GX CAPTURE-T

User Manual

Content

1 How to start?

1.1 How to Start GXCAPTURE-T?

1. Invoke the Windows metro start screen with keyboard button  , locate GXCAPTURE-T and click it to start the application.

2. Click the Start button (At your screen bottom left corner) and a Start menu will appear. Move your mouse over the menu and try to locate GXCAPTURE-T, click to start it.

1. Double click on the desktop icon "  " (If installed) to start GXCAPTURE-T;

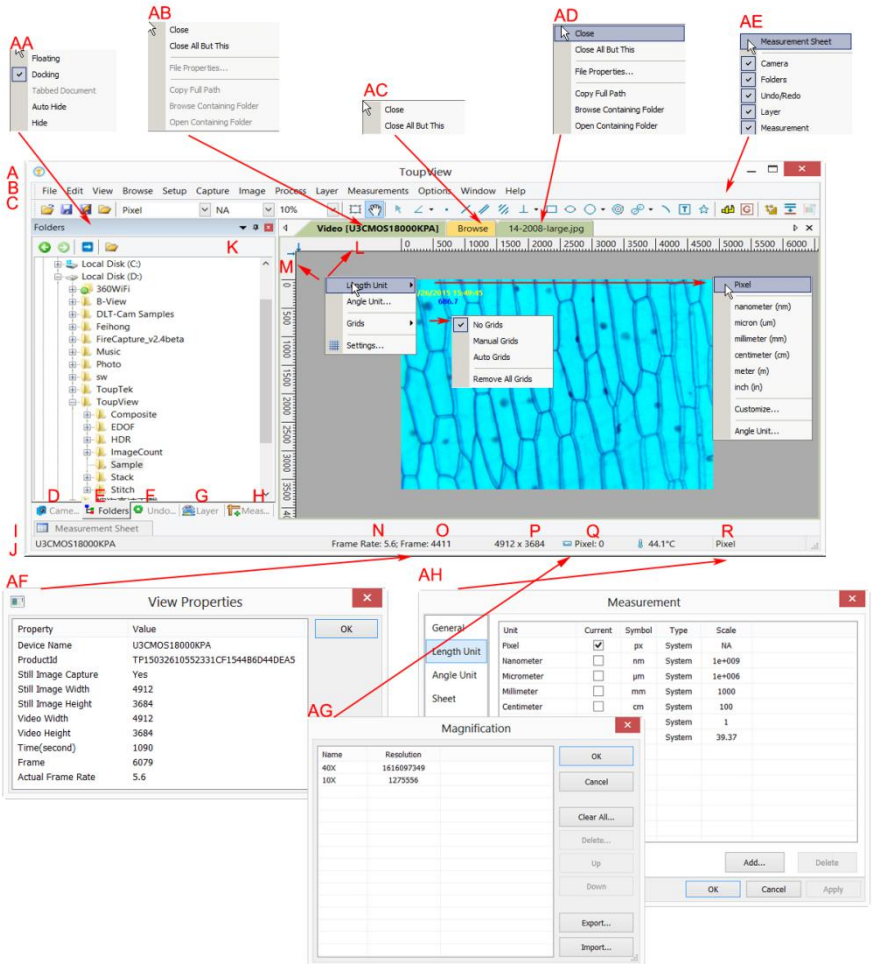
1.2 How to start the camera?

GXCAPTURE-T will detect all of the cameras that your computer has installed (Here, it is U3CMOS03100KPA, a 3.1M pixel USB3.0 CMOS camera) and will list all the camera names under the Camera List group on the Camera Sidebar

Click the Camera Sidebar (If it is not activated) and the Camera List to expand the Camera List group (if not expanded). Click the camera name (Here it is U3CMOS03100KPA) to start the video window and the camera will begin to stream the video. The video window will be associated with a name called "Video [U3CMOS03100KPA]" (i.e., its title bar name will be "Video [U3CMOS03100KPA]").

2 Video window GUI

2.1 Video window GUI



A:GXCAPTURE-T;

B: Menu;

C:GXCAPTURE-T toolbar

D:Camera Sidebar ;

E: Folders Sidebar ;

F: Undo/Redo Sidebar ;

G: Layer Sidebar ;

H: Measurement Sidebar ;

I: Measurement Sheet;

J:Statusbar;

K: Auto Hide button

L: Horizontal ruler;

M:Vertical ruler

N:Frame Rate

O:Frames captured

P:Current Video sizes

Q:Selected microscope Magnification

R:Current Unit;

AA: Sidebar right mouse button context menu;

AB: Video window right mouse button context menu;

AC: Browse window right mouse button context menu;

AD: Image window right mouse button context menu;

AE: Frame window right mouse button context menu;

AF: Double-click bring up Video Properties dialog;

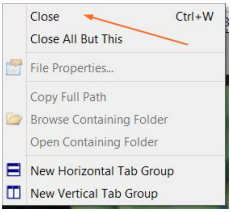
AG: Double-click bring up Magnification dialog;

AH: Double-click bring up Measurement dialog;

AI: Horizontal Ruler or Vertical Ruler right mouse button context menu

2.2 How to close the video window?

1 Double-clicking the tabbed video window title or clicking x on  will close the video window directly;



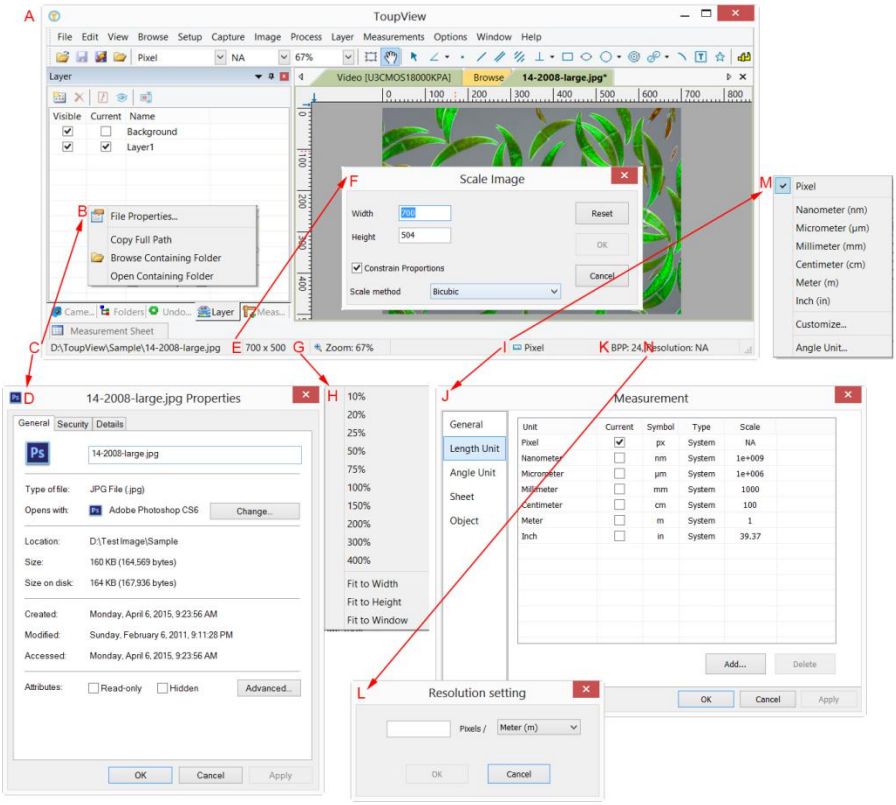
2. Choose the Windows>Close All command to close the video window;

3. Click the right mouse button on the video window title to invoke the context menu and choose Close to the video window.

4. Press Ctrl+W.

3 Image window GUI

3.1 Image window GUI



A:GXCAPTURE-T;

B:The opened file right mouse button context menu on status bar;

C:The opened file name and directory;

D:Double-click bring up opened file Properties dialog;

E:Current image width and height;

F:Double-click bring up Scale Image dialog;

G:Image Zoom ratio, double-clicking will zoom the image to 100%;

H:Zoom ratio right mouse button context menu;

I:Currently selected Unit;

J: Double-click bring up Measurement dialog;

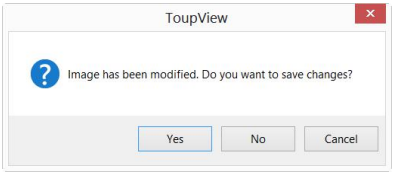
K:Image BPP & Resolution;

L:Double-click bring up Resolution Setting dialog;

M: Unit right mouse button context menu.

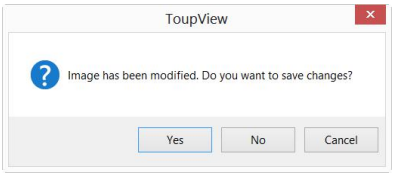
3.2 How to close the image window?

1. If you have modified an image before attempting to close it, double-clicking the tabbed image window title or clicking x on  will bring up a GXCAPTURE-T dialog:



Clicking Yes will save the changes with its old name and close the window quickly, No will close the file immediately with no changes and no warning, or Cancel will cancel the Close command and leave the window there with no changes;

2. If the Image window is snapped from the video window and with number as its title, double-clicking the tabbed image window title or clicking x on  will bring up a warning GXCAPTURE-T dialog:

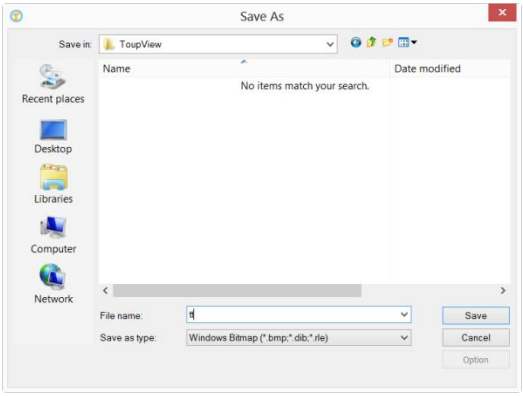


Clicking Yes will bring up the Save As dialog. In the Save As dialog, user can:

Save in: Select the driver and folder to which you want your image file saved in the Save in combobox and enter the file name in the File name edit box;

Save: Click Save to save the captured image with the specified directory and file name;

Cancel: Click Cancel to close the Save As dialog and return to image window.



Click No on the GXCAPTURE-T dialog will close the file immediately with no changes and no warning

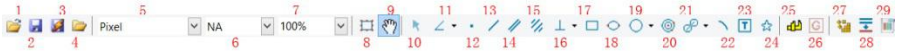
Click Cancel on the GXCAPTURE-T dialog will cancel the Close command and return to image window.

3. Ctrl+W;

Note: Choosing the Window>Close All command can also close the tabbed image window. Please check the Window>Close All for detail.

4 UI toolbar

When the camera is started or the image is opened (or captured), most of the icons on the toolbar will be available for the quick operation of the video or image window.



1: Open (Ctrl + O)

2: Save (Ctrl + S)

3:Quick Save (Quick Save)

4: Browse (Ctrl + B)

5: Unit

6: Magnification

7: Zoom

8:Video/Image Select

9: Track(enabled only when the video/image size is larger than the window size)

10: Object Select(will be enabled when an object is overlaid on the background layer

11: Angle

12: Point

13: Line

14: Parallel

15: Two Parallel

16: Vertical

17: Rectangle

18 Ellipse

19: Circle

20: Annulus

21: Two Circles

22: Arc

23: Text

24: Polygon

25: Calibration (for both video/image window)

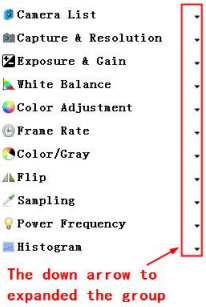
27:Gray Calibration (for video window)

28: Manual Fusion(for video window)

29: High Dynamic Range(HDR)

5 Camera Sidebar

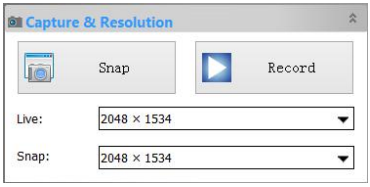
The Camera Sidebar is used for the control of camera, it includes many groups. The group can be expanded by a) clicking the group name or b) clicking the Down Arrow at the right end of the group name.



5.1 Camera List group

Camera List will list all of the cameras connected to the computer that support the GXCAPTURE-T application. Click the camera name will start the camera video window.

5.2 Capture & Resolution group



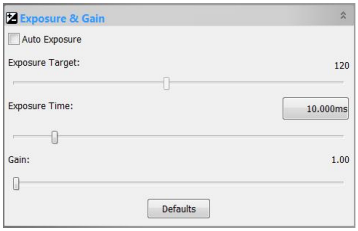
Snap: Continuously Snap images by clicking it;

Record: Record video stream in wmv/asf or avi format;

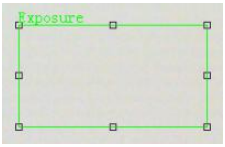
Live: Set the video resolution;

Snap: Set the Snap resolution for image capture.

5.3 Exposure & Gain group



1. When the Exposure & Gain group is expanded, a green rectangle marked with "Exposure" will be overlaid on the video window This marked region is a reference region for judging if the image brightness reach to the Exposure Target value. Drag or resize the Exposure ROI to the dark area will increase the video brightness and drag it to the brighter area will decrease the video



Rectangle for Auto Exposure

brightness;

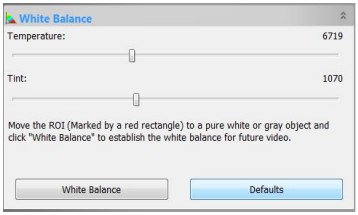
2. Uncheck the Auto Exposure box to switch the Auto Exposure mode to the Manual Exposure. The Exposure Target slider will be disabled in this mode;

3. Tune the microscope light source to a bright state, and then drag the Exposure Time slider left or right until the image brightness is normal;

4. If and only if the microscope light intensity is too low to meet the Exposure Time up limit, drag the Gain slide right until the video brightness is normal;

5. The exact Exposure Time can also be entered by clicking the edit box at the right of the Exposure Time. This will bring up a dialog called Exposure Time. You can type the number in the field to set the exact Exposure Time value.

5.4 White Balance group



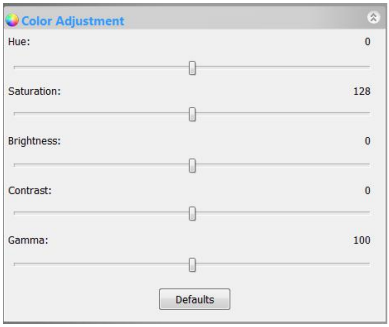
1. Click the White Balance bar to expand the White Balance group and a red rectangular marked with White Balance will be overlaid on the video window;

2. Drag or resize the red rectangle to a pure white or gray area and click the White Balance button to establish the video White Balance for future

video streaming process;

3. If the automatic setting and the actual result still has deviation, drag the Temperature and Tint slides to left or right to manually correct the White Balance.

5.5 Color Adjustment group



1. Hue: Adjusts the Hue of the video. Drag the slider to the right to increase or drag to the left to decrease Hue;
2. Saturation: Adjusts the Saturation of the video. Drag the slider to the right to increase or drag to the left to decrease video Saturation;
3. Brightness: Adjusts the video Brightness. Drag the slider to the right to increase or drag to the left to decrease the video Brightness;
4. Contrast: Adjusts the video Contrast. Drag the slider to the right to increase or drag to the left to decrease the video Contrast;
5. Gamma: Adjusts the video Gamma. Drag the slider to the right to increase or drag to the left to decrease the video Gamma;
6. Defaults: Click the Defaults to clear all the changes and reset them to default ones;
7. All of your settings will be saved for future Color Adjustment group.

5.6 Frame Rate group

Drag the slider to the right (High) to ensure that the camera can run the video at the fastest Frame Rate that the computer USB hub supports. If the video fails to display, drag the slider to the left (Low) to reduce the Frame Rate and this will enable the video to stream in a low speed mode.

5.7 Flip group

If the video on the screen appears in different directions from what is viewed under the camera, check the "Horizontal" or "Vertical" box to set the video direction to the right one.

5.8 Color/Gray group

If you wish to preview Color video, select the "Color" button, otherwise, check the Gray button.

If you wish to preview Gray video, check the "Gray" button.

5.9 Power Frequency group

1. A CMOS sensor captures each row of pixels (from top to bottom) in sequential order, creating a rolling effect, hence the name "Rolling Shutter". Instead of being relatively constant, so for example, as the commercial main frequency in Europe is 50Hz, fluorescent lights in Europe flicker at 100 times per second and as the main frequency in US is 60Hz, so in the USA they flicker at 120 times per second;
2. This flickering problem is solved by capture row pixels in over the duration of integer number of (n) flicker periods;
3. check 50HZ will delete the rolling dark band for the 50HZ light fluctuation;
4. check 60HZ will delete the rolling dark band for the 60HZ light fluctuation;
5. For DC power, no light fluctuation is existed and no compensation is needed.

5.10 Sampling group

1. Bin: Pixel binning refers to the method of combining (averaging) pixels of blocks of neighboring same color pixels to resize the video to the lower resolution;
2. Skip: Also called "Decimation", means that a certain amount of pixels are not read out but skipped (horizontally, vertically or in both axes). This reduces resolution of the resulting video but introduces subsampling artifacts.

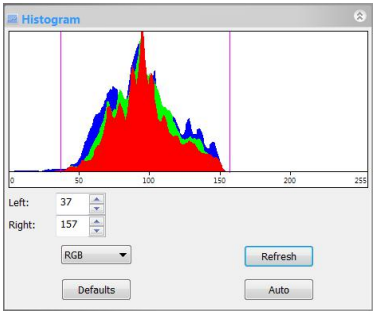
5.11 Bit Depth group

Switch between 8 bits and 12 bits. 8 bits is the basic Windows image format. 12bits will have higher image quality but moderate FPS.

5.12 ROI group

ROI, Region of interest. This function can set the ROI on the video window. When the ROI group was expanded, a dotted rectangle with "Handles" will appear around the video window that will let you alter the ROI. Use mouse button to adjust the ROI size. If ROI is ok, click Apply will set the video to ROI size, Defaults will return to the original size.

5.13 Histogram group



1. A Histogram illustrates how pixels in an image are distributed by graphing the number of pixels at each color intensity level. The Histogram shows detail in the shadows (shown in the left part of the histogram), midtones (shown in the middle), and highlights (shown in the right part). A Histogram can help you determine whether an image has enough detail to make a good correction;

2. This group shows the Histogram of current active video. Two vertical line markers show the upper and lower limits of the intensity levels. These markers can be dragged with mouse. If you are looking at a color image, the Histogram will reflect the RGB(red, green and blue channels histogram at the same time) R(red), G(green), and B(blue) values with lines of the same color;

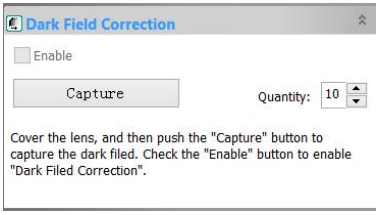
3. You can also enter directly the desired values in the Left or Right boxes below the Histogram chart for both Left and Right Histogram boundaries;

4. Click the "Refresh" button to update the Histogram display if the sample under observation is moved or changed;

5. Clicking the Defaults button will return the Left and Right Histogram boundaries to its original ones;

6. Click the Auto button to locate the two boundaries automatically to get the best video quality.

5.14 Dark Field Correction

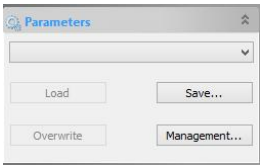


To Enable the Dark Field Correction, one should capture the dark field image first. After the images are captured, the Enable button will be enabled. Check it will enable the Dark Field correction. Uncheck is will disable the Dark Field Correction.

5.15 Misc

Negative will reverse the pixel values of the active video without going through the lookup table.

5.16 Parameters group



Parameters group is used to save the camera control parameters adjusted for further application.

Click Save will save the current camera control parameters with new parameter file; The Load and Overwrite buttons will be enabled.

Click Load will load the saved camera control parameters;

Click Overwrite will overwrite the current camera control parameters to the current loaded active camera control parameters file;

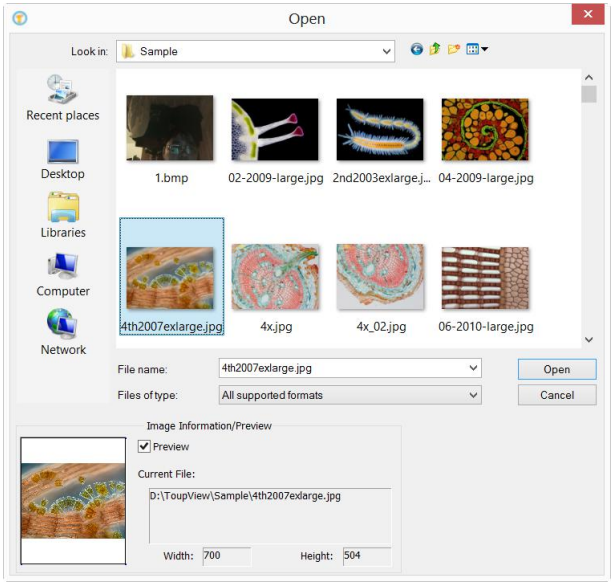
Click Management will invoke a Management dialog and in this dialog, one can manage all of the saved Parameter files.

6 File

6.1 Open Image••• Ctrl+O

Choose the File>Open Image••• command to open an existing image file. The Open Image••• command can also be used to preview an image in small size, or to view its statistics and information without actually opening the image itself. These capabilities can be used to quickly locate a particular image.

GXCAPTURE-T supports and can open many image formats. These are identified in the Files of type list box. You may also open an image file type with GXCAPTURE-T File Type (*.tft) format which can save Measurement Objects (for simplicity, only Object or Objects will be used to represent Measurement Object or Measurement Objects) overlaid on the image.



More than one image can be opened within GXCAPTURE-T simultaneously by a) with Ctrl + left mouse button method and b) Shift + left mouse button method to highlight the files to be opened. In this mode, the Preview window will be disabled.

When opening an image, GXCAPTURE-T places it into a new image window. It then becomes the active image.

Note: GXCAPTURE-T maintains, at the File>Recent Files submenus, a list of the last 4(Can be 1-8) opened files. Any of these files can be accessed by simply clicking on file name. If no files are listed in the File>Recent Files submenu, the Open Image••• command must be used to open the file.

Also, the View>Browse can be used to view images in an Icon format under any selected directory. Brief information is given in the View>Browse menu.

File name: From this list box, select the name of the file want to open. Either the type of the file name (with its entire path, if it is not in the current folder), or selecting Files of type to obtain a list of file names. Double-clicking a file name in the large combo box (where both folder and file names are listed) will automatically open it.
Note: If just type in the file name, be sure that the Files of type field correctly identify the format of the file to open. Otherwise error messages will bring up when GXCAPTURE-T tries to open the file.
Files of type: In this list box, select the image format of the file to open. If one selects All supported formats, GXCAPTURE-T uses the file's extension to identify its format. GXCAPTURE-T supports the following file formats:

Window Bitmap(*.bmp,*.dib,*.rle)
JPEG(*.jpg,*.jpeg,*.jpe,*.jif,*.jfif)
Portable Network Graphics(*.png)
Tag Image File Format(*.tif, *.tiff)
Compuserve GIF (*.gif)
Targa(*.tga)
PhotoShop(*.psd)
ICON(*.ico)
Enhanced Window Metafile(*.emf)
Window Metafile(*.wmf)
JBIG(*.jbg)
Wireless Bitmap(*.wbmp)
JPEG 2000 Standard(*.jp2)
JPEG 2000 Codestream(*.j2k)
GXCAPTURE-T File Type(*.tft)

If the image file does not use standard format-identifying extensions, the file in the File name field must be typed, and then select its format from the Files of type list

box. Otherwise, GXCAPTURE-T will select a format based on the file name extension.

Preview: Click this button to preview image in small size. In preview mode, statistics and information about the image (i.e. image Width, Height and image location) will be displayed. The default is no Preview.

Current File: Current File location on your computer;

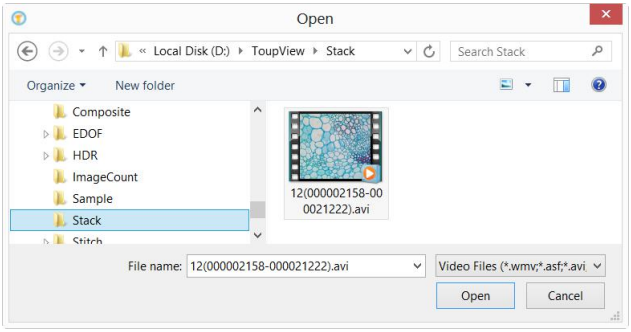
Width: Current File image width;

Height:Current File image height;

6.2 Open Video•••

The File>Open Video••• menu will be enabled only when there is no video file opened in the GXCAPTURE-T frame or no camera was opened.

1. Choose the File>Open Video••• command to open an existing video file;



2. Select the name of the file you want to open. If the file does not appear, select the option for showing all files from the Files of Type combobox. The video file type can be *.wmv*;*.asf* or *.avi* format.

3. Click Open to open a video file, this will create a video window and begin to start the video stream. The video window will be associated a name called "Video [XXX.XXX]" (i.e., its title bar will display "Video [XXX.XXX]", here, XXX.XXX is the video file name).

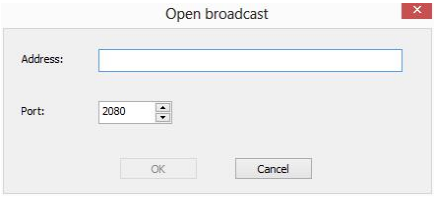
4. Click Cancel to return to the application.

Note: Only a single video can be opened at a time. GXCAPTURE-T takes camera as a

special video file, if the camera was opened, this menu will be disabled and the video file cannot be opened anymore.

6.3 Open Broadcast•••

Users could receive the broadcasting video by GXCAPTURE-T from the other user by the Address and Port. For example, if a user starts a broadcasting service via Address 192.168.0.20 and Port 2080, the other users could share the video that is opened on 192.168.0.20 by inputting the right Address and Port. If the receiver and the broadcaster are in one intranet, the performance will be excellent. If not, the performance will depend on the bandwidth.



6.4 Save  Ctrl+S

Choose the File>Save command to immediately store the current window image to its file (the file name is listed on the window's title bar) while leaving the image still active in its window.

