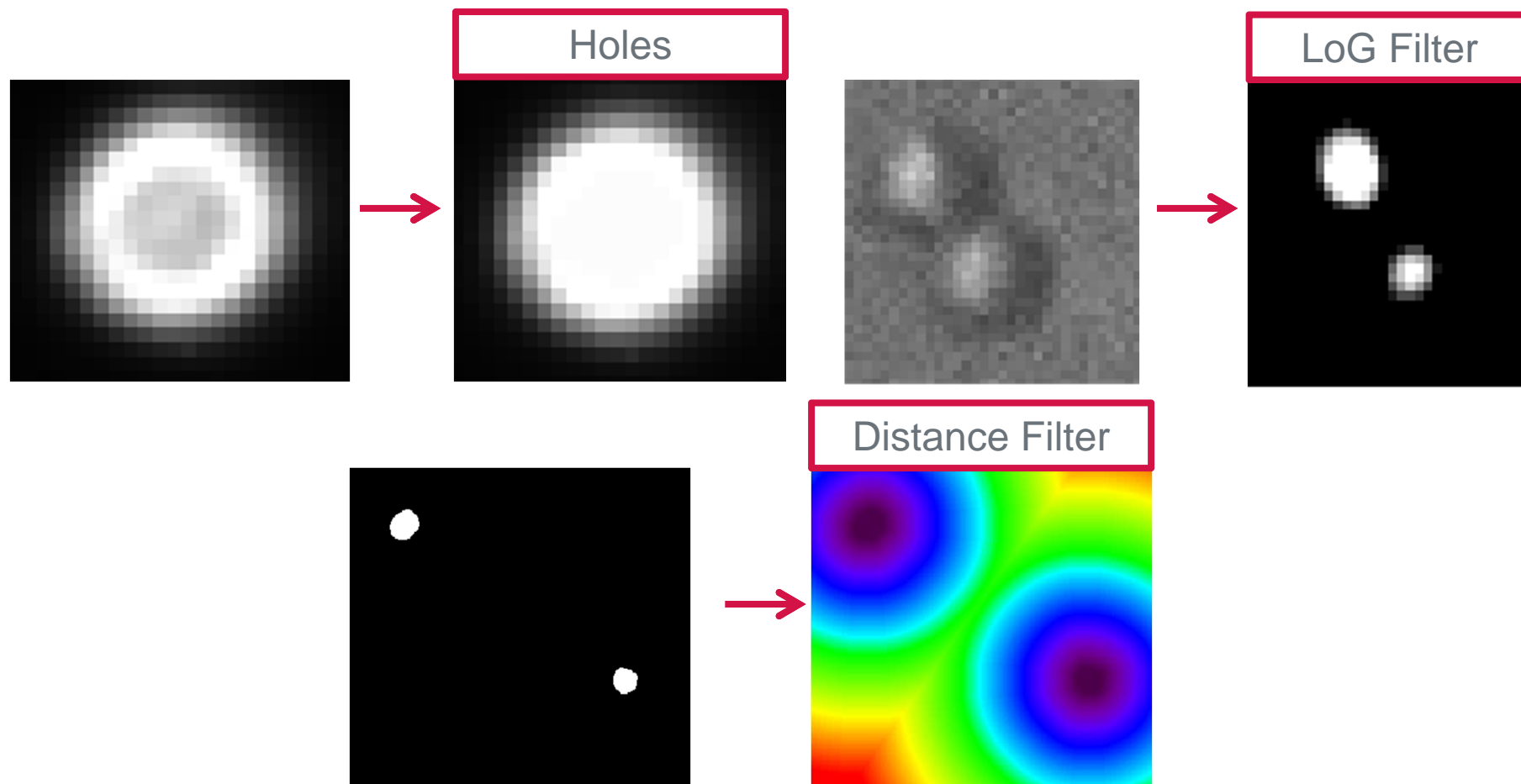
Modify Image: Examples of Morphology Filters

Erode

Dilate

Open

Close

MOLECULAR DEVICES

Modify Image: Examples of Morphology Filters

Gradient

Invert

Top Hat

Bottom Hat

MOLECULAR DEVICES

Modify Image: Examples of Morphology Filters

HDome

HBasin

Gaussian Filter

Regional Maximum

Modify Image: Examples of Morphology Filters

Holes

LoG Filter

Distance Filter

Support Resources

- F1 / HELP within MetaXpress® Software

- Support and Knowledge Base: http://mdc.custhelp.com/

- User Forum: http://metamorph.moleculardevices.com/forum/

- Request Support: http://mdc.custhelp.com/app/ask

- Technical Support can also be reached by telephone:
  - 1 (800) 635-5577
  - Select options for Tech Support → Cellular Imaging Products → ImageXpress Instruments

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