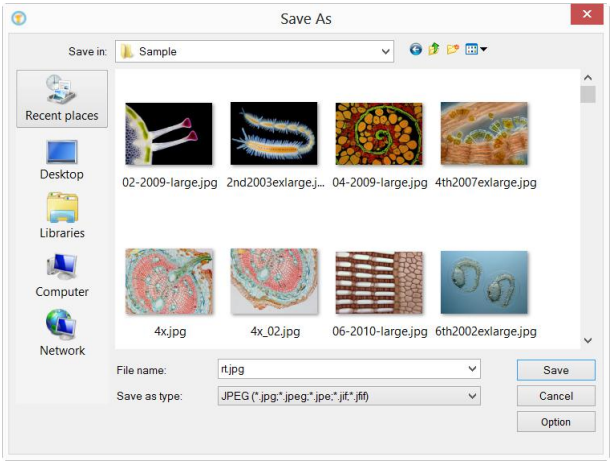
If the image is untitled or titled with a digit, GXCAPTURE-T will issue the File>Save As••• dialog automatically. The default "Save as type" will be "Window Bitmap (*.bmp,*.dib,*.rle)". If there are Objects overlaid on the image, the default Save as type will be "GXCAPTURE-T File Type (*.tft)".

The File>Save command can be used to save the most recent changes to disk. It is often performed as a precautionary measure during lengthy or involved processes to reduce the amount of reprocessing that might be required in the event of a system failure or operational error. When an image is closed and not to save its changes is chosen, GXCAPTURE-T discards all changes made since the last File>Save operation.

Note: a).The File>Save command always saves the contents of the entire window, even if there is an AOI (Area of Interest) defined on it; b).The File>Save command will be disabled if the file is not changed or the changes have been saved.

6.5 Save As•••

Choose the File>Save As••• command to store the contents of the current window to a specified file format. At the end of a File>Save As••• operation, the image window will be associated with the new file and the new format (i.e., its title bar will display the new file name).



GXCAPTURE-T supported file save formats are:

Window Bitmap(*.bmp,*.dib,*.rle)
JPEG(*.jpg,*.jpeg,*.jpe,*.jif,*.jfif)
Portable Network Graphics(*.png)
Tag Image File Format(*.tif, *.tiff)
Compuserve GIF (*.gif)
PCX(*.pcx)
Targa(*.tga)
JBIG(*.jbg)
JPEG 2000 Standard(*.jp2)
JPEG 2000 Codestream(*.j2k)
GXCAPTURE-T File Type(*.tft)

Save in: Find the folder where the file wishes to be saved. A new folder may be created using the New Folders button;

File name: The file name to be saved. To specify the file's location, either enter its

entire path (disk and folder), or specify its location using the Save in list box;

Save as type: In this list box, select the format in which the image wants to be saved. Save As••• is also used to convert a single image from one format to another. For example, if a TIFF file needs to convert to PCX format, open the TIFF image first, then choose Save As••• command with the PCX format to save it to a new file.

The default "Save as type" will be "Window Bitmap (*.bmp,*.dib,*.rle)". If there are Objects overlaid on the image, the default Save as type will be "GXCAPTURE-T File Type (*.tft)".

The Save As command has several important uses beyond simply storing an image to a new file name. Click Option to select the different parameters to encode the file.

6.5.1 Option for JPEG

For JPEG (*.jpg,*.jpeg,*.jpe,*.jif,*.jfif), Option has the following items:

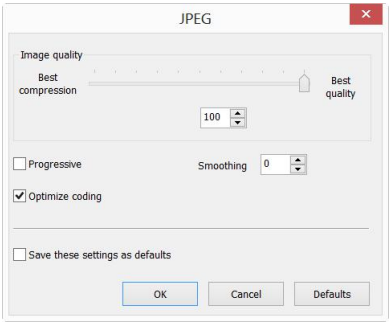


Image quality: If one save an image in JPEG format (*.jpg), one may adjust image quality in the edit box. The values range from 0 to 100. Default value: 75;

Progressive: The default is unchecked;

Optimize Huffman codes: The default is unchecked;

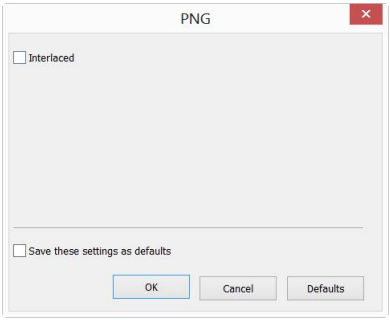
Smoothing: The values range between 0 and 100. Default value: 0;

Save these setting as defaults: When saving a file, the current settings will be saved as defaults for the next file save operation.

6.5.2 Option for PNG

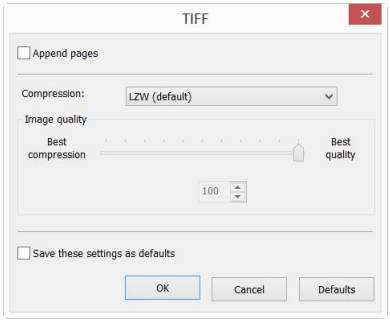
For Portable Network Graphics (*.png), Option has the following items:

Interlaced: The default is unchecked;
Save these setting as defaults: When saving a file, the current settings will be saved as defaults for the next file save operation.



6.5.3 Option for TIF

For Tag Image File Format (*.tif, *.tiff), the Option has the following items:



Appended pages: Determine whether the current image will be saved in multiple pages style or not;

Compressions: Specifies a method for compressing the composite image data. For saving a 32-bit TIFF file, one can specify that the file be saved with predictor compression, but have no option to use JPEG compression. Predictor compression offers improved compression by rearranging floating point values, and works with both LZW and ZIP compression;

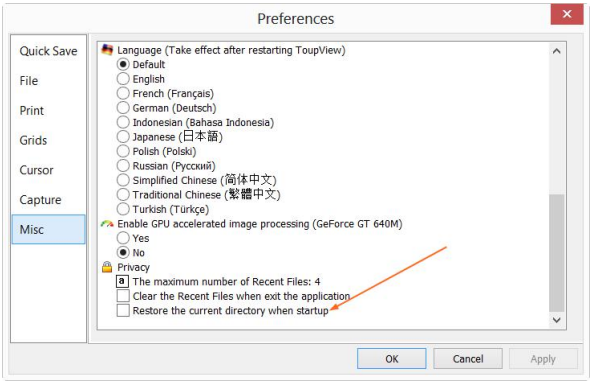
Image quality: If choosing Compressions as "JPEG", the Image quality can be adjusted by the slider bar. The values range between 0 and 100. Default value: 75;

Save these setting as defaults: When saving a file, the current settings will be saved as defaults for the next file save operation.

6.5.4 Option for the other formats

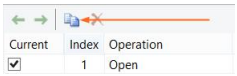
For Compuserve GIF (*.gif); PCX(*.pcx); Targa(*.tga); JBIG(*.jbg); GXCAPTURE-T File Type(*.tft), There is no Option.

Note: a) Detailed information of the above academic terminologies can be found in books about image processing and image compression or internet; b) The file saved directory can be restored for future use. To keep the directory unchanged when GXCAPTURE-T is started again, choose Options>Preferences••• command, click Misc page and check Restore the current directory when startup under the Privacy item.



6.6 Batch Save•••

The File>Batch Save••• menu will be enabled when a) an image is opened; b)an image is captured from the camera; c)an image window is created by choosing the File>Paste as New File command; d)an image window is copied from the Undo/Redo Sidebar with the copy button as show below:



6.6.1 Batch Save for a) style image window

1. If the image is modified, choosing the File>Batch Save••• command will save the

file with its opened file name and file extension;

2. If the image is modified because of the Objects, choosing the File>Batch Save••• menu will save the file with its opened file name but with "GXCAPTURE-T File Type (*.tft)" file extension format;

6.6.2 Batch Save for b), c) or d) style image window

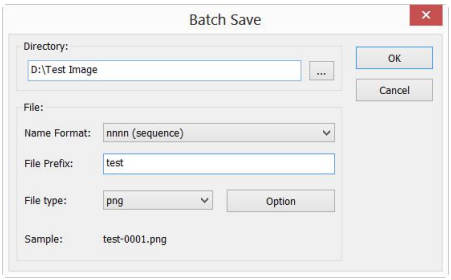
If the image window has been created with b), c) or d) style, choosing the File>Save As••• command to realize the file saving task will be time-consuming. The Batch Save••• command will runs File>Save As••• command with the name automatically specified according to the paradigm specified in the Batch Save dialog

To start the File>Batch Save••• command for b) style image window, you have to

1. Start the camera;

2. Snap at least an image first;

3. Choosing the File>Batch Save••• command will bring up a Batch Save dialog:



Directory: Enter the name of the drive and directory where your captured images will be saved. You may either type the path information, or use the Browse button to locate it from a standard Browse Folder dialog.

Name Format: The year, month, date, hour, minute and second or nnnn(sequence) are used to as part of the file name. If more files are saved with in a second, a (xx) suffix is attached to the end of Name Format to avoid the possible name conflict. For the nnnn(sequence) "Name Format", no suffix is needed.

File Prefix: Enter a file name prefix for Batch Save when generating files names for a

series of images. This prefix will be combined with Name Format to form a final file name naming paradigm.

File Type: In this combobox, select the format in which you want the image to be saved (can be BMP, JPG, PNG, TIF). Click Option button to set the different parameters for encoding the file (For BMP format, the Option will be disabled. See File>Save As••• menu about the details of the format encoding methods); If there are Objects over the image, the File Type will be chose as "GXCAPTURE-T File Type (*.tft)" by GXCAPTURE-T.

Sample: The final file name is shown at the right of the Sample label for reference.

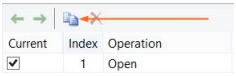
4, If the setting in the Batch Save dialog was finished, click OK button to begin the file batch save process or Cancel to cancel the Batch Save command and return to the application.

For the c) or d) style image window, only steps 3 and 4 are needed.

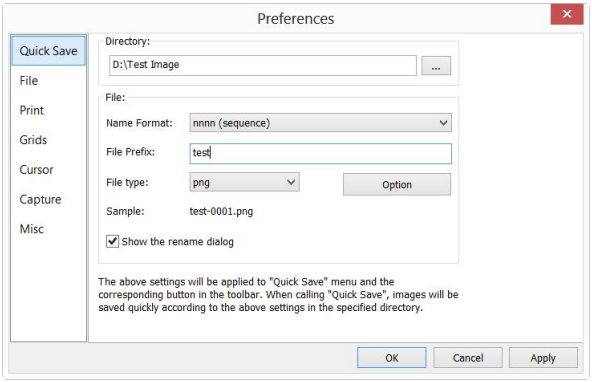
Note: a) In the process of the File>Batch Save••• command, the title on the image tab or image window will be modified with the file name paradigm in the Batch Save dialog. b) The File>Batch Save••• will perform no saving operation if the file is not modified or unchanged.

6.7 Quick Save  CTRL+Q

The File>Quick Save menu will be enabled when a)a new image captured from the camera; b)an image window is created by choosing the File>Paste as New File menu; d)an image window is copied from the Undo/Redo Sidebar with the copy button as show below:



File>Quick Save can save the file at quick way with no need to specify the file directory, file name and file format. All those are specified in Options>Preferences•••, Quick Save property page. The file name can be renamed according to the setup in the Options>Preferences•••, Quick Save property page's Show the rename dialog item.



6.8 Paste as New File

The File>Paste as New File menu will be enabled only when there is valid image data on the clipboard first (see the Edit>Copy menu). If there is no image data on the clipboard, the File>Paste as New File menu will be disabled.

Choose the File>Paste as New File command to place the contents of the clipboard image into a new image window, which becomes the active image.

The new image type will be the same as that of the original image. GXCAPTURE-T will accept image data from other applications via the clipboard as long as it is in Windows Bitmap (DIB) format.

Note: GXCAPTURE-T will assign a digit to the Paste as New File command created image window title bar.

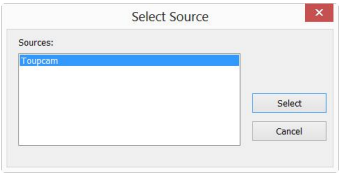
6.9 Twain: Select Device•••

Twain is a cross-platform interface for acquiring images captured by certain scanners, digital cameras, or frame grabbers. The manufacturer of the Twain Device must provide a Source Manager and Twain Data Source to work with GXCAPTURE-T.

Select the active device for the Twain: Acquire••• menu from all devices available in the device combobox which are enumerated by the application.

One must install the Twain Device hardware and its driver first. See the documentations provided by the device manufacturer for the installation instructions.

Before begin to start the Twain: Acquire at the 1st time with GXCAPTURE-T, choose the File>Twain: Select Device••• command first, this will invoke a dialog called Select Source as shown below:



Source: Choose the right device from the Source window (Highlight it)

Select: Click Select to select the device. User does not need to repeat this step for subsequent choosing of the Twain: Acquire••• command.

Note: All of the ToupCam cameras are integrated into one Source called Toupcam. This will greatly reduce the list item and easy to choose for the user.

6.10 Twain: Acquire•••

6.10.1 Introduction

There are basically two techniques used to capture the video images from video devices such as a PC camera, digital camera, and scanner. They are the Twain: Acquire••• technique and the DirectShow technique (previously called VFW).

The most obvious characteristics of the Twain technique is that it previews the video in smaller resolution but captures the image with higher resolution. The ToupCam series cameras support all of these two video preview techniques.

6.10.2 Steps for Twain Acquire

Here we illustrate how to capture the image using a U3CMOS03100KPA (3.1M pixels, USB3.0) camera as an example.

1. Install the camera Twain driver provide by the supplier (for example driver for U3CMOS03100KPA hardware);

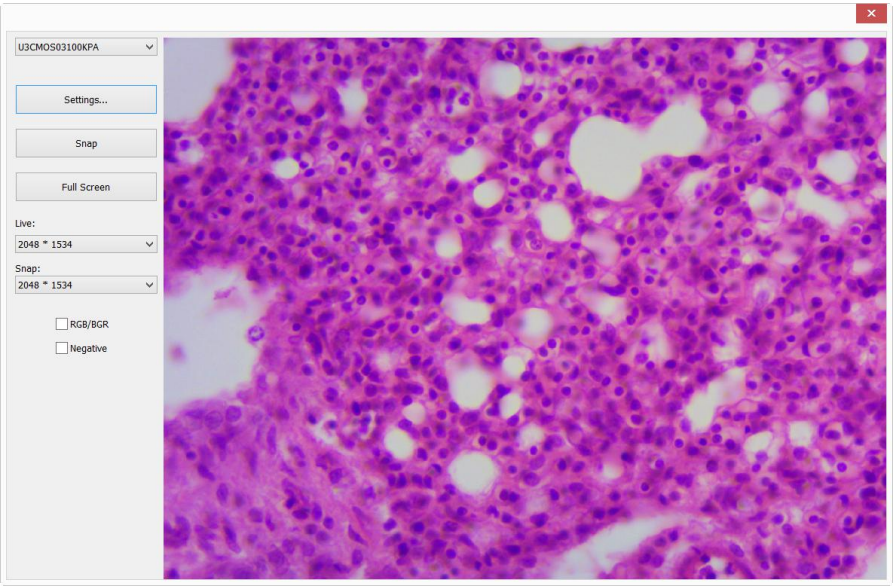
2. Install GXCAPTURE-T;

3. Plug the cameras U3CMOS03100KPA (USB3.0) into the computer;

4. Start GXCAPTURE-T;

5. Choose the File>Twain: Select Device••• command to select the device from the Select Source dialog (If never selected before);

6. Choose the File>Twain: Acquire••• command. There should be a dialog box like below:



In this dialog, the video Resolution can be chosen. The Video Source Property can be set by clicking the Setting••• button. Click the Snap button to capture an image. This will create a new window and its title bar will be assigned a digital as the image window name;

Check the RGB/BGR box to ensure the correct color encoding format compatible with your application.

Click X on the window's upright cornor to close the Twain: Acquire dialog.

6.11 Print Setup•••

Choose the File>Print Setup••• command to access the setup panel for the printer that has selected. GXCAPTURE-T will present the standard setup panel for the particular printer (this is the same panel one would receive if one were setting up the

printer from the Windows Control Panel). Change printer's setup to satisfy the requirements, click OK button to return.

6.12 Print Preview••• Ctrl+Shift+P

Choose the Print Preview command to see the real-time effect of the printer without actually printing it out.

6.13 Print••• Ctrl+P

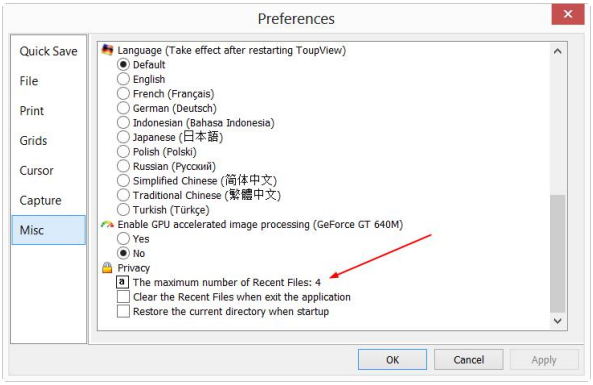
Choose the File>Print••• command to print one or more copies of the current image to the selected output device. The GXCAPTURE-T File>Print••• command lets one take full advantage of the printer's capabilities. If the printer has built-in half-toning or color dithering capabilities, use them or instruct GXCAPTURE-T to perform these processes before sending the image to the device.

The File>Print••• command also has facilities that let one adjust the size and position of the image on the printed page.

6.14 Recent Files

GXCAPTURE-T maintains 4 (default) most recently opened document files under the Recent Files menu. Choosing one of these submenus will reopen that file immediately.

Note. a) The maximum number of Recent Files can be modified by choosing the Options>Preferences••• command and clicking the Misc page as shown below:



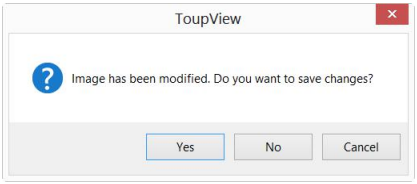
Here, clicking the 4 (default) edit box will allow you to enter the number of the Recent

Files submenus that you want. The value ranges from 0 to 8, the default is 4; b) One can also check the Clear the Recent Files when exit the application to clear the Recent Files after exit GXCAPTURE-T application.

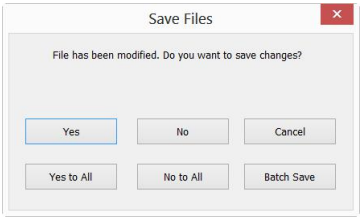
6.15 Exit

Choosing the File>Exit command will close video, all of the image windows and Browse window. After all of the windows are closed, GXCAPTURE-T will end itself.

Note: If an image has been modified before attempting to Exit it, GXCAPTURE-T will issue a warning to ask if user want to save the image or not first.



If multiple images have been modified before attempting to Exit it, GXCAPTURE-T will issue Save Files dialog to direct the user to save changes in different ways.



See Window>Close All for details.

7 Edit

7.1 Cut  Ctrl+X

The Edit>Cut menu will be enabled only when a) an Object or Objects on the Layer over the image is or are selected; b) an image or images in the Browse window is or are selected.

7.1.1 Cut for Objects

Check the Measurements>Object Select  or Edit>Select All menu to find how to select Layer Objects for the Edit>Cut command.

Choose the Edit>Cut command to a) copy the selected Objects to the clipboard and b) delete the selected Objects on the image. Any data already exist on the clipboard will be replaced.

The Objects copied to the clipboard can be pasted into the active window or into another opened video/image window on the layer overlaid on the image using the Edit>Paste command (when there is no Layer overlaid on the Background, GXCAPTURE-T will create a new Layer first).

7.1.2 Cut for Browse window selected files

When the Browse window is active and the image files in the Browse window are selected, the Edit>Cut command will be enabled. Choosing the Edit>Cut command will delete the selected files and copy it to the clipboard.

Note: The Edit>Cut command does not support Background Layer (image) Cut operation.

7.2 Copy  Ctrl+C

Choose the Edit>Copy command to Copy the highlighted Objects (on Measurement Layer) or an image's selected area on the Background Layer to the clipboard.

Note: When a) the Object(s) is (are) highlighted or b) the Current Layer is the Background Layer and an image ROI is selected, the Edit>Copy menu will be enabled.

7.2.1 Copy the selected area on the background layer to the clipboard.

1. Select the image area using the Image Select  button on the toolbar. The Edit>Copy menu will be enabled;

2. Choose the Edit>Copy command to copy the selected image area to the clipboard.

7.2.2 Copy object(s) on the measurement layer to the clipboard.

1. For the Layer operation, see the View>Sidebar>Layer menu in Sec.8 and the Layer menu in Sec.14 for details;

2. For the Measurement operation, see the View>Sidebar>Measurement menu in Sec.8 and the Measurements menu in Sec.15;

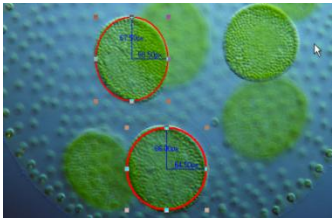
3. After the Measurement operating has been done, choose Measurements>Object Select command or check the Object Select button  , the cursor will change to  in the video/image window;

4. Move the mouse until the cursor becomes  , this means the cursor is right on the Object. Clicking it will highlight Object and select the Object;

5. Option 1: Continue to move the mouse until the cursor becomes  again, this means the cursor is right on another Object again. Clicking it with Shift+left mouse button and the second Object will be selected and highlighted;

6. Option 2: a) Move the cursor over the image, click down the left mouse button; b) Drag the mouse to draw a rectangle on the image. A dotted rectangle will appear around the selected area; c) Release the mouse and all of the Objects within the dotted rectangle will be highlighted and selected;

7. After the Objects are selected, the Edit>Copy menu will be enabled;



8. Choose the Edit>Copy to Copy the Object(s) to the clipboard. Then the Edit>Paste menu will be enabled. One can then Paste the objects onto the Current Layer or onto the other Measurement Layer in the same video/image window. If one switches to the Background Layer, the Edit>Paste menu will be disabled, but if one returns to the Measurement Layer again, the Edit>Paste menu will be enabled again.

7.2.3 Copy for Browse window selected files

When the Browse window is active and the image files in the browse window are selected, the Edit>Copy command will be enabled. Choosing the Edit>Copy command will copy the image files to the clipboard. After the Edit>Copy command, the Edit>Paste and the Edit>Paste shortcut menus will be enabled.

Note: a) The Edit>Copy command will not delete the Objects over the image. Any data existing on the clipboard will be replaced with the new data; b) The copied Object(s) can be pasted into the active window or into another opened window using the Edit>Paste command as long as the current window is not on the Background Layer (the Edit>Paste menu will be disabled if the Background Layer is active). See the View>Sidebar>Layer command in Sec.8 and the Layer menu in Sec.14 for details; c) the copied files on the clipboard can be pasted into the Browse window by choosing the Edit>Paste command.

7.3 Paste  Ctrl+V

If a) there is (are) Object(s) on the clipboard and the Current Layer is not the Background Layer, or b) there is (are) image file(s) on the clipboard and the current active window is Browse window, the Edit>Paste menu will be enabled.

7.3.1 Paste for Objects

Choose the Edit>Paste command to Paste Objects from the clipboard onto the active image's Measurement Layer. One can also choose Edit>Paste command to transfer a

layer's Objects from one image window's Measurement Layer to another image window's Measurement Layer.

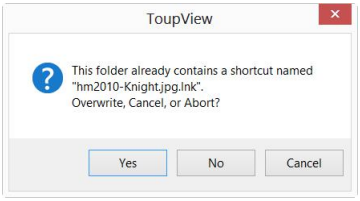
7.3.2 Paste for Browse window selected files

When the Browse window is active and the image files in the browse window are selected, the Edit>Paste command will be enabled. Choosing the Edit>Paste command will paste the clipboard files to the Browse window.

Note: The Edit>Paste command does not support the image area Paste operation.

7.4 Paste Shortcut

This command is for Browse window only. This menu will be enabled when files in the Browse window are selected and the Edit>Copy command is executed to copy the file shortcut to the clipboard. Choose this command will create the selected files Shortcut(in *.lnk format) in the current Browse window.



If the to be pasted *.lnk file has been existed in the current Browse window, GXCAPTURE-T will pop up a prompt dialog.

One can click Yes, No or Cancel to Overwrite, Cancel or Abort the command.

7.5 Delete  Delete

The Browse>Delete File menu will be enabled if a) the file(s) is (are) highlighted in the Browse window, b) the Object(s) on the video/image are selected. This command is for Browse/Video/Image window only.

You can Delete or remove one or more files from the Browse window. The steps are as follows:

7.5.1 For Browse Window file delete

1. Select one or more files by a) Clicking the displayed file icons, a single file will be

highlighted; b) Clicking the file one by one with Ctrl + left mouse button, all of the clicked files will be highlighted; c) Clicking the displayed file icons, the first clicked file will be highlighted, clicking the end file with Shift + left mouse button, all of the files among the first and last will be highlighted. d) Dragging the mouse to draw a dotted line rectangle across the files you wish to delete, all of the files in the rectangle will be highlighted; e)Ctrl+A to select whole files in the Browse window

2. a) Press the Delete key to delete the selected files; b) Click you right mouse button to bring up a context menu, choose the Delete command to delete the highlighted files. A Confirm File Delete dialog will bring up.

In the Confirm File Delete dialog, click Yes to move the files to the desktop recycle bin, or No to cancel the Delete operation.

7.5.2 For Video/Image Window Object delete

If the Objects on the video/image are selected, choosing Browse>Delete File or pressing delete button will remove the Object from the video/image window.

7.6 Image Select 

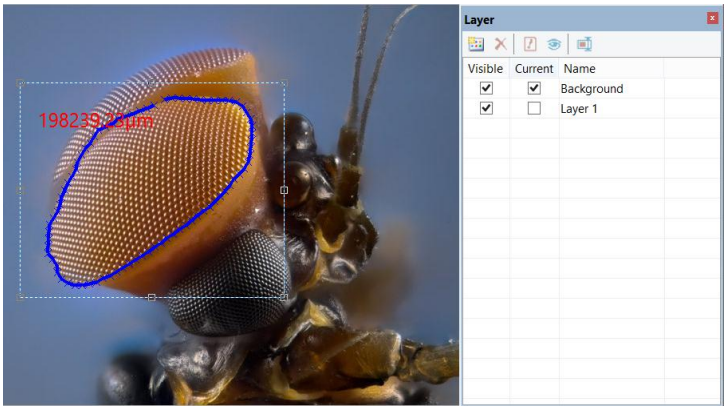
The Edit>Image Select command can be used to mark ROI and Copy the selected ROI to the clipboard. This command is only used to select the ROI on the Background Layer.

Choosing the Edit>Image Select command will check this menu (or click  on the toolbar will keep  down) and the cursor will turn into "+". The ROI selection steps are described as below:

1. After the Edit>Image Select command is chosen (or click the Image Select button  on the toolbar), the Background Layer will be checked automatically regardless of if the other Layer is checked or not;

2. Drag the mouse cursor across the image with the left button held down until the area is selected;

3. Release the left button and the area will be marked. Handles will appear on the area that will allow altering the selection after it is marked.



7.7 Select All Ctrl+A

7.7.1 Select all on the background layer

When the video/image window is active and the Background Layer is checked, choosing the Select All command will select all pixels on the Background Layer within the canvas (shortcut: Ctrl+A).

7.7.2 Select all objects over the background layer

When the video/image window is active and the Background Layer is not checked, choosing the Edit>Select All command will select all of the Objects on the Current Layer (shortcut: Ctrl+A).

7.7.3 Select all files in the Browse window

When the Browse window is active, choosing the Edit>Select All command will select all of the files in the Browse window under the specified directory in the Folders Sidebar.

7.8 Select None Ctrl+D

Deselect a) any selected area (ROI) on the image; b) the Objects on a Layer; c) the file listed in the Browse window.

7.8.1 Select None for Background Layer

When the Current Layer is the Background Layer and an image area is selected, the

Select None menu will be enabled. Choosing the Edit>Select None command will delete the dotted rectangle representing the selected area (ROI).

7.8.2 Select None for Objects

When the Current Layer is not the Background Layer and the Objects are selected, the Edit>Select None command will be enabled. Choosing the Edit>Select None command will deselect all of the selected Objects.

7.8.3 Select None for Browse window

When the Browse window is active and the image files in the browse window are selected, the Edit>Select None command will be enabled. Choosing the Edit>Select None command will deselect all of the selected files in the Browse window.

Note: See Edit>Image Select, Edit>Select All and Measurements>Object Select  to understand how to perform select operations.

8 View

8.1 Browse Ctrl+B

8.1.1 Open the Browse window

1. Choose the View>Browse menu or click the Browse toolbar button open or active browse images under the specified directory in the Folders Sidebar;

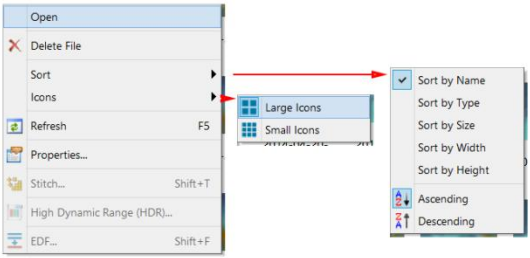
2. Click the Folders Sidebar to activate it and double-clicking the listed directory in the Folders Sidebar will create the Browse window.

After creating the Browse window, GXCAPTURE-T will display a Browse window that looks like windows explorer. The child window on the left part of the Browse window called Folders Sidebar is used to locate the directory on the hard disk. Images in the current directory are displayed in Large Icons or Small Icons mode on the right side of the Browse window.

Image file's order can be set in Ascending or Descending order according to Sort by Name, Type, Size, Width or Height et al.

8.1.2 Browse window right mouse button context menu

Clicking the right mouse button on the listed Icon in the Browse window will bring up a right mouse button context menu as shown below:



These context menu functions are described in

Browse>Delete File

Browse >Sort>Sort by Names

Browse >Sort>Sort by Type

Browse >Sort>Sort by Size

Browse >Sort>Sort by Width

Browse >Sort>Sort by Height

Browse >Sort>Forward

Browse >Sort>Reverse

Browse >Icon>Large Icons

Browse >Icon>Small Icons

Browse >Refresh

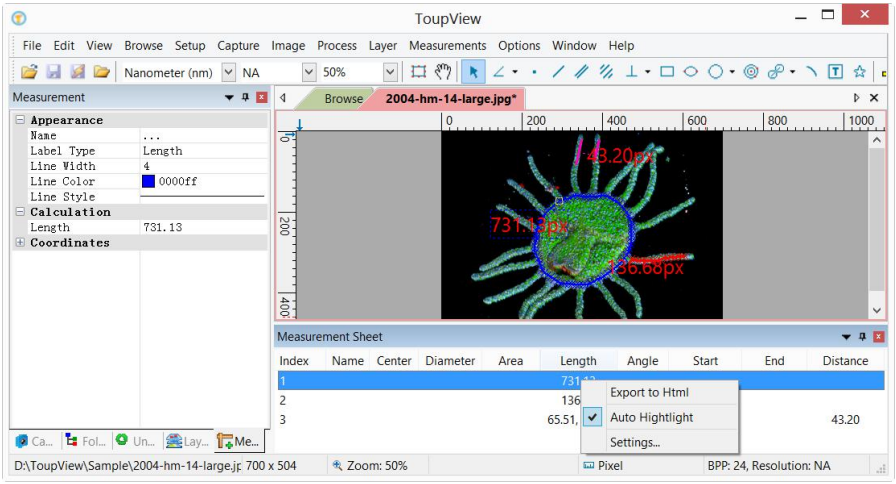
Browse >Properties

menus. Please check them for details.

There other menu can be found in Process menu in Sec.13.

Note: The Folders Sidebar and the Browse can be used to perform tasks such as creating new folders, renaming, moving, and deleting files. Individual file information and import data from digital cameras can also be displayed. Double-clicking the left mouse button on the icon will open the image as an active image in full size. See Image window GUI in Sec.3 for more details.

8.2 Measurement Sheet



When choosing the View>Measurement Sheet command, the Measurement Sheet will be active. The Measurement Sheet shows the Object's possible features, such as Name, Center, Radius, Area, Perimeter, Angle, Start Point, and End Point overlaid on

Background Layer.

Clicking the right mouse button on the Measurement Sheet••• and the right mouse context menu will bring up on the Measurement Sheet••• window as shown above. They are explained below:

8.2.1 Export Html

Export all the Layer Objects to the *.html file in a tabbed format.

Layer Name	Index	Name	Center	Diameter	Area	Length	Angle	Start	End	Distance
Layer1	1		(124.86, 239.18)	218.54	37509.04	686.55				
Layer2	1		(578.19, 249.50)	205.15	33055.73	644.51				
	2		(350.50, 246.50)			457.13	178.62	(579.00, 252.00)	(122.00, 241.00)	
Length Unit:Pixel, Angle Unit:Pi										

Note: This menu will be enabled only when there are Objects overlaid on the Background Layer (video/image).

8.2.2 Auto Highlight

When this menu is checked, clicking the item in the Measurement Sheet will highlight the corresponding Object overlaid on the Background Layer.

8.2.3 Settings•••

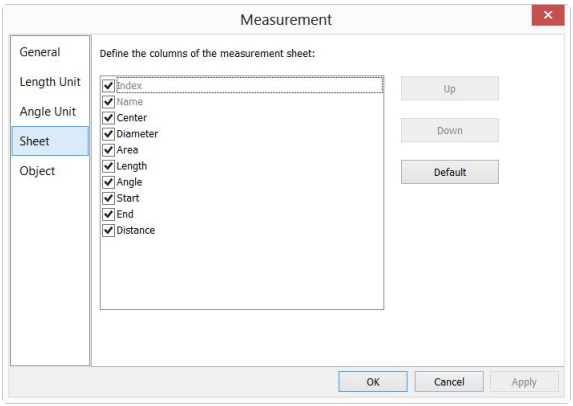
1. To modify the Measurement Sheet's item order, click the item to highlight it, the Up or Down button will be enabled (If the item is in the third position, the Up button will be disabled, if the item is in the last row, the Down button will be disabled). Click the Up or Down button to modify the item order;

2. Checking/Unchecking the item will show/hide the item in the Measurement Sheet;

3. Clicking Default will return to the GXCAPTURE-T's default settings;

4. Item 1(Index) and item 2(Name) cannot be changed (in grayed state).

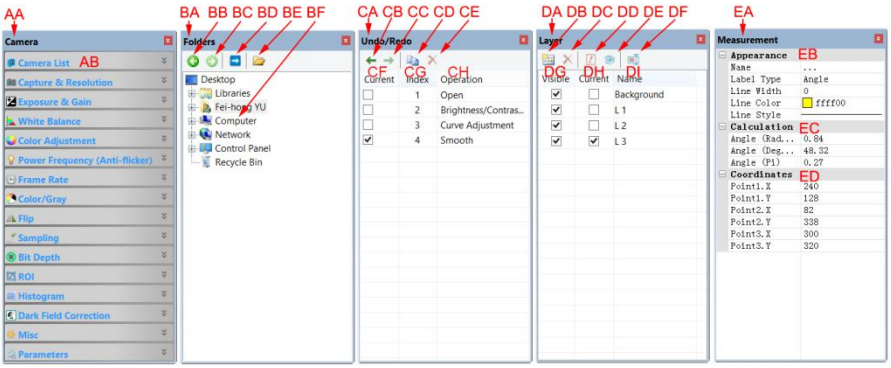
Note: The item Index and Name are always in grayed states, this means these two items cannot be modified (Both their hide/show states and their positions).



8.3 Sidebar

There are 5 Sidebar in the GXCAPTURE-T frame window in tabbed style. They are Camera Sidebar, Folders Sidebar, Undo/Redo Sidebar, Layer Sidebar and Measurement Sidebar.

8.3.1 Sidebar overview



AA: Camera Sidebar;

AB: Camera Sidebar groups for the control of the camera.

BA: Folders Sidebar;

BB: Back to the previous folder;

BC: Forward to the next folder;

BD: Browsing the pictures under the application's file directory;

BE: Open the Browse window if it is not opened (Double-clicking on the selected

directory will perform the same functions.);
BF: Folders to locate the Browse window's file directory.

CA: Undo/Redo Sidebar;
CB: Forward to the previous step;
CC: Backward to the next step;
CD: Operation Copy: Copy the highlighted operation in the Undo/Redo Sidebar to a new image window; User can also drag the selected operation in the Undo/Redo Sidebar to the window area to create a new image window;
CE: Remove the highlighted operations from the Undo/Redo list (This button will be enabled only when the operation(s) is (are) selected, the opened image(the first operation) cannot be removed;
CF: Indicating the Current operation displayed in the image window;
CG: Operation Index;
CH: Operation name.

DA: Layer Sidebar;
DB: Make a New layer;
DC: Remove a layer;
DD: Set as the Current layer;
DE: Show/Hide a layer;
DF: Rename a layer;
DG: Visibility control of the layer items;
DH: The Current active layer for operations;
DI: The layer Name. The image layer is always named as "Background".

EA: Measurement Sidebar;
EB: The Appearance of the highlighted Object on the Current layer; you can edit the Appearance by clicking its item and editing it;
EC: The Calculation of the highlighted item on the Current layer;
ED: The Coordinate of the highlighted item on the Current layer; you can edit the Coordinate by clicking the item.

8.3.2 Sidebar>Camera

The Camera Sidebar is mainly used for the control of camera, it includes many groups. Each group can be expanded by clicking the group name or the arrow button

at the right of the group name.

Checking the Sidebar>Camera menu will activate/show it on sidebar group.

Please check Camera Sidebar in Sec.5 for details.

8.3.3 Sidebar>Folders

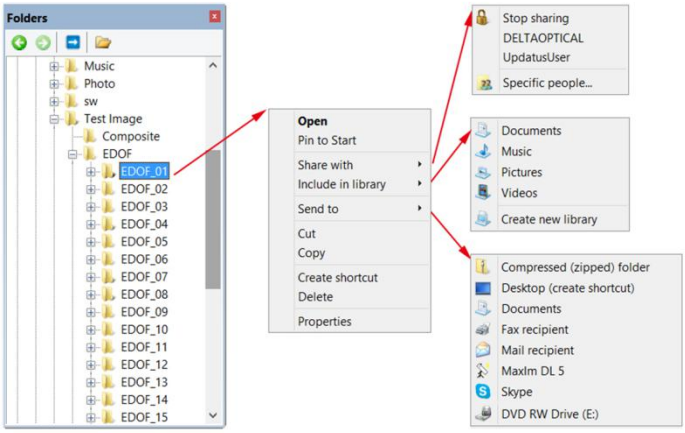
The Folders Sidebar is mainly used for the image Browse control.

Checking the View >Sidebar>Folders menu will activate/show the Folders Sidebar. Clicking its tree can navigate the file directories.

Double-clicking the directory in the Folders will create the Browse window. If there are image files under the directory that GXCAPTURE-T supports to Browse, the image files will be displayed in Large or Small icons mode.

Their orders can be set in Ascending or Descending styles according to Sort by Name, Type, Size, Width or Height et al.

Clicking the right mouse button on the directory will bring up the right mouse context menu as shown below:



Folders directory right mouse button context menu

This is the basic window explorer menu and will not be explained in this manual.

8.3.4 Sidebar>Undo/Redo

The Undo/Redo Sidebar is used to list the Undo/Redo operations for the Image and Process menus' command.

Checking the View>Sidebar>Undo/Redo menu will activate/show the Undo/Redo Sidebar.

8.3.5 Sidebar>Layer

Layer Sidebar is used for the management of Layer operations. These operations include making a New Layer, Removing a Layer or Renaming a Layer and Layer visibility controlling et al.

Checking View>Sidebar>Layer will activate/show the Layer Sidebar.

8.3.6 Sidebar>Measurement

The Measurement Sidebar is used to check or edit the selected Objects on the Layer.

Checking View>Sidebar>Measurement will activate/show the Measurement Sidebar.

In this sidebar, the Object Appearance, Calculation and Coordinates characteristic are listed. The Appearance and Coordinates can be edited.

8.4 Grid

The Grid menu has 5 submenus, they are:

8.4.1 Settings•••

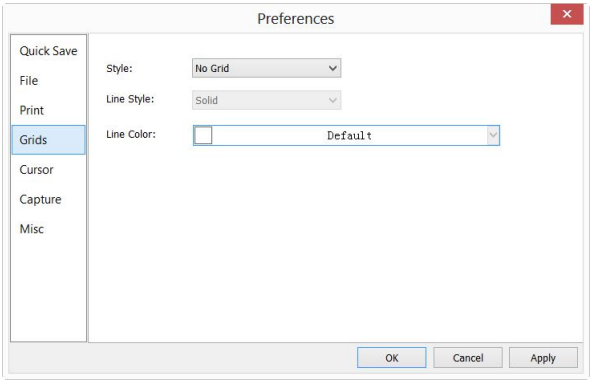
Choosing the View>Grid>Setting••• command, or choosing the Preference>••• command and clicking the Grids page realize the same function.

Choosing the Preference>••• command and clicking the Grids page can set the Grid Style, Line Style, and Line Color for the Grid overlaid on the video and image window can also be set.

Style: The Grid Style can be No Grid, Auto Grid or Manual Grid. Default is No Grid;

Line Style: The Line Style for the grid can be Solid, Dash, Dot or DashDot et al. Default is Solid;

Color: The color of the grid line. Default is Red (255,0,0).



8.4.2 Grids>No Grids

Choosing this command will remove both Manual Grids and Auto Grids overlaid on the video/image window.

8.4.3 Grids>Auto Grids

Choose Grids>Auto Grids command to overlay the grids on the video/image automatically.

The Auto Grids can be set in the View>Grids>Setting••• menu.

8.4.4 Grids>Manual Grids

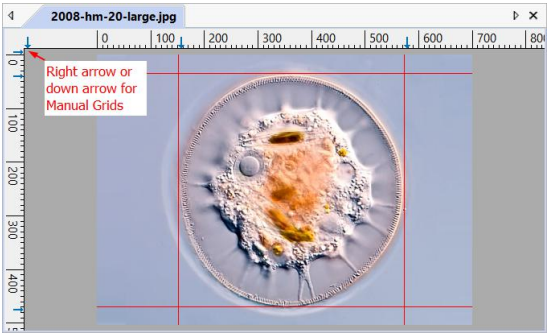
Choosing this command will display two small Right Arrow and Down Arrow overlaid on the top of the Vertical Ruler and on the left of the Horizontal Ruler as shown below:

Down Arrow: Move the mouse over the Down Arrow will show a horizontal drag icon. Drag the Down Arrow along the Horizontal Ruler to where ever you want. When it is dragging over the video/image, there will be a Vertical line appeared to let you judge where to release this line on the video/image. You can drag any lines to overlay them on the video/image.

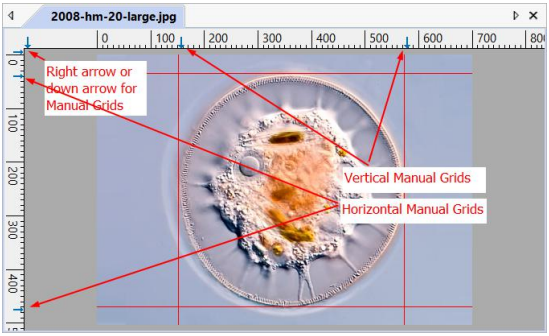
The overlaid lines can be adjusted by dragging the specific Down Arrow again on Horizontal Ruler.

Right Arrow: Move the mouse over the Right Arrow will show a vertical drag icon. Drag the Right Arrow along the Horizontal Ruler to where ever you want. When it is dragging over the video/image, there will be a Horizontal line appeared to let you

judge where to release this line on the video/image. You can drag any lines to overlay them on the video/image.



The overlaid lines can be adjusted by dragging the specific Right Arrow again on Vertical Ruler.



Choose the Grids>No Grid command to remove the Manual Grids overlaid on the video/image window. The menu will be checked.

Choose the Grids>Manual Grids command again (If it is unchecked) to display all the previous Manual Grids overlaid on the video/image window. The menu will be checked.

8.4.5 Grids>Remove All Grids

Remove (Delete) all of the Manual Grids or Auto Grids overlaid on the image/video window.

8.5 Best Fit Num *

Choose View>Best Fit command to automatically resize the video/image to fit in the

window.

Note: Choosing this command will enable View>Actual Size menu.

8.6 Actual Size Num /

Note: This option will be disabled if the image is currently viewed at 100%. At any other zoom ratio, View>Actual Size will be enabled.

Choose View>Actual Size command to set the active image to its Actual Size (e.g. 100%).

8.7 Full Screen ESC

Choosing the View>Full Screen command will display the video window in full screen style. Press the ESC button will restore the video window.

8.8 Track

Note: If the video/image size is smaller than the window size. The track operation will be disabled.

If the image's actual size is larger than the video/image window, check this command to position the video/image that does not fit entirely within in the video/image window. Its function is similar to the scroll bars. It is an alternative to using the arrows on the scroll bars for positioning the video/image within the window.

Checking the View>Track menu will change the cursor to and the button on the toolbar will be checked.

Then keep down the mouse button to drag the region of interest on the video/image to any location in the video/image window.

9 Browse

9.1 Sort

9.1.1 Sort>Sort by Names

This command is for the Browse window only.

Sort the image files in order of names in the Browse window.

9.1.2 Sort>Sort by Type

This command is for the Browse window only.

Sort the image files in order of file type in the Browse window.

9.1.3 Sort>Sort by Size

This command is for the Browse window only.

Sort the image files in order of file size in the Browse window.

9.1.4 Sort>Sort by Width

This command is for the Browse window only.

Sort the image files in order of image file width in the Browse window.

9.1.5 Sort>Sort by Height

This command is for the Browse window only.

Sort the image files in order of image file height in the Browse window.

9.1.6 Sort>Ascending 

This command is for the Browse window only.

Sort the image files in order of the Ascending mode (i.e. 1, 2, 3 and 4) in the Browse window.

9.1.7 Sort>Descending 

This command is for the Browse window only.

Sort the image files in order of the Descending mode (i.e. 4, 3, 2 and 1) in the Browse window.

The Sort settings are saved until they are changed. For example, if you sort images in the Browse window according to the Type, the images will remain sorted according to Type until the Sort settings are changed.

9.2 Icon

9.2.1 Icon>Large Icons 

This command is for the Browse window only.

The Thumbnail mode displays small preview images; you can select different view modes in the Browse window.

Choosing the Icons>Large Icons will display the image files in Large Icon mode in the Browse window.

9.2.2 Icon>Small Icons 

This command is for the Browse window only.

The Thumbnail mode displays small preview images; you can select different view modes in the Browse window.

Choosing the Icons>Small Icons will display the image files in Small Icon mode in the Browse window.

9.3 Refresh  F5

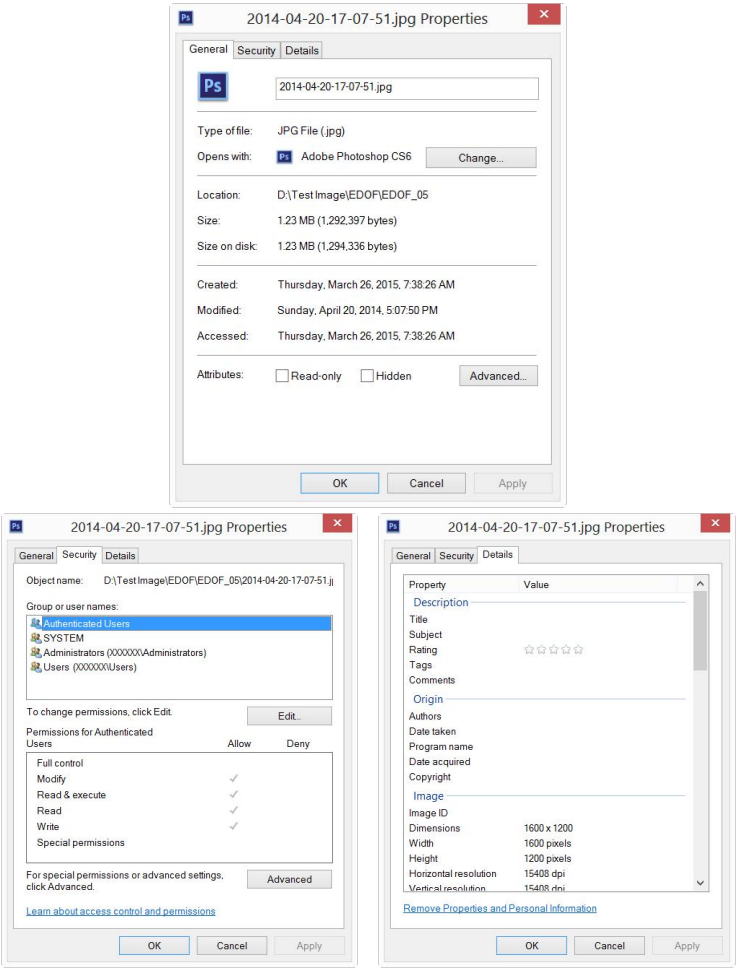
This command is for the Browse window only.

If the files under the Folders Sidebar's directory are altered outside of GXCAPTURE-T, after switch back to GXCAPTURE-T, one can Refresh the image files in the current directory to update the Thumbnails with Browse>Refresh command.

9.4 Properties●●● 

If an image file listed in the Browse window is highlighted. Choosing the Browse >Properties command or clicking the selected file in the Browse window with the right mouse button context menu Properties will bring up a Properties dialog as

shown below:



The file Properties dialog including 3 pages. They are General, Security and Details pages. These Property pages may depend on the operating system and we will not discuss it in this help manual.

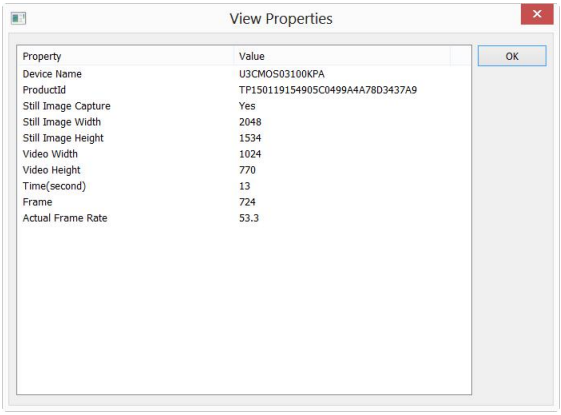
10 Setup

10.1 Start/Pause  Pause

If the video in video window is playing, one can choose the Setup>Start/Pause command to pause the video and choose the Setup>Start/Pause command again to start the video again.

10.2 View Properties••• Shift+V

The Setup>View Property••• will help you to understand the camera statistical properties. Choose the Setup>View Property••• command to invoke the View Property dialog as below:



The items in the dialog are described in the following table:

Device Name: Readable string to identify the name of the camera device;

ProductId: Unique ID to identify the camera device;

Still Image Capture: To identify whether or not the camera supports Still Image Capture. Still Image Capture is used for high resolution camera to capture an image with a different resolution from the video. This feature is mainly used to capture high resolution image under low resolution video to compromise between the frame speed and the image resolution;

Still Image Width: The to be captured image width;

Still Image Height: The to be captured image height;

Video Width: The actual video window video width;

Video Height: The actual video window video height;

Time (second): Seconds elapsed after the camera video has been started;

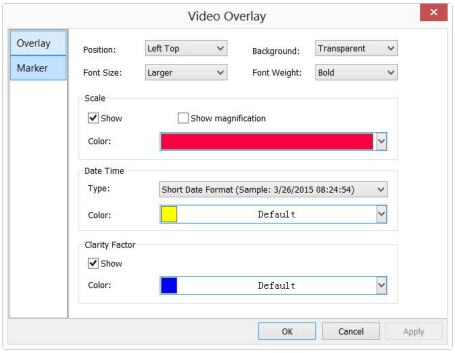
Frame: Frames acquired after the video has been started;

Actual Frame Rate: The camera frame rate of the video stream, which is the Frame by Time.

10.3 Video Overlay•••

10.3.1 Video Overlay>Overlay

Choose the Setup>Video Overlay••• command, this will invoke a Video Overlay dialog. Click the Overlay page on the Video Overlay dialog can set Scale, Magnification, Date Time and Clarity Factor to overlay on the video window.

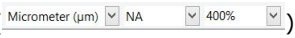


The Position, Background, Font Size, Font Weight of the Scale, Magnification and Date Time, and Clarity Factor can be defined together. Their Colors can be defined separately.

Clicking the OK button and the Scale, Magnification and Date Time, and Clarity Factor will be overlaid on the Video window.

The Clarity Factor can tell if the sample is in good focused state or not. The larger the Clarity Factor, the better the sample focused.

Note: To enable the Scale bar, the Magnification must be defined and chosen first in

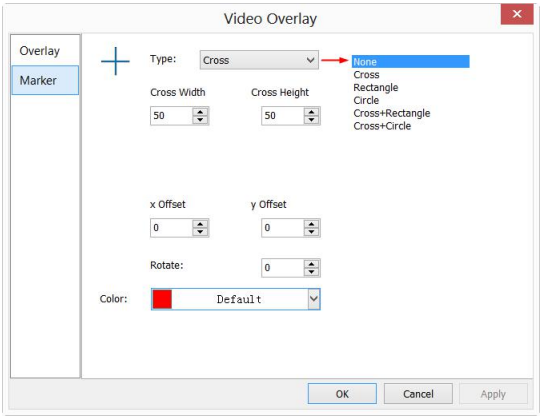
the Unit combo box on the toolbar. The Unit can be any unit except Pixel. There are two methods to set the Unit, they are: a) Choosing the Unit in the Unit dropdown combobox (

) on the toolbar which is just on the left of the Magnification dropdown list box; b) Choosing the Option>Measurement••• command, a dialog called Measurement will bring up, click the Length Unit page and check the Unit in the Current to set the Unit.

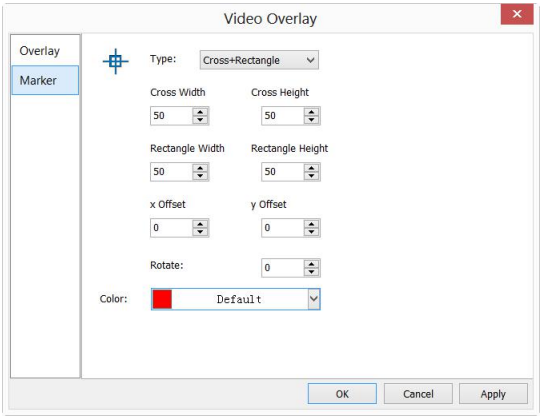
10.3.2 Video Overlay>Marker•••

Choose the Setup>Video Overlay••• command, this will invoke a Video Overlay dialog. Click the Marker page on the Video Overlay dialog to set the Marker on the video window.

The Video Marker type can be None, Cross, Rectangle, Circle, Cross+Rectangle, or Cross+Circle. The Video Marker page is shown as below:

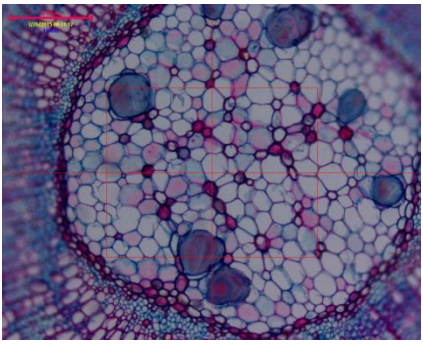


Choosing "Cross+Retangle" in the Type combobox and Video Overlay: Marker dialog will change to the following style:



Edit the Cross Width and Cross Height, Rectangle Width and Rectangle Height, x Offset and y Offset, in their specific fields. Click Color to define the Video Marker color.

Click OK to end the Video Marker setup page and a Cross+Rectangle Marker will be overlaid on the video window as shown below:



Click Cancel to cancel the Video>Overlay: Marker setup and return to the application area, or Apply to overlay the Marker on the video window and keep the Video Overlay dialog there for further setup.

10.4 Video Watermark●●●

Fig.1 shows a micro ruler. The dark lines can be extracted as Video Watermark and overlaid on the video window. The steps are as follows:

1. Choose the Capture>Capture Image command or click 

to capture the micro ruler image as shown in Fig.1;

2. Choose the Process>Binary••• command to binarize the image as shown in Fig.2;

3. Choose the Image>Adjust>Invert command to invert the image and choose the Image>Color Quantize••• command to convert the image to 24 bits as shown in Fig.3. Choose the File>Save As••• command to save the image in 24 bit BMP format;

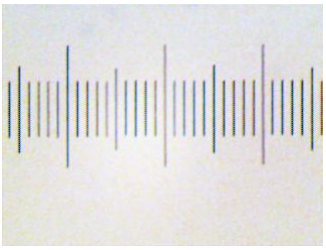


Fig.1 Captured Micro Ruler

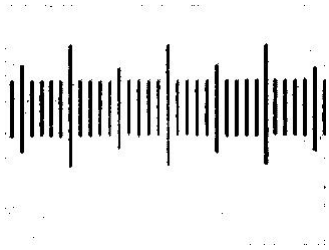


Fig.2 Micro ruler after being binarized

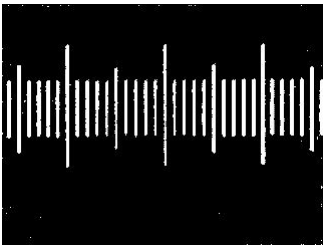


Fig.3 Inverted 24 bits image

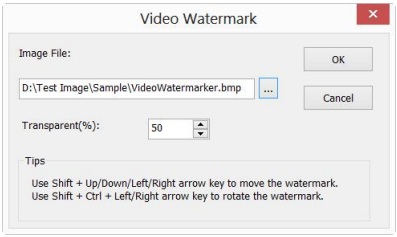


Fig.4 Video Watermark setup dialog

4. Choosing the Setup>Video Watermark••• command and a dialog called Video Watermark is brought up as shown in Fig.4. Click the  button to locate the image saved in step 3. Use the defaults Transparent (%)(50). If everything is ok, click OK button. The final Video Watermark is overlaid on the video window as shown in Fig.5.

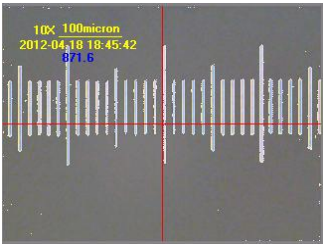


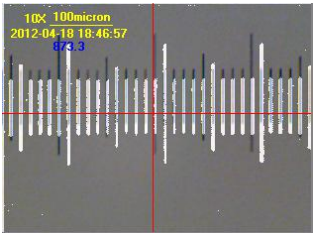
Fig.5 Video Window with Video Watermark overlaid

10.5 Move Watermark

10.5.1 Move to•••

If there is Watermark overlaid on the video window, this menu will be enabled.

Choosing the Setup>Move Watermark••• command will bring up a Move dialog. Where one can enter the X: and Y: offset value in their fields for the desired pixel move distances. The default X and Y offsets are 0;



10.5.2 Move to zero

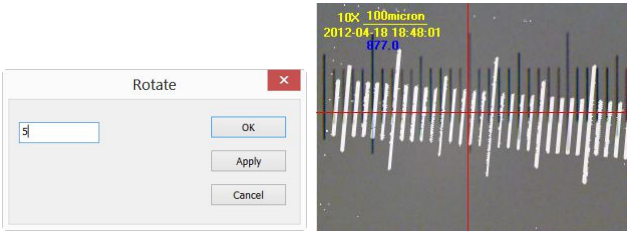
If the Watermark on the video window was moved, this menu will be enabled. Choosing this menu will move the Video Watermark to its original coordinates (0, 0).

10.6 Rotate Watermark

10.6.1 Rotate to•••

If there is Watermark overlaid on the video window, this menu will be enabled.

Choosing the Setup>Rotate Watermark>Rotate to••• command will bring up a Rotate dialog, where one can define an Angle to Rotate the Video Watermark a specified angle around the video center (0, 0) (default value).



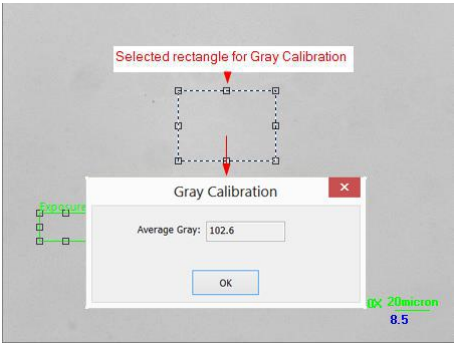
10.6.2 Rotate to zero

If the Video Watermark was rotated, the Rotate to zero menu will be enabled. Choosing this menu will rotate the Video Watermark to zero degree.

10.7 Gray Calibration•••

This function can make the image brightness to a desired value among various scenarios in a specified area, achieving the continuity requirement of the observation. The Gray Calibration steps are summarized as follows:

1. Click the Exposure & Gain group name on the Camera Sidebar to expand the Exposure & Gain group, uncheck the Auto Exposure box (If it is checked).



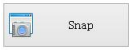
2. Choose the Edit>Image Select command or click the Image Select button  on the toolbar to select a reference region, and choose the Setup>Gray Calibration••• command. A dialog called Gray Calibration will be brought up to display the current ROI Average Gray. Now the brightness of the microscope can be adjusted until the Average Gray reaches to the desired value. Click "OK" to finish the calibration and return to the application area. The current gray value here is around is 102.

11 Capture

11.1 Capture Image F8

During the video preview, you can always choose the Capture>Image Capture command to capture the video image.

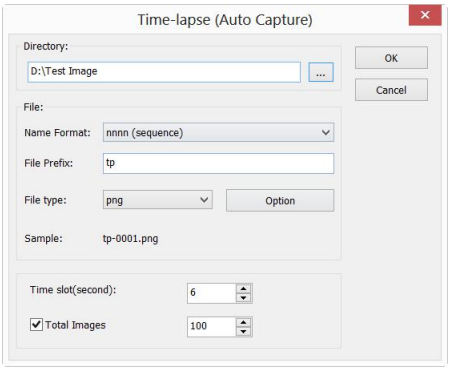
After the image is captured, the captured image will become the current active window. The Capture>Capture Image menu will be disabled. If you wish to capture image again, click the video window title to activate the video window and the Capture>Capture Image menu will be enabled again.

Note: a) The "Snap" button 

on the Camera Sidebar can continuously snap the image even if the video window is not activated. User can click this button on the Camera Sidebar to capture image in quick style; b) Only when the video window is active, the Capture>Capture Image menu will be enabled; c) If the Live and Snap resolutions are different,GXCAPTURE-T need to switch the resolution from Live to Snap resolution in the backstage to capture an image with Snap resolution. After the Snap is finished, GXCAPTURE-T will switch back to the Live resolution to continus the video stream process. This will take more time to capture a still image.

11.2 Start Time-lapse (Auto Capture)•••

Choosing the "Capture>Start Time-lapse (Auto Capture)•••" command will bring up Time-lapse (Auto Capture) dialog shown below:



This function can capture a sequence of pictures with the specified time interval; you can precisely set the time interval (2 to 3600 seconds) and the total number of images(1 to 9999).

Directory: The file Directory can be select by clicking on the Browse button;

File: The File name including Name Format, File Prefix, File type. It can be a combination of File Prefix, Name Format and File Type and is shown in the Sample;

Time Slot(Second): Time slot(Second,2-3600S) is a time segment to capture an image;

Total Images: Checking Total Images will enable its edit box. You can enter the Total Images (1-9999) to be captured. GXCAPTURE-T will stop the Time-lapse capture process automatically when the Total Images are reached;

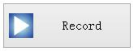
If Total Images is unchecked, GXCAPTURE-T will capture the images continuously until user choose the Capture>Stop Time-lapse (Auto capture) command again to stop the Time-lapse capture.

Click OK to begin the Time-lapse capture, or Cancel to cancel the Start Time-lapse(Auto Capture)••• command.

After the Time-lapse capture is started, the Capture>Start Time-lapse (Auto Capture)••• menu will be changed to the Capture>Stop Time-lapse (Auto capture) menu. Choosing this command will stop the Time-lapse capture.

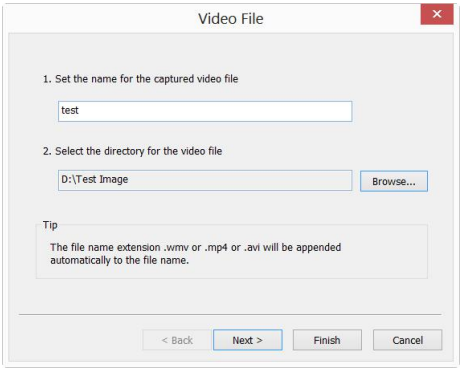
There are a variety of image format available (they are bmp, jpg, png and tif) to save the captured image. For example, when choosing jpg format, you can set the parameters of "Option" to adjust its compression quality or encoding method. Please check the File>Save As••• menu for these details.

11.3 Start Record••• F9

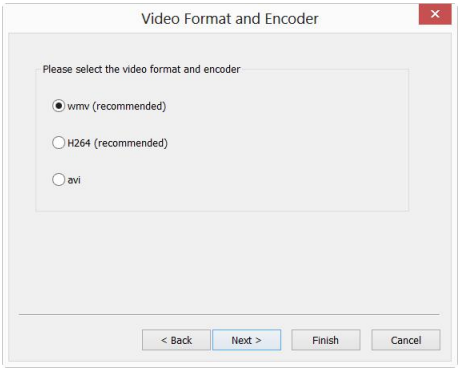
1. You can a) choose the Capture>Start Record••• command; b) click "Record" button 

on the Camera Sidebar ; c) use the shortcut key "F9" to start recording movies. The will bring up a Video File dialog as below; Enter the video file name under 1.Set the name for the captured video file field and click the Browse•••

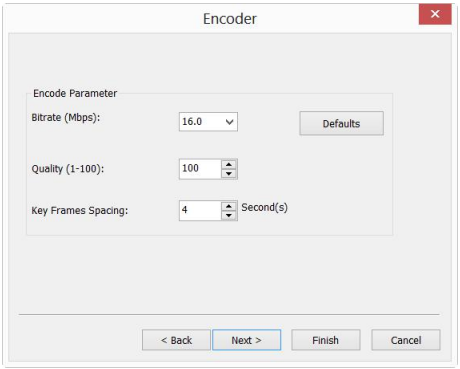
button under 2 Select the directory for the video file item to locate the video file directory. Click Next to the next step;



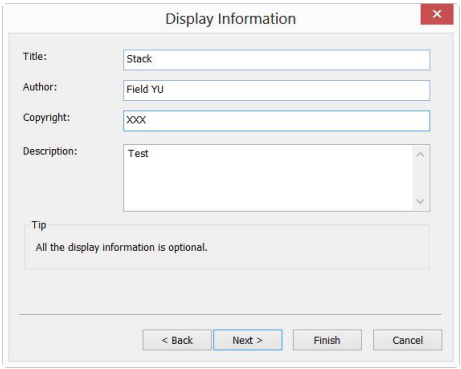
2. Clicking Next on the Video File dialog will display the Video Format and Encoder dialog. The video format can be wmv/asf(recommended) H264(recommended) or avi; Click Back to return to the Video File dialog, or Next to the next step;



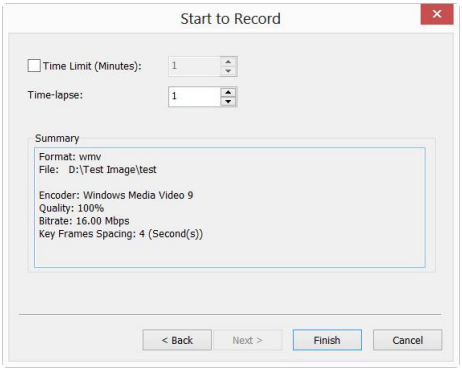
3. An Encoder dialog will be brought up. Here you can select the Encoder format, set the Bitrat(Kbps)(256-16384), Quality (1-100) and Key Frames Spacing (1-30). Click Back to return to the Video Format dialog, or Next to the next step;



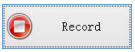
4. A dialog called Display Information will be brought up. Here you can enter Title, Author, Copyright and Description into their fields. Click Back to return to the Encoder dialog, or Next to the next step;



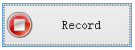
4. A dialog called Start to Record will be brought up. Here you can check Time Limit (Minutes 1-1440) and enter recording time (If checked); Input Time-lapse(1-100). There is a Summary text to display what you have been defined. Click Back to return to the Encoder dialog, or Finish to end the setup;



5. After the Video capture is started. The 

button on the Camera Sidebar will become 

. Clicking 

will stop the capture process, otherwise ,it will stop untill the Time Limit is reached. After the Video capture process is finished. The 

on the Camera Sidebar will become 

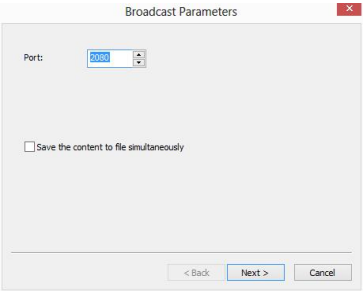
for the future Record process;

6. You can choose the File>Open Video••• command to display the captured video file in the video window;

11.4 Start Broadcast•••

Start a network broadcasting service. Select the Port and Encoder before start the service. After that, GXCAPTURE-T will start broadcasting the video that is opened by GXCAPTURE-T locally via the specified Port and Encoder. The other users could share the video by open broadcasting function.

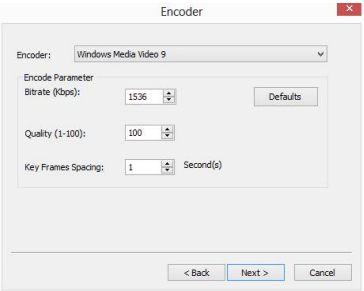
Choosing Capture>Start Broadcast••• will invoke a Broadcast Parameters dialog as below:



Port：Set the Port and;

Save the content to file simultaneously: Check or uncheck Save the content to file simultaneously;

Next>：Clicking the Next> button will invoke a Encoder dialog as shown below:

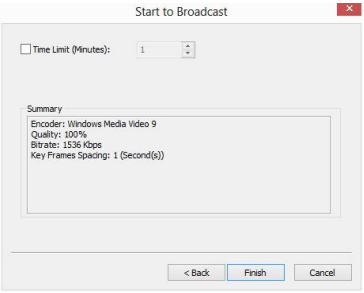


This dialog is used for the setup of video Encoder parameters for broadcasting. This setup dialog is just the same as those of Capture>Start Record••• setup dialog. It mainly including Encoder, Encode Parameter such as Bitrate, Quality(1-100), Key Frame Spacing in second et al.

Next>: Clicking the Next> button again will invoke the Start to Broadcast dialog. Here, one can set the broadcast Time Limit in minutes. The Encoder parameters are also listed in the Summary window for reference;

<Back: Clicking <Back will return to Broadcast Parameters dialog;

Cancel: Clicking will end the Start Broadcast••• command and return to the video window.



<Back: Clicking <Back will return to Encoder dialog;

Cancel: Clicking will end the Start Broadcast••• command and return to the video window;

Finish: Clicking the Finish button will start the broadcasting process and it will end up the process when it reaches to the Time Limit;

See File>Open Broadcast••• to understand the Start Broadcast function.

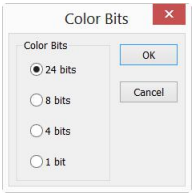
12 Image

12.1 Mode

12.1.1 Color Quantize•••

The Color Quantize••• command is widely used to change the image bit. GXCAPTURE-T supports the mutual changes among 24 bit, 8 bit, 4bit or 1 bit images.

When the Colour Bits dialog is opened, the default checked color bits is the current image's color bit. Check the desired bit and click OK to end the command. The image will converted to the selected color bits in the image window.

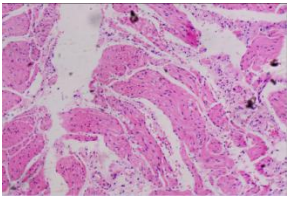


12.1.2 Gray Scale

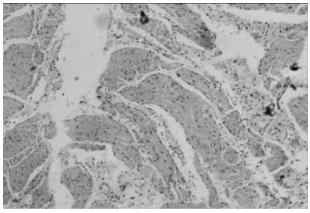
Choose the Gray Scale command to convert a color image (true color image or index color image) to a gray scale image. If the original image is 24 bit, the new image is 8 bit. Otherwise the bits of the image will not be modified.

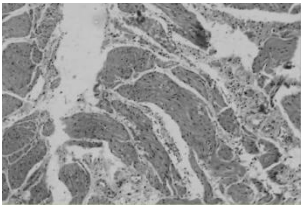
12.1.3 Contrast Preserving Decolorization

Choose the Image>mode>Contrast Preserving Decolorization command can convert the color image into gray image with contrast preserved. The following pictures (a) is the original microscopic image, (b) is the gray image produced by traditional method, (c) is the gray image produced by Contrast Preserving Decolorization.



(a) Original microscopic image



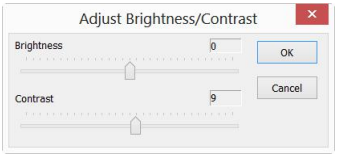


(b) Traditional method (c) Contrast Preserving Decolorization

12.2 Adjust

12.2.1 Brightness/Contrast•••

The Image>Adjustment>Brightness/Contrast••• command offers simple adjustments to the tonal range of an image. This command makes the same adjustment to every pixel in the image. The Brightness/Contrast command does not work with individual channels and is not recommended for high-end output because it can result in the loss of details about the image.



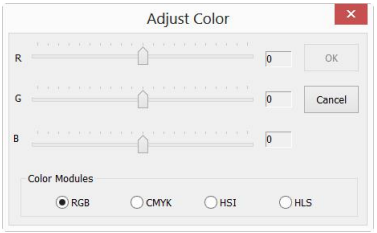
Brightness: Dragging the slider bar to the left decreases the level and dragging it to the right increases the level. The numbers on the right of the slider bar displays the Brightness value. Values can range from -100 to +100. Default is 0;

Contrast: Dragging the slider bar to the left decreases the level and dragging it to the right increases the level. The numbers on the right of the slider bar displays the Contrast value. Values can range from -100 to +100. Default is 0;

12.2.2 Color•••

Choose the Image>Adjustment>Color••• command to modify the overall mixture of the colors in an image.

There are four color modules: RGB, CMYK, HIS and HLS.



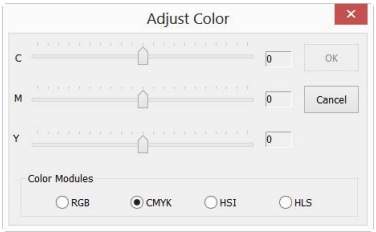
RGB: GXCAPTURE-T uses the RGB model. It assigns an intensity value to each pixel ranging from 0 (black) to 255 (white) for each of the RGB components in a color image.

For example, a bright red color might have an R value of 246, a G value of 20, and a

B value of 50. When the values of all three components are equal, the result is a shade of neutral gray. When the value of all components is 255, the result is pure white; when the value is 0, pure black.

RGB images use 3 channels to reproduce up to 16.7 million colors on-screen. In addition to being the default mode for new GXCAPTURE-T images, the RGB mode is used by computer monitors to display colors. This means that when working in color modes other than RGB, such as CMYK, GXCAPTURE-T uses RGB mode for display on-screen.
Although RGB is a standard color mode, the exact range of colors represented can vary, depending on the application or display device.

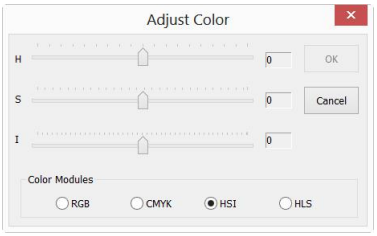
CMYK: The CMYK mode is based on the light-absorbing quality of ink printed on papers. As white light strikes translucent inks, certain visible wavelengths are absorbed while others are reflected back to the eyes.



In theory, pure cyan (C), magenta (M), and yellow (Y) pigments should combine to absorb all light and produce black. For this reason these colors are called subtractive colors. Because all printing inks contain some impurities, these three inks actually produce a muddy brown and must be combined with black (K) ink to produce a true black. (K is used instead of B to avoid confusion with blue.) Combining these inks to reproduce color is called four-color process printing.

The subtractive (CMY) and additive (RGB) colors are complementary colors. Each pair of subtractive colors creates an additive color, and vice versa.

HSI: Based on the human perception of color, the HSI model describes 3 fundamental characteristics of colors:

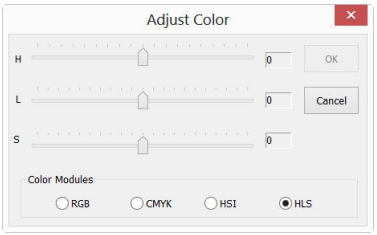


Hue is the color reflected from or transmitted through an object. It is measured as a location on the standard color wheel, expressed as a degree between 0° and 360°. In common use, Hue is identified by the name of the color such as red, orange, or green.

Saturation, sometimes called chroma, is the strength or purity of the color. Saturation represents the amount of gray in proportion to the hue, measured as a percentage from 0% (gray) to 100% (fully saturated). On the standard color wheel, Saturation increases from the center to the edge.

Intensity is the relative lightness or darkness of the color, usually measured as a percentage from 0% (black) to 100% (white).

HLS: The HLS model is very similar to the HLS color model. The main difference between them is the calculation used to produce the brightness value. In the HLS model, a pixel's brightness (L) is derived from its three (R, G and B) color values. In the HLS model, a pixel's brightness (L) is determined by the minimum and maximum values of its three color values.



The values beside the slider bar show the color changes in various color channels.

For RGB channel values, they are range from -100 to +100. Default is 0;

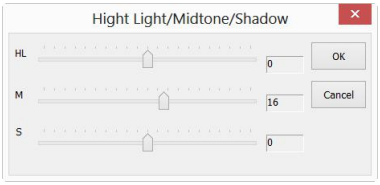
For CMYK channel values, they are range from -100 to +100. Default is 0;

For HSI channel values, the H value can range from -180 to 180, the S value is range from -275 to 275, and the I value is range from -442 to 442.Default is 0;

For HLS channel values, the H value is range from -180 to 180, the L value is range from -100 to 100, and the S value is range from -100 to 100. Default is 0;

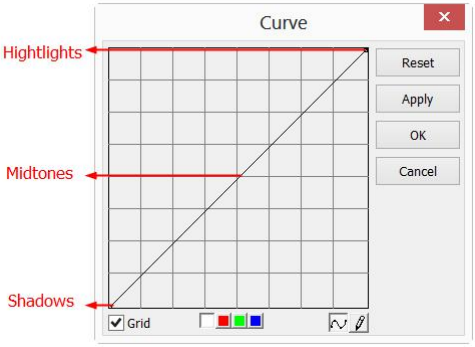
12.2.3 HMS•••

Choose the Image>Adjustment>HMS••• command to adjust the HL (Highlight), M (Midtone), and S(Shadow) parts of the image. Each part's value ranges from -100 to 100. This command is only available for 24 bits true color image.



12.2.4 Curve•••

Choose the Image>Adjust>Curve••• command to adjust the entire tonal range of an image. But instead of making adjustments using only three variables (Highlight, Midtone, Shadow), one can adjust any point on the curve along a 0-255 scale while keeping up to any other values constant. One can also use Curve to make precise adjustments for individual color channels on an image. The Curve dialog is shown below:



Horizontal Axis: The horizontal axis of the graph represents the original intensity values of the pixels (Input levels).

Vertical Axis: The vertical axis represents the new color values (Output levels). In the default diagonal line, all of the pixels have identical Input and Output values.

Curve area: Area (specified with the blue rectangle) to setup a map between input and output;

a) When you open the Curve dialog you see, perhaps surprisingly, not a curve but a straight line. As a default, the input values are the same as the output, so there's no change;

b) By clicking in the center of the line and dragging upwards, we make our first curve. Raising the curve increases the overall brightness of the scene.

c) Conversely, clicking in the center and dragging downwards lowers the brightness, producing an image that's darker overall;

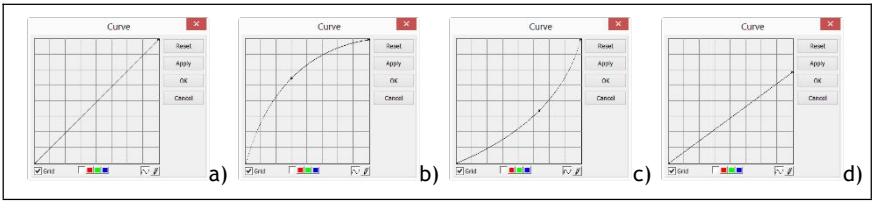
d) As well as clicking in the center, we can also adjust the endpoints. Clicking the top right point and dragging down limits the brightest part of the image, reducing contrast.

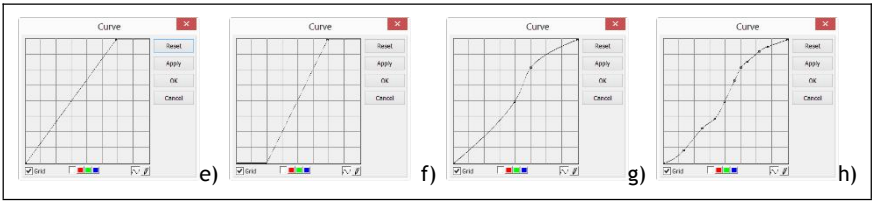
e) If we drag that top right point to the left rather than down, we produce the opposite effect—increasing the contrast of the image. This is a very useful and controllable quick fix;

f) By dragging the top and bottom points towards the center, we create a stylized, posterized effect that turns any photograph into more of a graphic object.

g) Click once in the center of the RGB curve to "pin" that midpoint; now drag just the top half of the curve to make this S shape, and the result is to increase the overall contrast.

h) You can add up to any control points to the curve, locking those values. To remove a control point, 1)drag it off the graph or 2)click the right mouse button on that point. You cannot delete the endpoints of the curve.





Grid: Check to overlay the grid on the Curve window;

Channel  : To adjust the color balance of the image, check the channel(R, G or B) from the Channel button. Check the white button to select RGB channels at the same time, which is located on the left of the R (Red), G (Green) and B (Blue) buttons;

Curve  : Click the Curve with your left mouse button, a spline curve (straight line) will setup the initial input-output relation. Click on the Curve will mark the Curve with a point. The point number can be any as long as it can be inserted on the Curve. Drag the marked point until the image looks satisfactory. The point can be deleted by move the mouse on it and click the right mouse button on it.

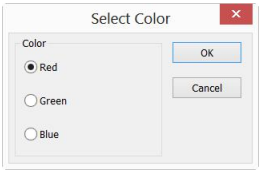
Pencil  : Check the pencil button at the bottom of the dialog, and use your left mouse button to draw a new arbitrary Curve in the Curve area.

Reset: Click the Reset button will reset the Curve to the initial straight line.

Apply: Apply current Curve map on the image.

12.2.5 Filter Color•••

Choose the Image>Adjustment>Filter Color command to filter a special color channel from a color image. Check either Red, or Green, or Blue color to filter. For every pixel, if check Red color to filter, only information about the red channel will be discarded, and Green and Blue information will remain there.

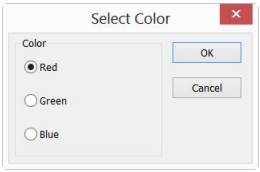


See Image>Extract Color••• for another color operation.

12.2.6 Extract Color•••

Choose the Image>Adjustment>Extract Color••• command to extract a special color channel from a color image. Check either Red or Green, or Blue color to extract.

For every pixel, if selecting Red color to extract, only information about the red channel will be kept, and Green and Blue information will be discarded.



See Image>Filter Color••• for another color operation.

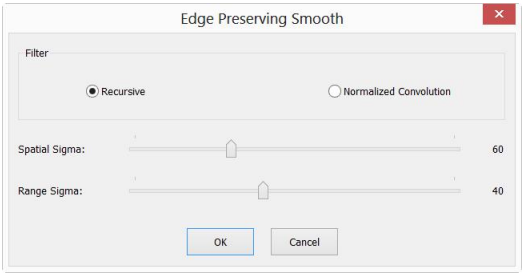
12.2.7 Invert

Choose the Image>Adjustment>Invert command to reverse the pixel values of the active image without going through the lookup table.

12.2.8 Edge Preserving Smooth•••

Edge Preserving Smooth is an image processing technique that smooth away textures whilst retaining sharp edges. Examples are the Bilateral filter, the Guided filter and Anisotropic diffusion.

Choose the Image>Adjust>Edge Preserving Smooth••• command can smooth the entire image and preserve the edge of image, as shown below:



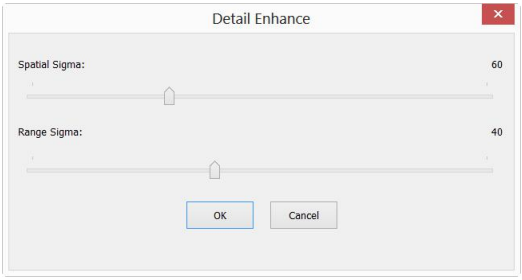
Edge Preserving Smooth function provide two kinds of filter including Recursive and Normalized Convolution filter, and the default filter is Recursive.

GXCAPTURE-T use Spatial Sigma and Range Sigma to define the filter kernel size.

The bigger the two parameters, the stronger the image smoothed, vice versa.

12.2.9 Detail Enhance•••

Choose the Image>Adjust>Detail Enhance••• command can enhance the detail in the image, as shown below:



GXCAPTURE-T choose Spatial Sigma and Range Sigma to define the kernal size of detail enhance algorithm. The bigger the 2 parameters, the stronger the enhanced image and vice versa.

The following picture is the detail enhanced image for reference with default parameter.

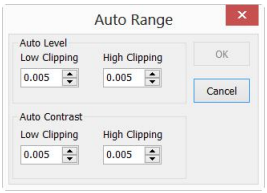
a)Original image and b)Enhanced image

12.2.10 Auto Level

The Image>Adjustment>Auto Level command moves the level's sliders automatically to set highlight and shadow. It defines the lightest and darkest pixels in each color channel as white and black and then redistributes the pixels' color values proportionately. Since Auto Level adjusts each color channel individually, it may remove or introduce color casts. The Auto Level command moves the level's

sliders automatically to set highlight and shadow. It defines the lightest and darkest pixels in each color channel as white and black and then redistributes the pixels' color values proportionately. Since Auto Level adjusts each color channel individually, it may remove or introduce color casts.

By default, this feature clips the white and black pixels by 0.5%--that is, it ignores 0.5% of the lightest pixels and 0.5% of the darkest pixels when identifying the lightest and darkest pixels on the image. Choose the Options>Auto Correction••• command to modify this default setting. This ensures that white and black values are representative without being determined by extreme pixel values. The Auto> Correction••• dialog is shown below:



The Image>Adjustment>Auto Level command gives good results when an image with an average distribution of pixel values needs a simple contrast adjustment or when an image has an overall color cast. However, adjusting the Curves manually is more precise.

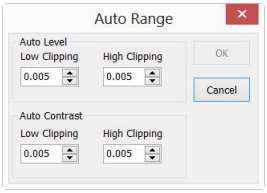
See Image>Adjustment>Auto Contrast for another auto adjust command.

12.2.11 Auto Contrast

The Image>Adjustment>Auto Contrast command automatically adjusts the overall contrast and mixture of colors in an RGB image. Since it does not adjust channels individually, Auto Contrast does not introduce or remove color casts. It maps the lightest and darkest pixels in the image to white and black, which makes highlights appear lighter and shadows appear darker.

When identifying the lightest and darkest pixels on an image, Auto Contrast clips the white and black pixels by 0.5%--that is, it ignores the first 0.5% of either extreme.

Choose the Options>Auto Correction••• menu to modify this default setting. This ensures that white and black values are representative without being determined by extreme pixel values. The Auto Correction••• dialog is shown below:



The Auto Contrast command can improve the appearance of many photographic or continuous-tone images. It does not improve flat-color images.

See Image>Adjustment>Auto Level for another auto operation.

12.3 Rotate

Choose the Image>Rotate command to rotate the entire image. One has the following submenus:

12.3.1 90(CW)

Rotate the image clockwise by a quarter-turn.

12.3.2 180(CW)

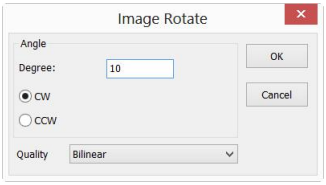
Rotate the image clockwise by 180 degrees.

12.3.3 270(CW)

Rotate the image clockwise by 270 degrees.

12.3.4 Arbitrary•••

Rotate the image by a specified angle. If choosing this option, enter an angle between 0 and 360 degrees in the angle text box, and check CW or CCW to rotate clockwise or counterclockwise. For the Arbitrary••• operation, it will invoke an Image Rotate dialog like below:



Degree: The degree that the image to be rotated.

CW: Rotates the image clockwise.

CCW: Rotates the image counterclockwise.

Quality: One can select one of the three methods for the image rotation among Nearest Neighbor, Bilinear, and Bicubic. The default is Bilinear.

12.3.5 Flip Horizontal 

Reverses the image in the application area so that the top right corner of the original image is now the top left, and the top left corner of the original image is now the top right corner.

12.3.6 Flip Vertical 

Reverses the image in the application area so that the top right corner of the original image is now the bottom right corner, and the top left corner of the original image is now the bottom left corner.

12.4 Crop  Shift+C

Choose the Image>Crop command to remove the portions of an image that does not want so that the focus is on the part of the image that is left. This document instructs users on how to Crop an image in GXCAPTURE-T.

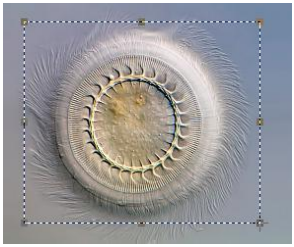
1. Choose the Open Image••• command to open an image to Crop;

2. Choose the Edit> Image Select command or click the Image Select button  on the Toolbar, the cursor will change to a small cross.

3. Move the cursor over the image to the desired location, click the mouse button and hold it down to mark the first position.

4. Drag the mouse over the part of the image to be kept, a dotted rectangle appears around the selection and release the left mouse button.

5. Optional 1: To move the rectangle: a) Move the mouse over the selected area and when it becomes a move cursor, click and hold the left mouse button;b) Drag the selected area to the desired position.



6. Optional 2: To change the size of the rectangle: a) Put the mouse cursor on one of the handles that appear on the edges of the selected area; b) Click and hold the mouse button; c) Drag the box to the desired size.

Note: Each of the handles that appear on the edges of the box sizes the box differently.

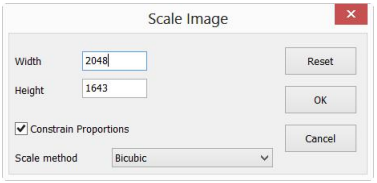
7. To Crop the image, choose the Image>Crop command or press Shift+C buttons.

Note: If the selected area is on the video, choosing the Image>Crop command will capture the selected area and display it on a new image window.

12.5 Image Scale•••

Choose the Image>Image Scale••• command to change the image to a specified size. This process actually changes spatial resolution by adding (replicating) or removing (decimating) pixels to achieve the specified dimensions.

Width and Height: When choosing the Image Scale command; the dialog displays the dimensions of the original image in pixels. The Width and the Height can be set on the new image by adding or removing pixels. If Constrain Proportions is checked, the Width and Height will stay proportionate to each other. If Constrain Proportions is unchecked, the Width and the Height can set independently, but this will distort the image.



Reset: Reset the image Width and Height to the original ones.

Constrain Proportions: To maintain the current proportions of pixel Width and Height, check Constrain Proportions. This option automatically updates the Width as the Height is modified, and vice versa. Otherwise, uncheck the Constrain Proportions button.

Scale method: There are 3 options for the Scale method. They are: Nearest Neighbor, Bilinear, and Bicubic. The default is Bilinear.

12.6 Histogram•••  Shift+H

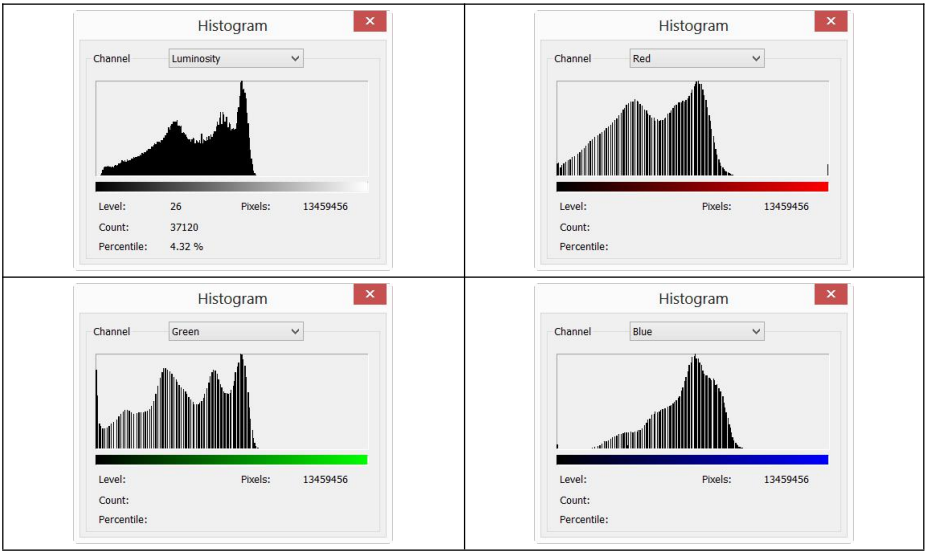
A Histogram illustrates how pixels in an image are distributed by graphing the number of pixels at each color intensity level. The Histogram shows whether the image contains enough detail in the Shadows (shown in the left part of the Histogram), Midtones (shown in the middle), and Highlights (shown in the right part) in order to make a good correction.

The Histogram also gives a quick picture of the tonal range of the image, or the image key type. A low-key image has detail concentrated in the shadows, a high-key image has detail concentrated in the highlights, and an average-key image has detail concentrated in the Midtones. An image with a full tonal range has a number of pixels in all areas. Identifying the tonal range helps determine the appropriate tonal corrections.

Choose the Image>Histogram••• command to open the Histogram dialog as shown below.

Depending on the image's color mode, choose R, G and B, or Luminosity to view a composite Histogram of all the channels.

If the image is RGB true color, choose Luminosity to display a Histogram representing the luminance or intensity values of the composite channel.



If the image is RGB true color, choose R, G and B to display a composite Histogram of the individual color channels in color.

Do one of the following:

To view information about a specific pixel value, place the mouse pointer in the Histogram.

To view information about a range of values, click down the left mouse button and drag it in the Histogram to highlight the range.

The dialog displays the following statistical information below the Histogram:

Pixels: Represents the total number of pixels used to calculate the Histogram.

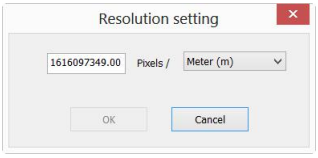
Level: Displays the intensity level of the area underneath the pointer.

Count: Shows the total number of pixels corresponding to the intensity level underneath the pointer.

Percentile: Displays the cumulative number of pixels at or below the level underneath the pointer. This value is expressed as a percentage of all of the pixels in the image, from 0% at the far left to 100% at the far right.

12.7 Resolution•••

Choose the Image>Resolution••• command to set the image Resolution to calibrate the spatial scale. By default, GXCAPTURE-T expresses spatial measurements in terms of pixels. This Resolution command is used to change the terms in which GXCAPTURE-T reports such measurements. This command should be run first in order to measure objects in terms of units other than pixels.



X: Horizontal PPM (Pixels per meter) of current Resolution.

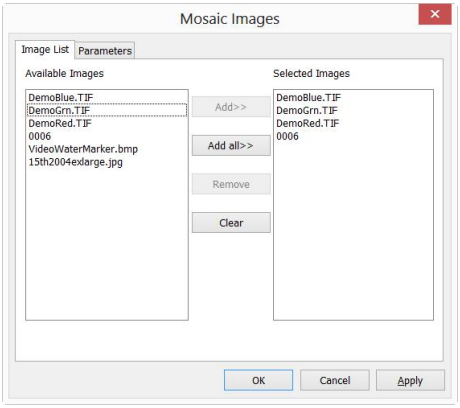
Y: Vertical PPM (Pixels per meter) of current Resolution.

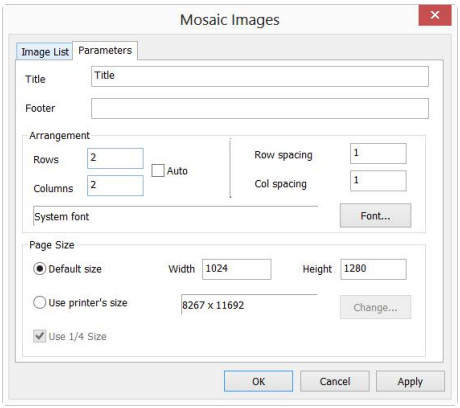
Note: The resolution in the Y direction need not to be filled. GXCAPTURE-T will always let it equal to the X direction.

After the new Resolution is set, all of the measurements will be calculated according to the new Resolution. (See more in the Measurements and Options>Measurement••• menu).

12.8 Mosaic•••

Mosaic is a process that can combine the images opened into a new image. This will open the following dialog:





ImgList page

Available Images: Images opened with GXCAPTURE-T.

Add>>: Add the opened images to the Selected Images list view

Add All>> Add all the opened images to the Selected Images list view

Remove: Select the images and remove them from the Selected Images list view.

Clear: Remove all the images from the Selected Images list view.

Property page

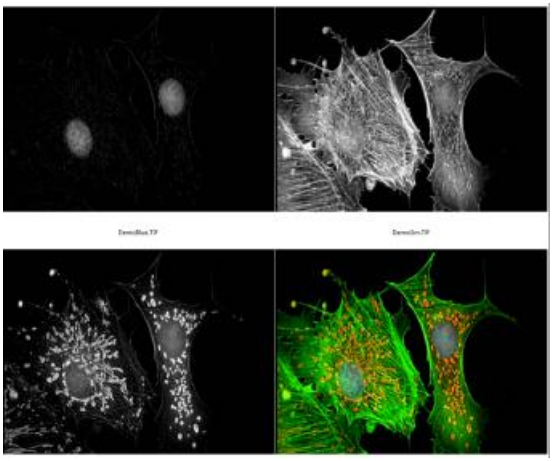
Title: The title wanted

Footer: The footer wanted

Arrangement: The Mosaic Images distribution on the page

PageSize: The page size for the Mosaic Images

If everything is set, click OK to end the Mosaic Images operations and a new image window will be displayed and the final results should be:



13 Process

13.1 Stitch••• Shift+T

Image stitching or photo stitching is the process of combining multiple photographic images with overlapping fields of view to produce a segmented panorama or high-resolution image. Commonly performed through the use of computer software, most approaches to image stitching require nearly exact overlaps between images and identical exposures to produce seamless results. Some digital cameras can stitch their photos internally. Image stitching is widely used in today's world in applications such as "Image Stabilization" feature in camcorders which use frame-rate image alignment, high resolution photo mosaics in digital maps and satellite photos, medical imaging, multiple image super-resolution, video stitching and object insertion.

GXCAPTURE-T also integrated this function into it. It includes Video Stitch, Image Stitch and Browse Window Stitch.

13.1.1 Video Stitch

When the video window is active, choosing the Process>Stitch••• command will invoke the video Stitch dialog as below:

Capture Images

Snap: Click to capture image from camera. One should try to move the slide to a prop position to capture the desired images. In the moving process, the next image should have some overlaid area with the previous left or up image to ensure the success of

the stitching process.

Reset: When an image or images is or are captured, the Reset button will be enabled, click Reset will remove it or them from the memory；It will be disabled when there is no captured image;

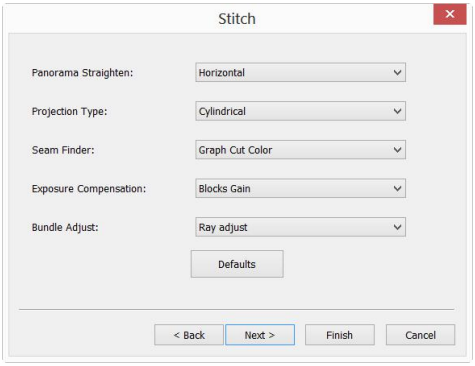
Snap: The captured images from the camera;

Cancel: Click to cancel the stitching process;

Next>: Click Next> will step to the next step;

Finish: Click Finish will accept the other Default setup and begin to stitch the captured images according to the above setup.

Stitching Method



Panorama Straighten: The image stitching direction. It can be Horizontal, Vertical and None. Default is Horizontal;

Projection Type: For image segments that have been taken from the same point in space, stitched images can be arranged using one of various map projections. GXCAPTURE-T including Plane, Cylindrical, Spherical, Fisheye, Stereographic, Mercator or Transverse Mercator map projections. The Default is Cylindrical;

Seam Finder: Seam Finder method, GXCAPTURE-T including None, Voronoi Diagram, Graph Cut Color or Graph Cut Color Grad. Default is Graph Cut Color;

Exposure Compensation: Exposure Compensation is required between images to

minimize exposure differences. GXCAPTURE-T including None, Gain or Blocks Gain Exposure Compensation method. Default is Blocks Gain;

Bundle Adjust: Bundle Adjustment can be defined as the problem of simultaneously refining the 3D coordinates describing the scene geometry as well as the parameters of the relative motion and the optical characteristics of the camera(s) employed to acquire the images, according to an optimality criterion involving the corresponding image projections of all points. GXCAPTURE-T including Ray adjust or Reprojection error adjust method. Default is Ray adjust;

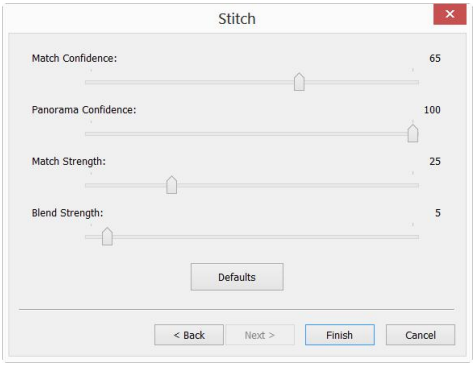
<Back: Click <Back will return to the previous setup page;

Next>: Click Next> will step to the next step;

Finish: Click Finish will accept the other Default setup and begin to stitch images according to the above setup;

Cancel: Click to cancel the stitching process;

Stitching Parameter



Match Confidence: 1~100, Default is 65;

Panorama Confidence: 1~100, Default is 100;

Match Strength: 0~100, Default is 25;

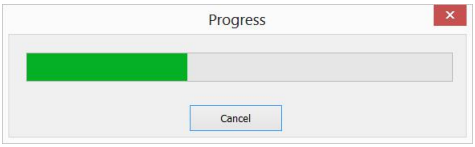
Blend Strength: 0~100, Defaults is 5;

Defaults: Click Defaults will set all the parameters to the Default ones.

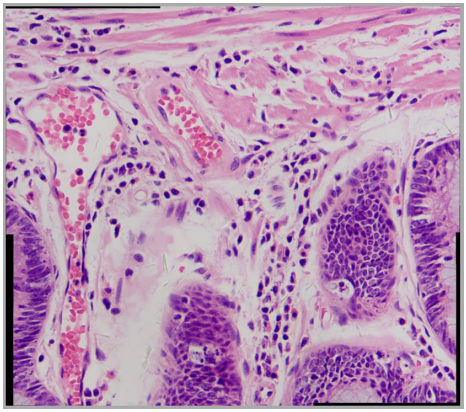
<Back: Click <Back will return to the previous step;

Finish: Click Finish will begin to stitch images according to the above setup. After the Finish button is clicked, GXCAPTURE-T will start to stitch and a progress dialog will be shown to indicate the progress of the process.

Cancel: Click to cancel the stitching process;



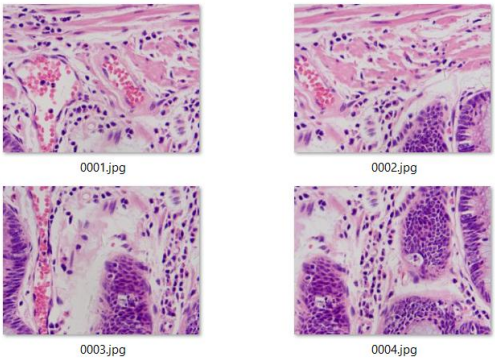
The final stitched image will be created in a new image window.



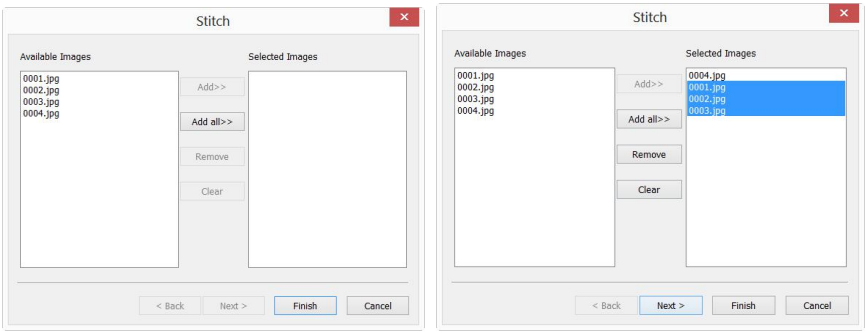
In the stitched image, there are some black areas; these are happened when there are translations among the edge images in both directions.

13.1.2 Image Stitch

If images are opened in GXCAPTURE-T, for example 0001.jpg, 0002.jpg, 0003.jpg, 0004.jpg are opened as shown below:



Choosing the Process>Stitch command will invoke the image Stitch dialog as shown below:



a) Available Images and b) Selected Images

Available Images: The images opened by GXCAPTURE-T; Here, 4 images are listed in the list box. One can click the image file name to select the files to be added to the Selected Images;

Selected Images: The images selected for stitching; Using Add>> to add the Available Images to this list box;

Add>>: When an image or images is or are selected and highlighted in the Available Images window, the Add>> will be enabled. Click Add>> will add it or them into the Selected Images list box;

Add All>>: Click Add All>> will add all of the Available Images into the Selected Images list box;

Remove: When an image or images is or are selected and highlighted in the Selected Images list box, the Remove button will be enabled, click Remove will remove it or them from the Selected Images list box;

Clear: Used to clear all of the images in the Selected Images list box. When no image in the Selected Images list box, it will be disabled;

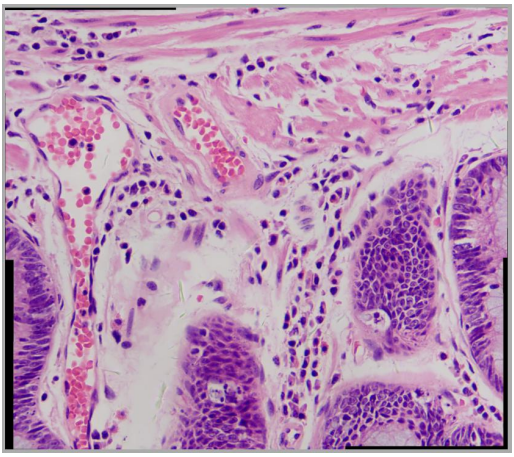
Cancel: Click to cancel the stitching process;

Finish: Click Finish will accept the other Default setup and begin to stitch the captured images according to the above setup;

Next>: Click Next> will step to the next step;

The other Next> steps are just the same as those of the Video Stitch process.

The final stitched image will be created in a new image window as shown below:



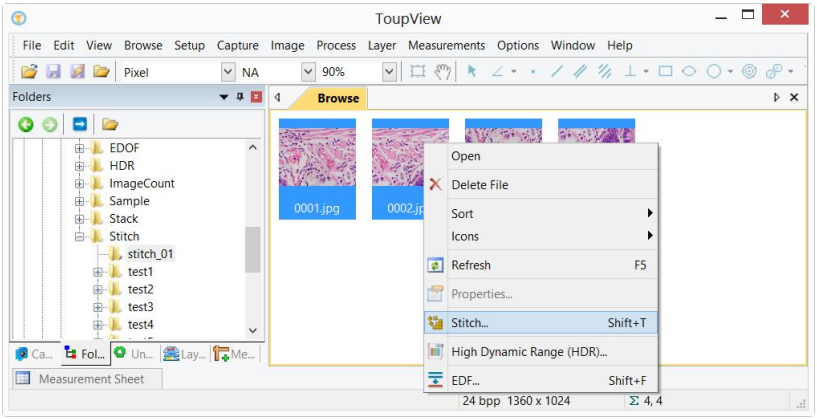
The Stitched image

In the stitched image, there are some black areas; these are happened when there are translations among the edge images in both directions.

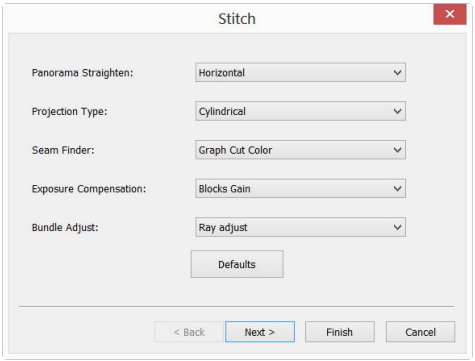
13.1.3 Browse Window Stitch

Click the Folders Sidebar to activate it. Double-click the right directory to show the images under the directory in the Browse window. Choosing the image files to be stitched and then clicking the right mouse button will display the context menu,

choose the Stitch submenu to start the image stitch operation (One can also choosing Process>Stitch to do the same operation after the files are selected in the Browse window)

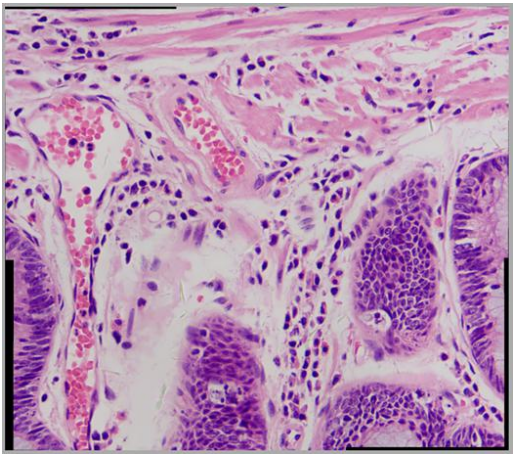


After the Stitch command is selected, a dialog called Stitch will pop up as shown below.



The Stitch dialog and the other Next> steps are just the same as those of Video Stitch. The final stitched image will look like below:

In the stitched image, there are some black areas; these are happened when there are translations among the edge images in both directions.



The stitched image

13.2 High Dynamic Range(HDR)●●●

High Dynamic Range can fuse a sequence of multi-exposure images into a high dynamic range image. The user can capture the multi-exposure images by adjust the aperture of microscope or the exposure and the gain.

GXCAPTURE-T support High Dynamic Range function in 2 modes, which is shown in the following part.

13.2.1 Browse window high dynamic range operation

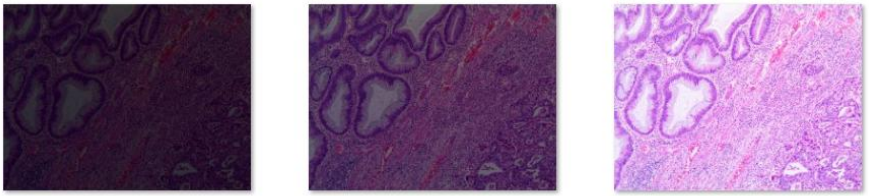
In browse window, the user can choose images to be fused directly and there is no need to open any image to save the system cost.

When the browse window is active, the user can choose low dynamic range images by Ctrl+A or Ctrl+mouse left button.

Click the right mouse button on the Browse window will invoke the context menu. Choose High Dynamic Range (or choose Process>High Dynamic Range), GXCAPTURE-T will begin to calculate according to the selected images. The high dynamic range image will be displayed in a new image window when the progress bar reaches to the end.

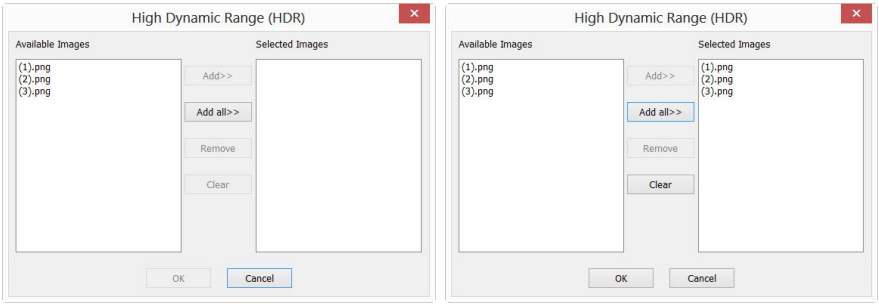
13.2.2 Image window high dynamic range operation

When the image window is active, the user can choose images from opened window to generate high dynamic range image. This mode will lead the system to overhead when many images were opened



Opened image for HDR operation

Choose Process>High Dynamic Range command to fuse captured or opened images to high dynamic range image., a dialog is called High Dynamic Range will be shown as below:



a)Available Images and b) Selected Images

We assumed that 1.jpg, 2.jpg, 3.jpg 3 images have been opened.

Available Images: The images opened by GXCAPTURE-T; Here, 3 images are listed in the list box. One can click the image file name to select the files to be added to the Selected Images;

Selected Images: The images selected for stitching; Using Add>> to add the Available Images to this list box;

Add>>: When an image or images is or are selected and highlighted in the Available Images window, the Add>> will be enabled. Click Add>> will add it or them into the Selected Images list box;

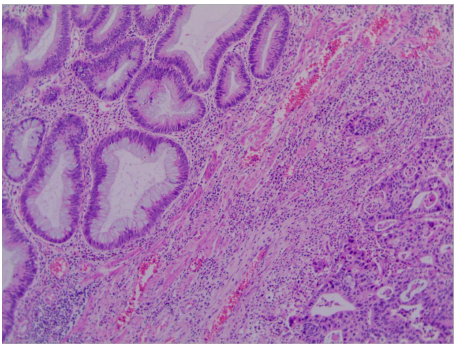
Add All>>: Click Add All>> will add all of the Available Images into the Selected Images list box;

Remove: When an image or images is or are selected and highlighted in the Selected Images list box, the Remove button will be enabled, click Remove will remove it or them from the Selected Images list box;

Clear: Used to clear all of the images in the Selected Images list box. When no image in the Selected Images list box, it will be disabled;

Cancel: Click to cancel the stitching process;

OK: Click OK will accept the other Default setup and begin to stitch the captured images according to the above setup.

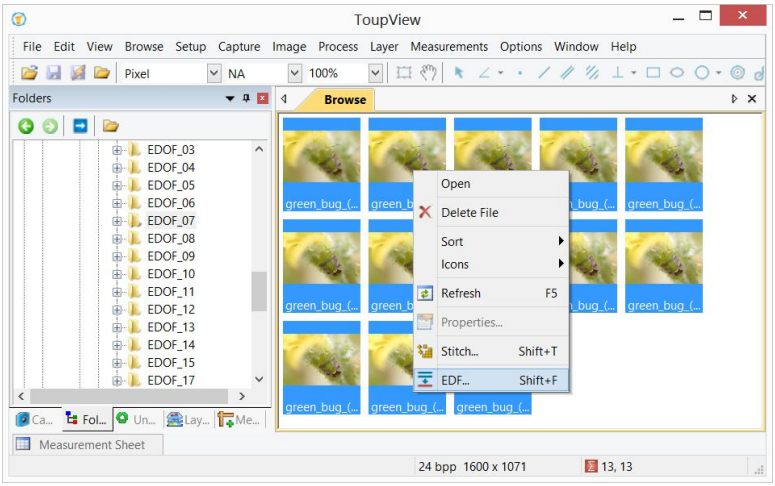


The HDR result

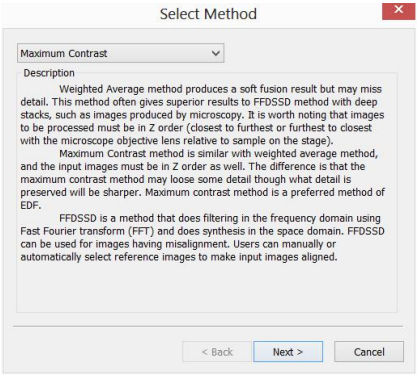
13.3 EDF●●● Shift+F

13.3.1 Browse Window EDF

Click the Folders Sidebar to activate the Browse Window. Double-click the directory to display the images in the Browse window in Icon mode. Choosing the image files to be fused with Ctrl+A(Select all files in the current directory) or Ctrl+left mouse button to select the image one by one and then clicking the right mouse button will display a context menu, choosing the EDF submenu to start the image fusion process (One can also choose Process>EDF●●● command to do the same operation after the image files are selected in the Browse window).



After the Process>EDF command is chosen, a dialog called Select Method is pop up as follows:



There are 3 EDF methods in GXCAPTURE-T, they are:

Maximum Contrast: Maximum Contrast method is similar with weighted average method, and the input images must be in Z order as well. The difference is that the maximum contrast method may lose some detail however the preserved details will be sharper. Maximum Contrast method is a preferred method in these 3 EDF methods.

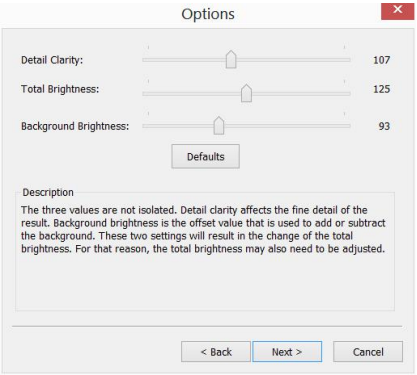
Weighted Average: Weighted Average method produces a soft fusion result but may

lose detail. This method often gives superior results to FFDSSD method with deep stacks, such as images produced by microscopy. It is worth noting that images to be processed must be in Z order (Capture a series images in closest to furthest or furthest to closest order);

FFDSSD: FFDSSD is a method that does filtering in the frequency domain using Fast Fourier transform (FFT) and does synthesis in the space domain. FFDSSD can be used for images having misalignment. Users can manually or automatically select reference images to make images aligned.

Maximum Contrast

Choosing Maximum Contrast in the Select Method dialog will pop up an Options Dialog as follows:



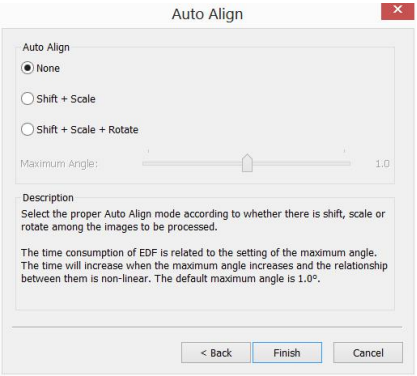
Detail Clarity: Detail Clarity affects the fine detail of the result. Default:107, Range: 10~240;

Total Brightness: Total Brightness is the overall brightness. The Detail Clarity and Background Brightness will result in the change of the Total Brightness. For that reason, the Total Brightness may also need to be adjusted. Default:125, Range: 10~240;

Background Brightness: Background Brightness is the offset value that is used to add or subtract the background. Default: 93; Range: 10~240;

Default: This will set all 3 values to the Default ones;

Clicking Next> button will pop up an Auto Align dialog as follows:



None: Considering no Shift+Scale+Rotate among the selected images in the fusion process;

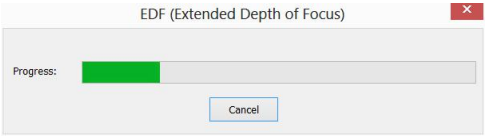
Shift+Scale: Considering Shift+Scale among the selected images in the fusion process; Rotation is not condsidered in this option;

Shift+Scale+Rotate: Considering Shift+Scale+Rotate among the selected images in the fusion process; If this mode is checked, The Maximum Angle slide bar will be enabled;

Maximum Angle: The Maximum Angle is used to set the upper limit in Rotate alignment. The Default is 1 degree. Range:0.1~10;

User can select the proper Auto Align mode according to whether there is shift, scale or rotate among the images to be processed. The time consumption of EDF is related to the setting of the Maximum Angle. The time will increase when the Maximum Angle increases and the relationship between them is non-linear. The default is 1.0°;

Clicking <Back will return to Option dialog and clicking Finish will begin the EDF operating according to the previous setup. GXCAPTURE-T will display the EDF(Extended Depth of Focus) progress bar as follow:



The final EDF result is shown below:

Weighted Average

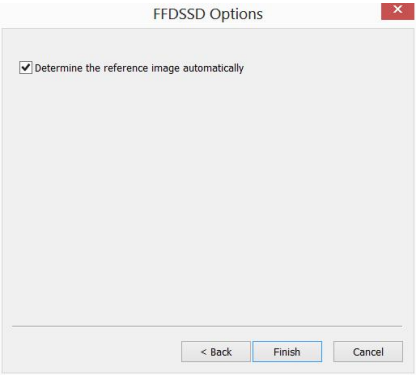
The setups of the Weight Average are the same as those of the Maximum Contrast. About the setup details, please refer to Maximum Contrast.

FFDSSD

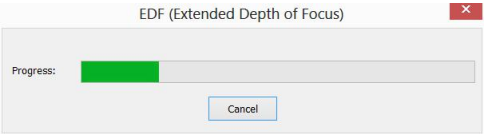
Choosing FFDSSD in the Select Method dialog will pop up a FFDSSD Options dialog as below:

Determine the reference image automatically: Before EDF, FFDSSD will evaluate all the images to determine the reference image for feature matching. After the reference image is determined, FFDSSD will perform feature matching between the reference image and the other images to find the alignment parameters

The default is checked. If the Determine the reference image automatically is unchecked, GXCAPTURE-T will take the first image as reference image in the alignment operation.



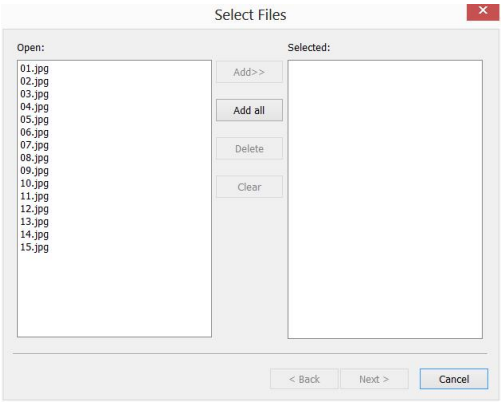
Clicking Finish button will begin the EDF, an EDF (Extended Depth of Focus) progress bar dialog will display as follows:



The final EDF result is shown below:

13.3.2 Image Window EDF

Similar to the Browse window EDF, Image window EDF is also a very useful tool to generate a clear image by combining a sequence of previously captured or opened multi-focus images. Choosing the Process>EDF••• command, the following dialog will be brought up (assume 01.jpg 02.jpg ••• 15.jpg are already opened in GXCAPTURE-T):



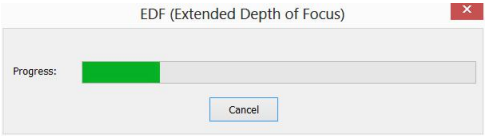
Clicking on the image file name in the Open combobox will highlight the image, and then the Add>> button is enabled (Click on the selected images will deselect them). Click the Add>> button, the highlighted images will be added into the Selected list box, which will be fused later.

Clicking the Add all button will add all images in the Open combobox into the Selected list box.

If images in the Selected combobox are highlighted, the Delete button will be enabled. Click the Delete button, the highlighted images in the Selected combobox will be removed.

Clicking the Clear button will remove all the images in the Selected list box, including the unselected ones. The button will be disabled if there is no image in the Selected combobox.

When the desired images are all selected (If more than 2 images are added in the Selected List box, the Next> button will be enabled), clicking on the Next> button will start the other EDF setup as those of the Browse window EDF. After all of the setup is finished, GXCAPTURE-T will display the EDF(Extended Depth of Focus) progress bar as follows:



The final EDF result is shown below:

NOTE: Images used for fusing must be the same size; otherwise there will be a prompt when adding different sizes of image to perform the EDF operation. The prompt dialog indicates which image is not the same size with the others.

13.3.3 Video Window EDF

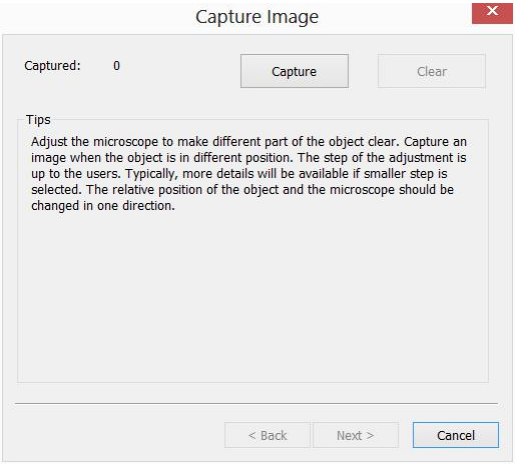
Make sure that the GXCAPTURE-T package and the camera are correctly installed. Turn on the microscope's light.

1. Run GXCAPTURE-T and start the camera;

2. Choosing the Process>EDF••• command or clicking on the toolbar will bring up a dialog called "Capture Image";

3. Use the microscope coarse or fine focus knobs to move the sample stage up and down, in order to find the positions where the clearest regions of the whole sample can be seen on the Video window;

4. Click the Capture button to capture an image into the image list which will be used for the EDF operation.



5. Unless there is 1 captured image, the Clear buttons will not be enabled. Unless there are more than 2 captured images, the Next> buttons will not be enabled. If the captured images are not satisfactory, click the Clear button to clear the captured image(s) and capture new image(s).

6. If more than 2 images are captured, Clicking Cancel will end the Capture Image and return to the Video window. If the Next> button is clicked, GXCAPTURE-T will pop up a dialog called Selected Method to begin the EDF configuration process. About the configuration detail, please check Browse Window EDF in this section.

The final fused image will be displayed in a new active image window and its title bar will be associated with a digit assigned by GXCAPTURE-T.

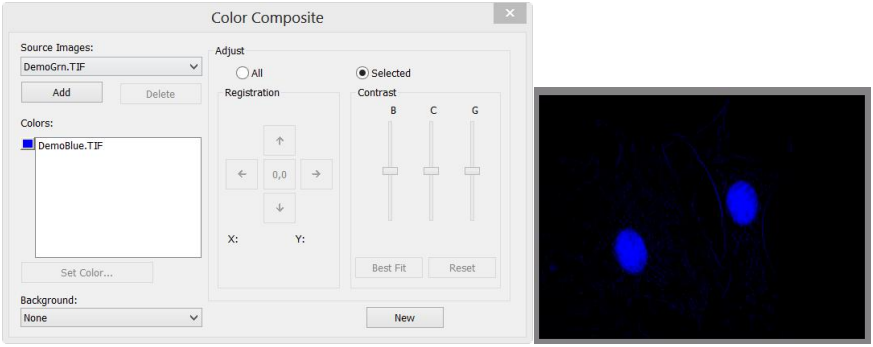
Note: a). Use the coarse and fine focus knobs to move the sample stage up and down; b). Clicking the Capture button will capture the current image into the image fusion list; c). Repeating steps 1-4 until there are enough images; d). Clicking the Fusion button will start image fusion. Waiting for some time and a fantastic fusion result will be displayed in a new image window;

13.4 Color Composite●●●

Use the Color Composite dialog box to create and configure color composites using black and white source images. You can access the Color Composite dialog box through the Color Composite menu item from the Process menu.

You can combine gray-scale images into a color composite. Any group of gray-scale images that are of the same size can be mixed in a color composite. Images of 8-, 12-, 16-bit integer or floating point format are combined into a 24-bit color composite. Each input channel will have individual LUT adjustments, as well as a registration offset to line it up with the rest of the images.

You can also combine individual channels from a single image. Each channel will be listed separately, as shown here:

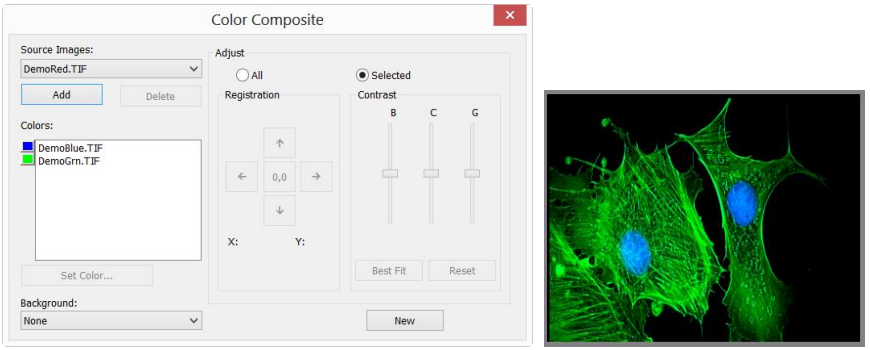


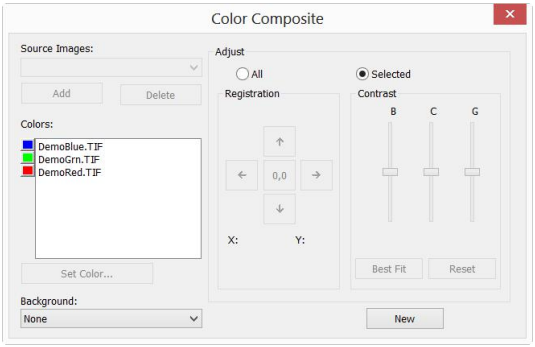
Source Images: The Source Images combo box displays the images available for color mixing. The Source Image list is initially filled with a list of the gray scale images that are currently open. The size of the color composite is determined by the first input image selected. Once this is entered, the list is filtered to contain only images of the same size as the initial selection.

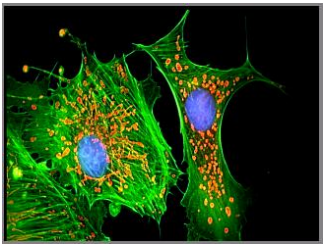
Add: Click the Add button to add an image to the mix. You will be prompted for the color to be assigned to that image from the Set Color dialog.

Delete: Use this button to delete the selected image from the list.

Colors: The Colors combobox displays the images selected for color mixing.





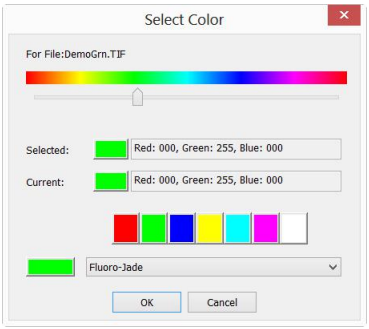


To change the color within the list box, double-click to select the image name (the Select Color dialog box appears) or highlight the name and click the Set Color button.

To delete colors/images from the Colors list box, first click on the color/image to highlight it then press the Delete button within the Color Composite dialog box.

Color Bar: The picture item box on the left side of the Colors list indicates the color associated with each image in the composite. The Color Bar will scroll with the contents of the Colors list box.

Set Color: This option determines the Color value used for the selected channel in the final image display. Clicking on the Set Color button brings up the Select Color dialog box.



Directly select a color by:

1) Dragging the Color Value Slider to the desired color on the Color Bar (range of 0 to 359°): or

2) Clicking the appropriate Color button on the Color Palette. The Color Bar represents Color degrees in the standard color wheel representation, and the Color Palette contains a subset of possible Colors (pure red, green, blue, cyan, magenta, and white): or

3) Select a dye in the dye list, and click the Select Dye button.

Note: You can navigate through the Select Color dialog box by using the <Tab> and <Shift + Tab> keys to cycle through the items in the dialog box.

Intensity is determined by the image the Color is applied to, and saturation will always be 100%.

The only exception to this is the "white" Color, which has by definition a saturation of 0%. Selecting a value greater than or equal to 360 (dragging the Color Value slider over to the far right) is a choice of white, which results in a non-tinted (gray) image.

The elements of the Select Color dialog box are:

Color Bar: The Color Bar shows a rainbow displaying the Colors underneath the appropriate point of the Color Value slider.

Note:

If Color Value Slider is the selected (highlighted) selected control, then you can also control the slider with keyboard strokes:

Use the left/right arrow <-> or <->keys to move the slider incrementally.

Press the <Page Up> and <Page Down> to move the slider in "chunk" sections along the Color Bar.

Use the <Home> and <End> keys to move the slider to the beginning and end of the Color Bar.

Selected: This color block displays the new Color selected by the Color Value slider bar or the Color Palette.

Selected Color: The Selected Color text field displays the corresponding numeric Color value of the Selected color block described above. The Selected Color value is

expressed as an HSV color, with the red value first, followed by the green and blue values. If the color corresponds to a dye color, the dye name will be displayed. If the dye color corresponds to a color palette color, the name of the color will also be displayed.

Current: The Current color block displays the starting Color of the channel.

Color Palette**:** The Color Palette proves an alternate method of selecting a Color. Clicking on an item in the Color Palette will set the Color Value slider to the correct value and update the displays in both the Selected color block and Selected Color text field.

For example, clicking on the white button on the Color Palette will set the Color Value slider to the right, change the Selected color block to white, and cause the Selected Color text box to display "White".

Adjust: The controls in this section are used to adjust the color composite contribution from each image, or for the color composite preview itself. You can adjust the input image that is currently selected in the Colors list by clicking the selected button. When you want to adjust the color composite preview, or you want no image is selected in the Colors list, use the All button.

Registration: Registration allows you to correct for mis-registrations of images caused by filter-induced optical shifts. Use the directional keys to shift the selected image in the *x*- and/or *y*- direction, with respect to the rest of the input images. One click moves that channel one pixel in the direction indicated. Blank areas are filled with black. The key labeled "0,0" will re-center the selected image.

The registration shift for the selected channel or the overall image is displayed in the static text box below the directional keys.

Contrast: Use the BCG sliders along with the Best Fit and Reset buttons to adjust the contrast of the selected image or the composite.

BCG sliders: The Brightness, Contrast, and Gamma sliders are the similar to the Contrast Enhancement feature in GXCAPTURE-T. You can also adjust each channel individually or collectively by using the Selected or All radio buttons (to the left of the BCG sliders in the Adjust group box).

Best Fit: Click this button to perform a Best-Fit contrast stretch on the selected input, automatically setting the Brightness and Contrast settings accordingly (Gamma will be reset to 50.). This method is identical to the Best Fit contrast adjustment under the standard Contrast Enhancement feature of GXCAPTURE-T. Best Fit is useful for first pass adjustments.

Reset: Pressing the Reset button automatically resets the BCG settings. If the Adjust radio button is set on All, the BCG settings for the overall color image will be reset.

Frame: Use the frame slider to adjust the frame of the selected image that is used for the preview, or the active frame of the composite. (Please see the discussion of Color Composite and Image Sequences that follows this section.)

Background**:** Select one of the available images to be the background color in this combo box. The rest of the image planes are subtracted from the background image — effectively punching "holes" into it and allowing the foreground colors to show without mixing with the background. This is most effective where the background covers large areas and the other images have smaller objects within the background objects.

Background allows the other inputs to be displayed "in front of" the background inputs, minimizing color mixing. For example, GXCAPTURE-T can display a red dot on a blue background without turning the dot to magenta.

Selecting None causes all images to be equally mixed.

New: Click on the New button to discard the current color composite image, and start over.

The Source Images combo box will reset to include all gray scale images (including floating point images). Selecting an image from the list will create a new composite the same size as the initial selection. As mentioned previously, the source images list will be filtered to contain only images of the same size as the initial selection.

13.5 Segmentation & Count●●●

Choose the Process>Segmentation & Count command to realize the segmentation and count of the interested image. The arrangement of Segmentation & Count is very special and some explanations are needed here to clarify it in details:

1. The function provides users with five methods which are Watershed(W), OTSU Dark, OTSU Bright, RGB Histogram, HSV Histogram and Color Cube. Users can select any one of those 5 methods, but after selecting any one of them, the others will be disabled.

2. After segmentation, there may exist adhesions. Then what we should do is segment connected object manually by choosing the Split Objects function.

3. When the users get the expected results, they can choose the Counting Results menu and get the statistics and analysis results.

According to the counting result, you can go back from step 2 or 3 to step 1 or 2 to repeat segmentation or split objects operation.

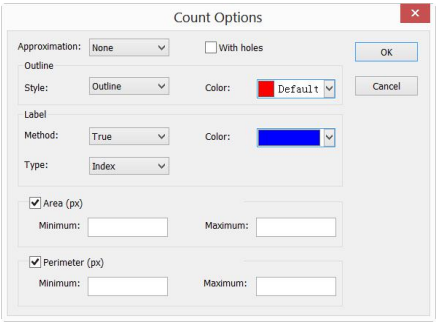
Note: If the users choose None in the Label button at the Count Options dialog, then regardless of the type of Method set, there is no Label for Index, Area or Perimeter on the image. But the None, Circle and Ellipse will show the segmentation results. That's why GXCAPTURE-T name the menu as Segmentation & Count**.** That is, this function can achieve either the image Segmentation or Count. In this regard, please refer to the Process>Segmentation & Count > Watershed(W) in the Count Options dialog.

13.5.1 Watershed(W) ●●●

Watershed segmentation method is a mathematical morphology segmentation method, which based on topological theory. The basic idea is taking the image as a topological geomorphology on geodesy, and each image pixel gray value indicates the altitude, boundaries of each local minimum value and its impact area called catchment basins and the formation of watershed catchment basins. So the formation of the watershed concept can be illustrated by simulating the immersion process. In each local minimum value of the surface, piercing a hole, then the entire model slowly immersed in water, with the immersion of the deepening impact of the domain of each local minima slowly expands outward in two catchments basin at the confluence build dams that form the watershed.

Watershed is suitable for relatively simple background target object or target object with a relatively large difference between the background images instead of the more complex application.

Choose Process>Segmentation & Count > Watershed(W)…, there will pop up the following dialog: (Note: Segmentation & Count function only works for 24 bits, otherwise all the sub-menu items will be disabled. Users can change the Color Bits to 24 bits by choosing Image>Mode>Color Quantize…)



Approximation: Approximation including 3 options: 1)None：drawn the actual outline of the segmented object; 2)Circle: The actual outline fitting into a perfect circle, users can get fit Radius of each object in the Count Result dialog；3)Ellipse：The actual outline fitting into a ellipse, users can get fit Axis of each object in the Count Result dialog；

With Holes: When checking With Holes function, the segmented object's Outline will be marked with Color. Meanwhile the holes are also marked with Color and its parameters will be output in the image (Hole is defined as the target grayscale or the color close to the background pixels). The left figure below is the segmentation result without checking With Holes; the right below is on the contrary. With Holes option is usually used to get hole parameters;

Outline: Style: Including 3 options: 1)Outline: objects are marked by outline, the color can be user-defined; 2)Filled：the segmented objects will be filled with custom colors；3)None：no marked outline for the segmented object;

Color: Custom colors used to mark the Style;

Label: Method：Including 3 options: 1)XOR：with the current pixel's XOR color to mark the current object segmentation;2)True： marked with the specified Color;3)False: no mark for the objects;

Note：If users choose False in the Label group box, then regardless of the type of Method, there is no display for Index, Area or Perimeter. But the None, Circle and Ellipse will displayed on the segmented image. That's why GXCAPTURE-T call it Segmentation & Count;

Color: Custom Color used to represent the color of Label. When selecting XOR in the Method, the Color selection will be disabled, but the GXCAPTURE-T will automatically mark the segmented image with the current pixel's XOR color;

Type: Including 3 options: 1) Index: use numbers to mark the segmented object. 2) Area: the object area is marked by outline area size. 3) Perimeter: the object perimeter is marked by the outline perimeter;

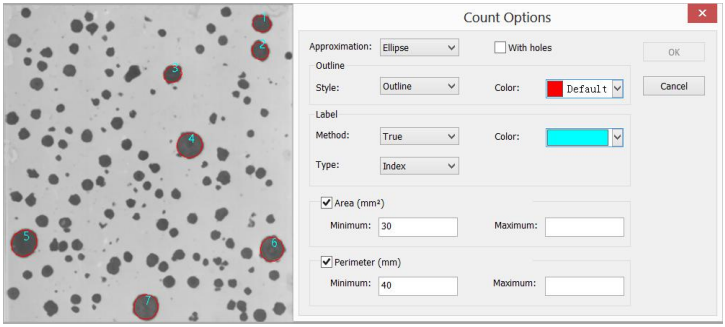
Area:

Minimum: determine the lower limit of the area. that is, if the object area is less than the lower limit , it will not be included;
Maximum: determine the upper limit of the area. that is, if the object area is greater than the upper limit , it will not be included;

Perimeter:

Minimum: determine the lower limit of the perimeter. that is, if the object perimeter is less than the lower limit, it will not be included;
Maximum: determine the upper limit of the perimeter. that is, if the object perimeter is greater than the upper limit, it will not be included;

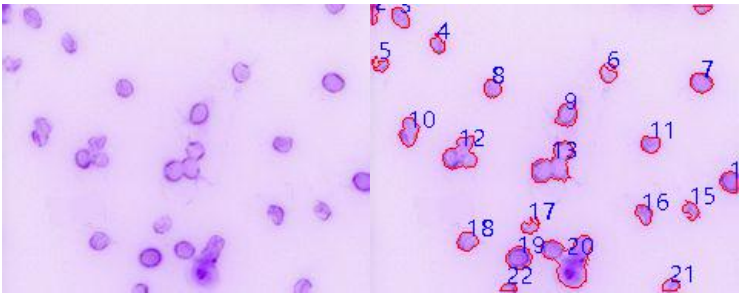
The figure below shows image Segmentation & Count results with watershed method with setting in Count Option dialog.



13.5.2 OTSU Dark●●●

OTSU is proposed in 1979 by Japanese scholars, which is a method to determine the threshold of an adaptive, also known as Otsu method, referred to as OTSU. It is based on the gradation characteristic of the image, and divided the image into the background and the target. The bigger the OTSU is between background and the target, the larger difference between the two parts images. The wrong part of the the background or the wrong part of the target will lead to smaller differences between the two parts. Therefore, the maximum OTSU means the minimum probability of misclassification.

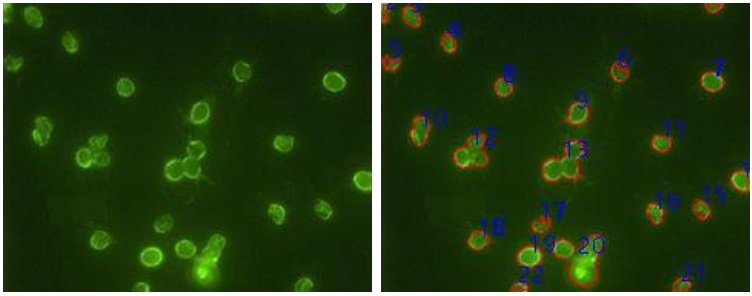
OTSU Dark segmentation method means segment the dark object from the bright background using OTSU algorithm. Its Count Options dialog is exactly the same with the Watershed Count Options. Below are bright background with dark object (bottom left) and its segmentation result (bottom right) for reference:



13.5.3 OTSU Bright (B) ●●●

OTSU Bright segmentation method means segment the bright object from the dark background using OTSU algorithm. Its Count Options dialog is exactly the same with

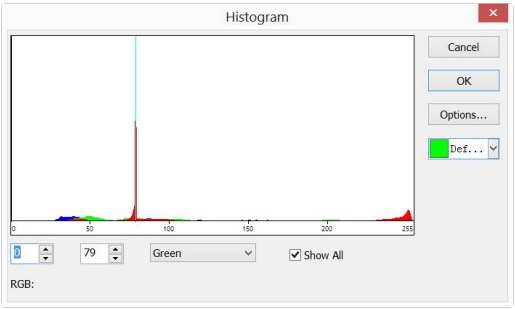
the Watershed Count Options. Below are dark background with bright object (bottom left) and its segmentation result (bottom right) for reference:



13.5.4 RGB Histoman ●●●

RGB Histogram segmentation is based on image histogram where image pixels between a specified histogram upper and lower range will be color processed. The segmented area can be adjusted by mouse to drag two vertical lines in histogram, or by inputting precise value in RGB upper and lower edit box directly and clicking "Enter" to make it effective. The Color representing the segmentation area can be customized by system palette. For a 24-bit true color image, segmentation can be realized by R，G，B channels respectively.

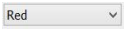
Choose Process>Segmentation & Count>RGB Histogram●●● shows Histogram dialog, each function is specified as below:



: Left Value in the currently selected region of histogram segmentation, corresponding to Left Vertical Line position in histogram. Users can segment the pixels bigger than the Left value by inputting a value in this edit box or dragging the Left Vertical Line in histogram. When input a Left Value in this edit box, users should

click enter to make the value effective. Meanwhile, the Left Vertical Line will move to the place the Left Value represents. Left Value range: 0~current Right Value. The current Left Value is 0;

: Right Value in the currently selected region of histogram segmentation, corresponding to Right Vertical Line position in histogram. Users can segment the pixels, bigger than the Left Value and smaller than Right Value, by inputting a value in this edit box or dragging the Right Vertical Line in histogram. When input a value in this edit box, users should click enter to make the value effective. Meanwhile, the Right Vertical Line will move to the place the Right Value represents. Range: The current Left Value ~255;



: A histogram channel of the currently RGB histogram. It can be R histogram, G histogram or B histogram;

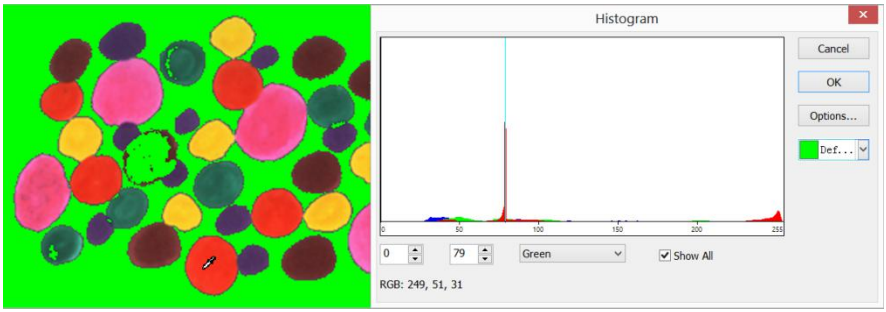
: Show all channel RGB histogram. When uncheck Show All, only a selected histogram channel will be shown;

: Used to identify the Color of the segmented pixels; The default is green;

: When users click Options••• button, a Count Options dialog pops up as below. The setting of Count Options dialog is the same as that of Waltershed's Count Options dialog, details can be referred to Process>Segmentation & Count>Watershed(W) •••;

Example of RGB Histogram is as follows:

1.Open an image and then choose Process>Segmentation & Counting>RGB Histogram••• menu, a Histogram dialog shows as below. When the mouse moves in the image area, the cursor will be displayed as Color Picker Cursor;

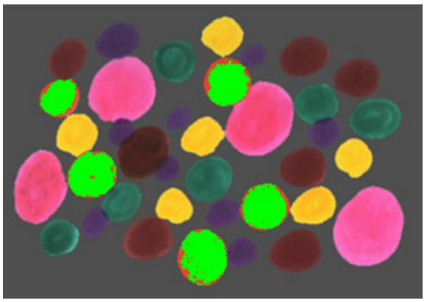


2.Move Color Picker Cursor to any pixel of the image, shown as above, RGB value of the current pixel will be displayed in the bottom Histogram window. Here R is 249，G is 51，B is 31, showing the RGB value of the ideal segmentation area, record the three values.

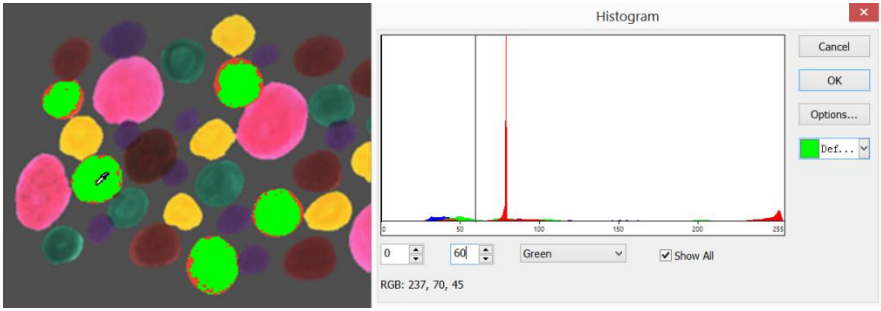
3.Move the mouse to the background area, the RGB value of Color Picker Cursor is 79, 79, 79. In order to accurately segment out the target, users can set RGB values of the segmented pixels in the initial interval, and those of background out of the initial interval. For example, the RGB values can be set to the initial interval as follows:

R is set to the initial interval: 200~255;
G is set to the initial interval: 0~60;
B is set to the initial interval: 0 ~ 60;

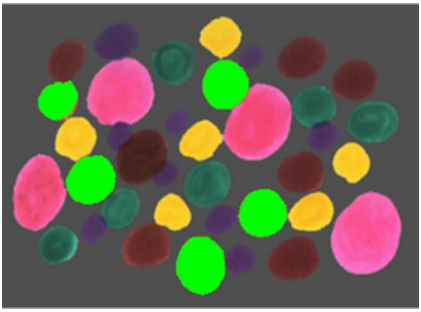
When setting completed, the segmentation effect is shown as below:



4.Move again the Color Picker Cursor to any other unshadded pixels, then the RGB value shown in left bottom of histogram is 237, 70, 45 as below:



It's easily found that here G channel, defined 60, is too small to get the pixel segmented. Then initial interval for G channel can be adjusted from 0~60 to 0~80 to segment the pixels nearby. (Note: If the background pixels of a single channel is within the initial interval, no segmentation change will take place. Only all three channels of the background pixels are within the initial intervals can the pixels be segmented) The segmentation effect by readjusting G initial interval is shown as below:



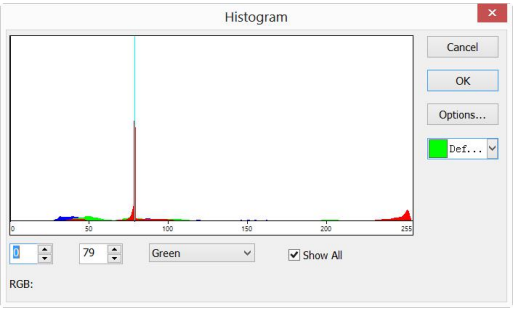
5.Repeat step 4 and readjust initial interval of each RGB channel to achieve perfect segmentation.

13.5.5 HSV Histogram●●●

HSV Histogram segmentation is based on image histogram where image pixels between a specified histogram upper and lower range will be color processed. The segmented area can be adjusted by mouse to drag two vertical lines in histogram, or by inputting precise value in HSV upper and lower edit box directly and clicking

"Enter" to make it effective. The Color representing the segmentation area can be customized by system palette. For a 24 bits true color image, segmentation can be realized by H, S, V channels respectively.

Choose Process>Segmentation & Count>HSV Histogram••• shows Histogram dialog, each function is specified as below:



0 : Left Value in the currently selected region of histogram segmentation, corresponding to Left Vertical Line position in histogram. Users can segment the pixels bigger than the Left value by inputting a value in this edit box or dragging the Left Vertical Line in histogram. When input a Left Value in this edit box, users should click enter to make the value effective. Meanwhile, the Left Vertical Line will move to the place the Left Value represents. Left Value range: 0~current Right Value. The current Left Value is 0;

79 : Right Value in the currently selected region of histogram segmentation, corresponding to Right Vertical Line position in histogram. Users can segment the pixels, bigger than the Left Value and smaller than Right Value, by inputting a value in this edit box or dragging the Right Vertical Line in histogram. When input a value in this edit box, users should click enter to make the value effective. Meanwhile, the Right Vertical Line will move to the place the Right Value represents. Right Value range: current Left Value ~255. The current Right Value is 79;

Hue : A histogram channel of the currently HSV histogram. It can be H histogram, S histogram or V histogram;

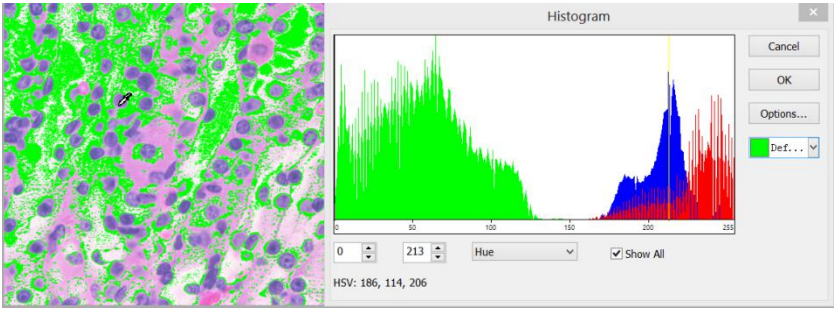
Show All : Show all channel HSV histogram. When uncheck Show All, only a selected histogram channel will be shown;

:Used to identify the Color of the segmented pixels; The default is green;

:When users click Options••• button, a Count Options dialog pops up as below. The setting of Count Options dialog is the same as that of Waltershed's Count Options dialog, details can be referred to Process>Segmentation & Count>Watershed(W)•••;

Example of HSV Histogram is as follows:

1.Open an image and then choose Process>Segmentation & Counting>HSV Histogram••• menu, a Histogram dialog shows as below. When the mouse moves in the image area, the cursor will be displayed as Color Picker Cursor;

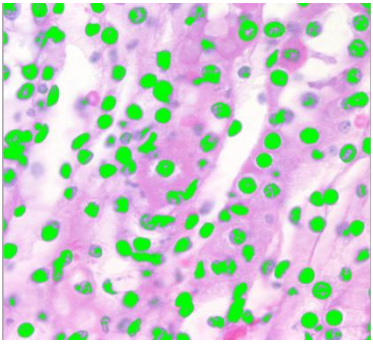


2.Move Color Picker Cursor to any pixel of the image, shown as above, HSV value of the current pixel will be displayed in the bottom Histogram window. Here H is 186, S is 114, V is 206, showing the HSV value of the ideal segmentation area, record the three values.

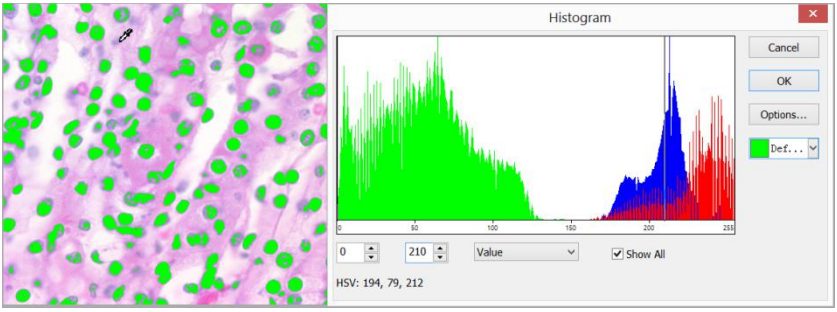
3.Move the mouse to the background area, the HSV value of Color Picker Cursor is 214, 87, 228. In order to accurately segment out the target, users can set HSV values of the segmented pixels in the initial interval, and those of background out of the initial interval. For example, the HSV values can be set to the initial interval as follows:

H is set to the initial interval: 60~200;
S is set to the initial interval: 90~130;
V is set to the initial interval: 0~210;

When setting completed, the segmentation effect is shown as below:

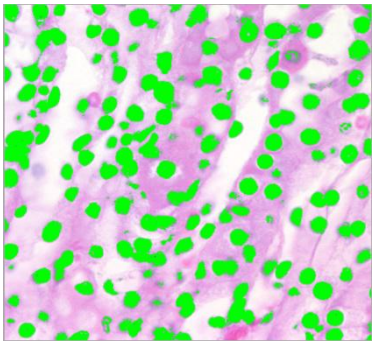


4.Move again the Color Picker Cursor to any other unshadded pixels, then the HSV value shown in left bottom of histogram is 194, 79, 212 as below:



It's easily found that here S channel, defined 90~130, its lower limit is too bigl to get the pixel segmented. Then initial interval for S channel can be adjusted from 90~130 to 60~130 to segment the pixels nearby. (Note: If the background pixels of a single channel is within the initial interval, no segmentation change will take place. Only all

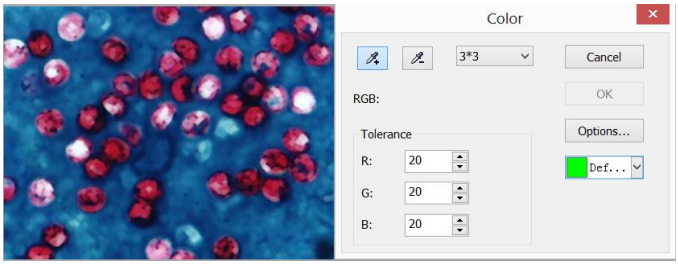
three channels of the background pixels are within the initial intervals can the pixels be segmented) The segmentation effect by readjusting S initial interval is shown as below:



5.Repeat step 4 and readjust initial interval of each HSV channel to achieve perfect segmentation.

13.5.6 Color Cubic•••

Choose Process>Segmentation & Count>Color Cube•••, a dialog called Color will pop up as below;



At this moment, the Colorizing Pipette (Default) is checked by default. Click the image will set the average color value in the masked area as Basic Value. GXCAPTURE-T will segment the image by choosing the pixel within Basic Value±Tolerance color range and mark it with current selected Color. By clicking the target pixel repeatedly, GXCAPTURE-T can continuously add new pixels within the Basic Value±Tolerance color range into the target and thus acquiring continuous segmentation colorizing.

When some undesirable pixels have been added into the segmentation data, the De-Colorizing Pipette can be used to wipe off the undesirable pixels. This operation process is the same as Colorizing Pipette, that is, to set the average color value of the clicked-pixel's Mask Area as Basic Value and wipe off the segmentation data, which is within the Basic Value±Tolerance color range.

Colorizing Pipette: Collect average color value of the clicked-pixel's Mask Area as Basic Value and add pixels which are within Basic Value±Tolerance color range into the segmentation data;

De-Colorizing Pipette: Collect average color value of the clicked-pixel's Mask Area as Basic Value and wipe off the segmentation data, which is within the Basic Value±Tolerance color range;

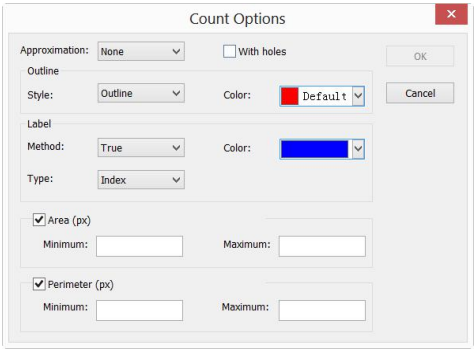
3*3 Mask Area: When Colorizing Pipette or De-Colorizing Pipette is used to click the image, a Mask Area is also needed to calculate the average color value of the clicked pixel. The Mask Area's color value will be used as Basic Value. Color values within the Basic Value±Tolerance range can be added to or wiped off from the segmentation data. The default Mask Area is 3*3, other options are 1*1，5*5，7*7;

RGB: The average RGB values of the Mask Area;

Tolerance: There are 3 Tolerance values, they are R, G and B. User can make fast and accurate object segmentation by selecting a proper Tolerance value according to their experience. The default R, G and B Tolerance values are 10;

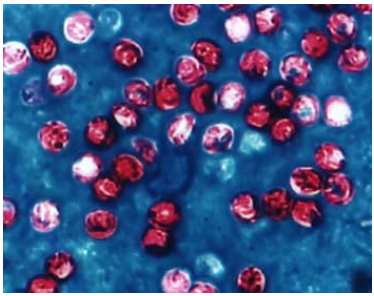
Def... : Used to mark the color of the segmentation area; The default Color is green;

Options... : When clicking the Options button, a Count Options dialog as below will pop up. This dialog is the same as that in Process>Segmentation & Count>Watershed (W)•••. Please refer to Process>Segmentation & Count>Watershed (W)••• for the detailed operation of this dialog;

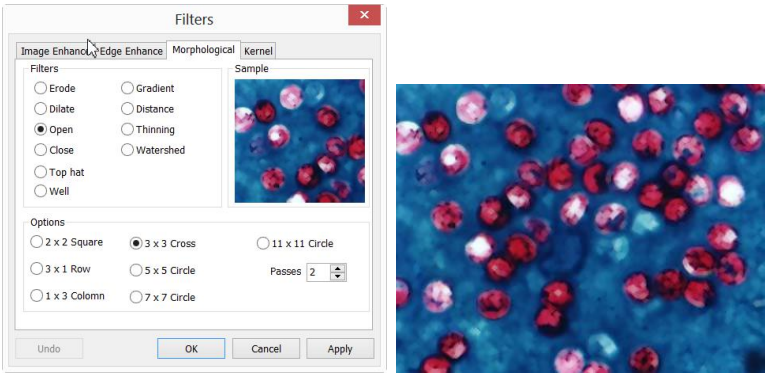


Here is an example to demonstrate the Color Cubic segmentation process:

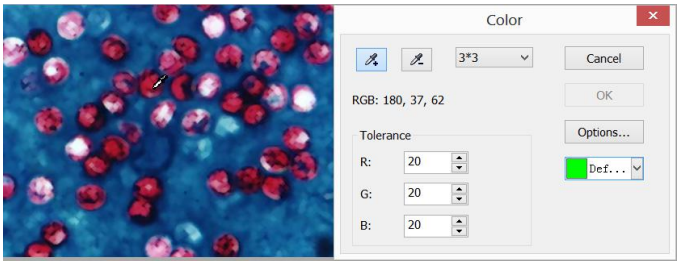
1. Open an image as below:



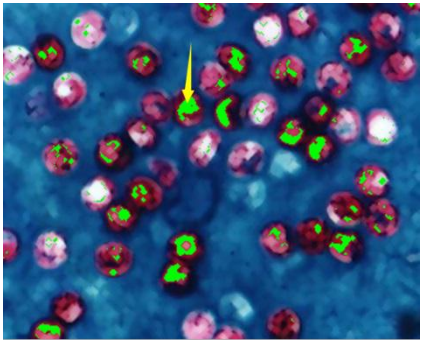
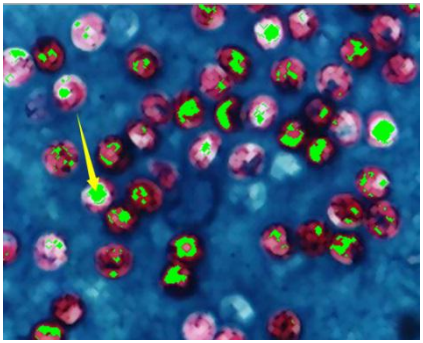
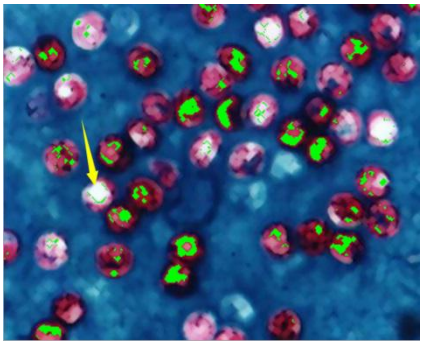
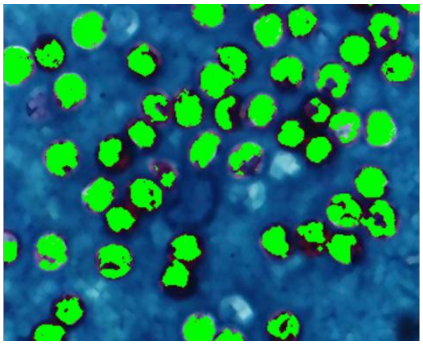
2. Because of the inevitable noise in the image, an image smooth operation should be done first. There are many algorithms to perform the image smooth operation and here we are to process it as follows: choose Process>Filter menu and click Morphological property page and a dialog will pop up with parameters as shown in the figure below on the left side. Click OK and the final smoothed image is shown below on the right side.



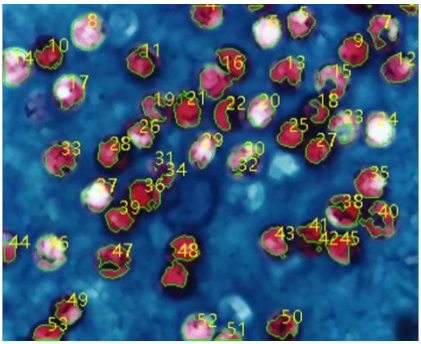
3. Choose Process>Segmentation & Count> Color Cube•••, a Color dialog will pop up as shown below;



4. At this moment, the Colorizing Pipette is checked. Click the pixel wish to segment. That is to say, select the color area which is interested in. If some undesirable color area is included in the segmentation area, just check the De-Colorizing Pipette and click the undesirable pixels, thus the undesirable pixels will be wiped off. When the segmentation process is completed, click OK and the Segmentation & Count operation will be carried out.

	
The result of segmentation after the first clicking at the pointed area with Colorizing Pipette	The result of segmentation after the second clicking at the pointed area with Colorizing Pipette
	
The result of segmentation after the second with the De-Colorizing Pipette (slight difference exists as inaccuracy in position)	The result of segmentation after countless clicking with Colorizing Pipette

5. Click Options to set Outline, Label and etc., the final results is shown below. So far the primary segmentation is completed.

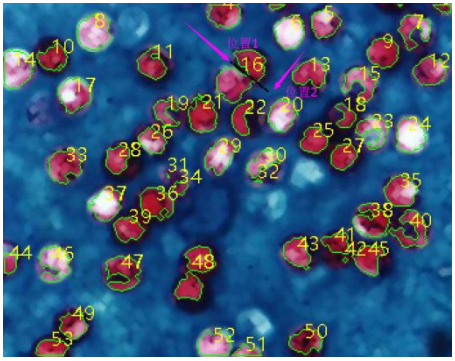


13.5.7 Split Objects

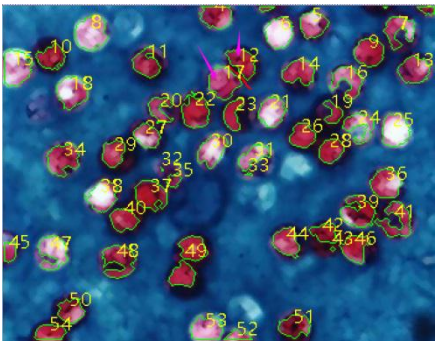
It can be found out in this segmentation, particle #16 (located in the upper middle of the image) is not a single object but actually two separate one. However they have been calculated as a single object. Choosing Split Objects will correct this problem. Object splitting with Split Objects is discussed below.

As is shown in the image below, move the cursor onto target #16. Click the left mouse button and draw a straight line.

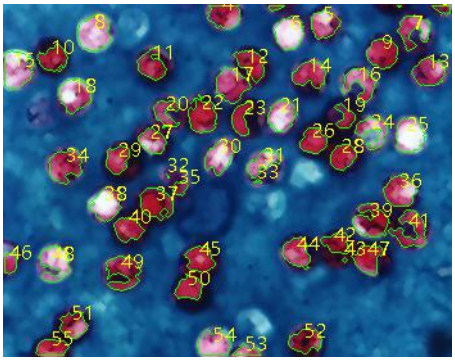
When pressing down the left mouse button, the cursor should not touch the target —— the starting point of the split line should be off the target that is to be separated. Move the cursor to the bottom right of the target—— the ending point of the split line should also be off the target that is to be separated. Release the left mouse button when this operation is completed. A split line is shown between the two adhesive objects as shown below:



After the left mouse button is released, GXCAPTURE-T will re-count the whole image. The result of re-counting is shown as below. The previous #16 turns out to be #12 and #17 now:



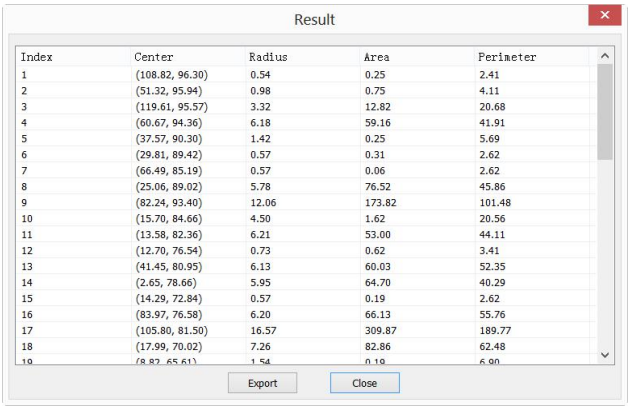
Unchecking or choosing Split Objects menu again will hide the split line. The final result of hiding the split line is shown as below. The whole Split Objects process is completed when the split line is hidden.



13.5.8 Count Result (T) ●●●

Count Result is a way to show count statistical result of the current image. Count Result dialog includes Index、Center、Radius(major-minor axis or non), Area and Perimeter, as is shown below. The unit of statistical result is the same as what the user selects in the Unit for the displayed image. Click Index, Center, Radius (major-minor axis or none), Area and Perimeter and the statistical result will be automatically sorted according to their data. Choosing a certain item can check the

split object in the image. In the meanwhile, Index (or Area and Perimeter) of the other targets will be hidden automatically.



The Center column in Result is relevant to the Approximation option in the Options dialog. When selecting Circle, radius of the circle will be listed as Radius column and when choosing Ellipse, major-minor Axis of the Ellipse will be listed as Axis column; when selecting None, no column shows up.

Click Export and then the statistical result, together with the image of Segmentation & Count, will be exported to an Excel sheet for further analysis and processing.

13.6 Denoise

GXCAPTURE-T provides 3 types of noise removal methods, Adaptive Wiener Filter, Bilateral Filter, Non Local Means. The processing speed of the 3 methods is from fast to slow, and the denoising quality is getting better and better. Each method is described in detail in the following:

13.6.1 Adaptive Wiener Filter

The Adaptive Wiener Filter can preserve more image details than those of median filter, mean filter, Gauss filter. The effect is more remarkable for additive noise (such as Gaussian noise) and multiplicative noise (such as Poisson noise).

For the Adaptive Wiener Filter algorithm, please find the details in the relevant literatures, here only to illustrate the improvement of Adaptive Wiener Filter over the classical Wiener filter.

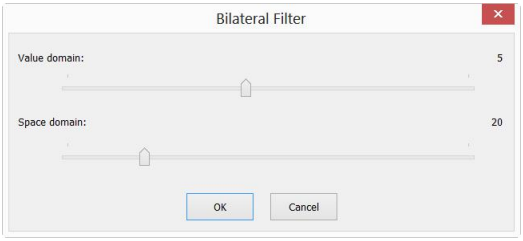
In the classical Wiener filter, the image noise intensity requires the user to manually input, but it is difficult to accurately enter the accurate value even for experienced users, because the value is usually very small, such as 0.0036781. Therefore in the development of the Adaptive Wiener Filter, the noise level is automatically calculated according to the image mean variance.

The process is quite simple, open an image, choose the Process>Denoise>Adaptive Wiener Filter to denoise the image.

13.6.2 Bilaternal Filter•••

The Bilateral Filter is a nonlinear filtering method that considers image spatial proximity, pixel value similarity, image spatial information and gray level similarity to achieve the purpose of edge preserving denoising. The Bilateral Filter has the simple, non-iterative, local characteristics. The Bilateral Filter is good to preserve image edge compare with Wiener filter or Gauss filter.

Choosing Process>Denoise>Bilateral Filter••• will pop-up dialog called Bilateral Filter as shown below:



Value domain: the range of neighborhood pixel in radius for considering, the greater the value, the slower process speed.

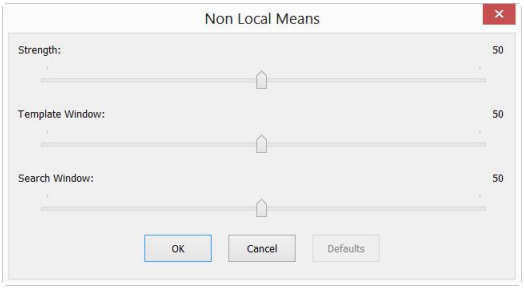
Space domain: Sigma value, the higher the value, the more effective the denoising effect.

13.6.3 Non Local Means•••

The traditional local mean filter is a pixels average method around the target pixel, but the Non Local Means is a weighted average method to average all of the image patches over the search window. The weight is determined according to the similarity between the target patch and neighborhood patches in the search window.

Compared to other famous denoising algorithms, such as Gaussian, Wiener filter, total variation and wavelet denoising, The Non Local Means method can get better effect.

Choosing Process>Denoise>Non Local Means••• will pop-up dialog called Non Local Means as shown below:



Strength: The denoising strength, the greater the value, the more removal the image noise, but will lose more details;

Template Window: The template block size, used to calculate the weight, the recommended default value is 7;

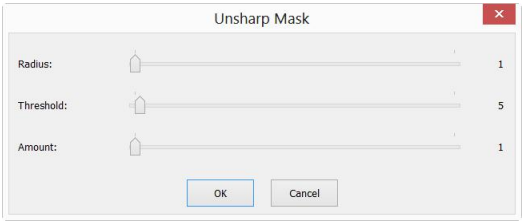
Search Window: The template patch search window size, used to calculate the weighted average value among image patches. Large value will increase the processing time. The recommended default value is 21.

13.7 Sharpen

13.7.1 USM•••

UnSharp Masking (USM) is an image sharpening technique, often available in digital image processing software. The "unsharp" of the name derives from the fact that the technique uses a blurred, or "unsharp", positive image to create a mask of the original image. The unsharped mask is then combined with the negative image, creating an image that is less blurry than the original one.

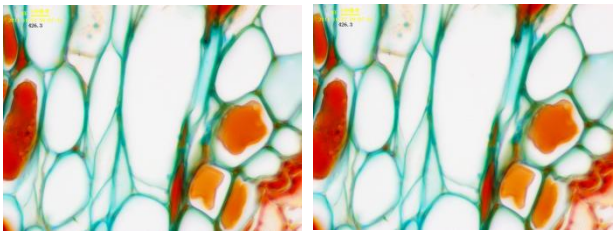
Open an image and then choose Process>Sharpen>USM••• command, a dialog will pop up as below.



Radius: Affects the size of the edges to be enhanced, so a smaller radius enhances smaller-scale detail. Higher Radius values can cause halos at the edges. As a result, fine detail needs a smaller Radius. In addition, Radius and Amount interact; reducing one allows more of the other.

Threshold: Controls the minimum brightness change that will be sharpened. This parameter is important to prevent smooth areas from becoming speckled. The threshold setting can be used to sharpen more-pronounced edges, while leaving subtler edges untouched. Low values should sharpen more because fewer areas are excluded. Higher threshold values exclude areas of lower contrast.

Amount: is listed as a percentage, and controls the magnitude of each overshoot (how much darker and how much lighter the edge borders become). This can also be thought of as how much contrast is added at the edges. It does not affect the width of the edge rims.

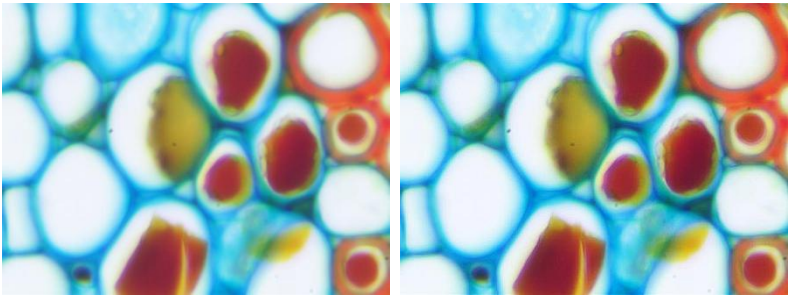


a) Original image; b) Sharpened image

13.7.2 Laplacian Sharpen

The Laplacian operator is an example of a second derivative method of enhancement. It is particularly good at finding the fine detail in an image. Any feature with a sharp discontinuity (like noise, unfortunately) will be enhanced by a Laplacian operator. Thus, one application of a Laplacian operator is to restore fine detail to an image which has been smoothed to remove noise.

Open an image and then choose Process>Sharpen>Laplacian Sharpen, no parameter is required for this method.

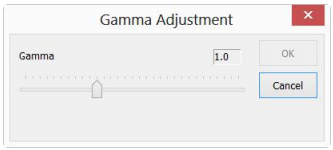


a) Original image; b) Sharpened image

13.8 Color Toning

13.8.1 Gamma•••

The Process>Color Toning>Gamma••• measures the brightness of midtone values produced by a device (often a monitor). A higher gamma value yields an overall darker image.



Preview: Check this button to display the real-time effects when one changes the slider bar's position. Default is checked;

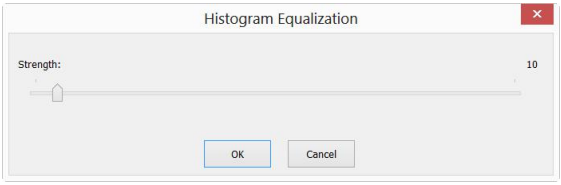
Gamma: Dragging the slider bar to the left decreases the level, while moving it to the right increases the level. Values can range from 0 to 3.0. Default is 1.0.

13.8.2 Histogram Equalization••• Shift+Q

Adaptive histogram equalization (AHE) is a computer image processing technique used to improve contrast in images. It differs from ordinary histogram equalization (HE) in the respect that the adaptive method computes several histograms, each corresponding to a distinct section of the image, and uses them to redistribute the lightness values of the image. It is therefore suitable for improving the local contrast. However, AHE has a tendency to over amplify noise in relatively homogeneous

regions of an image. A variant of adaptive histogram equalization called contrast limited adaptive histogram equalization (CLAHE) prevents this by limiting the amplification.

Please open an image and then choose Process>Color Toning >Histogram Equalization•••, a dialog should pop up as follows.



Strength: The Strength will affect the enhancement effect. The larger the value, the more obvious the effect.

a) Original image; b) Enhanced image

13.8.3 LCC•••

The Local Color Correction algorithm is computed in two steps:

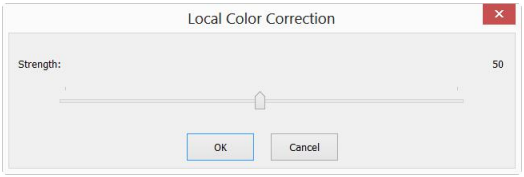
A mask image is computed from the input image.

The mask image is computed from the intensity component of the color image, defined as the average of R, G and B values i.e. I=(R+G+B)/3. The use of intensity information avoids distortions of the chroma. The mask image is obtained by inverting and then blurring the intensity component of the input image.

The input and mask images are combined to get the result.

The combination operation consists of a power function, where the exponent is computed using the mask value previously found. If the mask value is greater than 128, it will result in an exponent less than 1, while if the mask value is lower than 128, it will result in an exponent greater than 1. Moreover, if the mask value is precisely 128, the exponent will be 1, and it will have no effect on the input image. The operation is equivalent to a pixel-wise gamma correction.

Please open an image and then choose Process>Color Toning >LCC•••, a dialog should pop up as follows.



Strength：The strength will affect the enhancement effect. The larger the value, the more obvious the effect. Range:1~100, default is 50.

a) Original image; b) Enhanced image

13.8.4 AMSR

There are limited dynamic range problems when real world scenes are captured from a digital camera and displayed on monitors. Tone mapping algorithms are applied to image processing to reduce the dynamic range of an image to be displayed on low dynamic range devices. Multi-scale Retinex is one of the most popular methods for dynamic range compression, color constancy and color rendition. Here, we improve its performance by adopting the adaptive weight functions, named Adaptive Multi-scale Retinex (AMSR).

Please open an image and then choose Process>Color Toning>AMSR, the a) Original image; b) Enhanced image

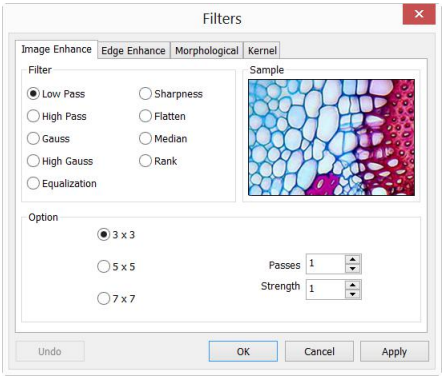
a) Original image; b) Enhanced image

13.9 Filter••• Shift+I

Choose the Process>Filter••• command to apply one of GXCAPTURE-T's numerous filters on the active image. If you are not familiar with the process and effects of filtering, some discussions about spatial filtering should be reviewed. GXCAPTURE-T provides an extensive set of convolution and no convolution (morphological) filters. You can also create custom filter kernels and apply them with the Filter commands.

Choosing the Process>Filter••• command will open the Filter dialog. Each group of filters has its own property page or tab, where the Filter type and size can be selected. The filtered results are almost always written to the active image. The Edit>Undo command can be used to remove Filter operations that have been applied.

13.9.1 Image Enhance



Low Pass: Check this filter to soften an image by eliminating high-frequency information (this has the effect of blurring sharp edges). The Low Pass filter replaces the center pixel with the mean value in its neighborhood. The Low Pass filter can also be used to remove noise.

High Pass: Check this filter to enhance high-frequency information. The High Pass filter replaces the center pixel with a convolved value that significantly increases its contrast from its neighbors. The High Pass filter leaves only elements of high contrast.

Gauss: Check this filter to soften an image by eliminating high-frequency information using a Gauss function. This has the effect of blurring sharp edges. The operation of the Gauss filter is similar to the Low Pass filter, but it degrades the image less than the Low Pass filter.

High Gauss: Check this filter to enhance fine details. This operation is similar to the unsharp masking technique (see the Sharpen filter), but it introduces less noise into the image. It uses a Gaussian curve type of kernel. Available in 7x7 and 9x9 kernel sizes.

Equaliza-tion: This filter is used to enhance the contrast based on the histogram of the local neighborhood (See Option below).

Sharpness: Check this filter to enhance fine details, or refocus an image that is blurred. The sharpen filter sharpens the image using the unsharp masking technique.

Median: Check this filter to remove impulse noise from an image. The Median filter replaces the center pixel with the Median value in its neighborhood. It will also blur the image.

Rank: Check this filter to remove impulse noise from an image. The pixels in the kernel are ranked by order of intensity, and the pixel in that range at the rank percentage is chosen for comparison. For example, in a 5x5 kernel, there are 25 pixels. A rank percentage of 95% would choose second-brightest pixel for comparison. If the difference between the selected pixel and the center pixel is greater than the threshold value, the Rank filter replaces the value of the center pixel with the value of the selected pixel.

Option :1. If one of the Enhancement filters is checked, the following options will be displayed:

3 x 3: Check 3 x 3 kernel will produce a more subtle filtering effect.

5 x 5: Check 5 x 5 kernel will produce a moderate filtering effect.

7 x 7: Check 7 x 7 kernel will produces a more extreme filtering effect.

Passes: Set the filter applied times on the image. When a filter is applied multiple times, its effect is amplified by each pass. An image that has been softened by one pass of the Low Pass filter will be softened further by a second pass.

Strength: Enter an applied value from 1-10 that reflects how much of the filtering effect on the image.

A value of 10 specifies the full strength (100%) of the filtered result applied to each pixel. Values less than 10 cut the full weight of the filter.

A value of 1 indicates that only 10% of the difference between the filtered pixel value and the original pixel value should be applied, a value of 2 indicates that 20% of the difference should be applied, and so forth.

Rank: This value specifies which pixel in the sorted array will be used to replace the center pixel. Pixels in the array will be sorted in ascending order. The pixels are indexed from 0 to Kernel Size x Kernel Size-1. In the pixel index 0 corresponds to the lowest pixel value.

The Rank will be specified in terms of a percentage of the indexes (Kernel Size x Kernel Size-1). A 50% Rank means the middle of the array. 0% rank means the lowest index (lowest gray value), and 100% rank means the highest index (highest gray value).

Option: 2. If the Equalization filter is checked, the options will relate to the histogram equalization. Local Histogram Equalization modifies the contrast of an image based on the pixel values in a small window surrounding each pixel.

Window: Image pixels statistics (min, max, histogram, mean, standard deviation, etc.) will be calculated on a small Window of the image. These measurements are then used to derive the local contrast for that area of the image. In short, an area of Window x Window around each pixel is all that is considered when modifying the intensities in the image. Larger Window produces smoother results, while small Window track small details more closely.

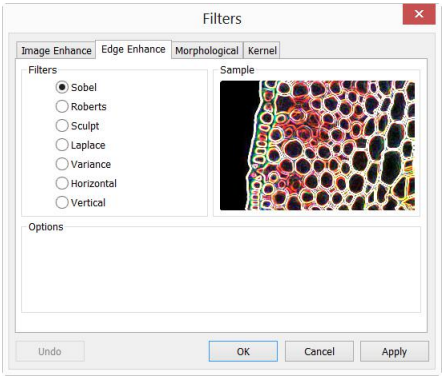
Best Fit: Choose the Best Fit button to optimize the values for the particular image. The results are achieved by stretching the local histogram to maximize the contrast between the brightest and darkest pixels in the local window region.

Linear: This option distributes the histogram linearly across the intensity scale. This function produces a high contrast image with the highest possible dynamic range.

Logarithmic: This option concentrates the histogram at the low end of the scale. This function produces a high contrast image with little dynamic image. It will tend to darken the image overall. It is useful for increasing the contrast in a very light image.

Exponen-tial: This option concentrates the histogram at the high end of the scale. This function produces a high contrast image with little dynamic image. It will tend to lighten the image overall. It is useful for increasing the contrast in a very dark image.

13.9.2 Edge Enhance



Sobel : Check this filter to enhance just the principal edges in an image. The Sobel applies a mathematical formula to a 3x3 neighborhood to locate and highlight its edges.

Roberts: Check this filter to enhance fine edges in an image. The Roberts filter is not a convolution filter. It applies a mathematical formula upon a 4 x 4 neighborhood to produce its effect. The upper left pixel in the neighborhood is the one that is replaced.

Sculpt: Check this filter to apply a sculpted effect on the image.

Horizontal: Check this filter to detect and emphasize horizontal edges.

Vertical: Check this filter to detect and emphasize vertical edges.

Options : 1. If one of the Edge filters has been checked, the options will relate to kernel size and filtering strength. The following options will be displayed:

3 x 3: Check 3x3 kernels to produce a more subtle filtering effect.

5 x 5: Check 5x5 kernels to produce a moderate filtering effect.

7 x 7: Check 7x7 kernels to produce a more extreme filtering effect.

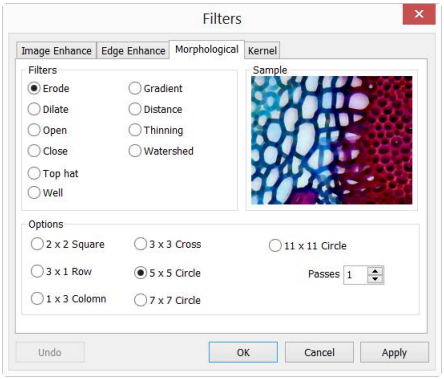
Passes: Enter the number of times that the filter will be applied to the image. When a filter is applied multiple times, its effect is amplified by each pass. An image that has been softened by one pass of the Image Enhancement Filter, will be softened further by a second pass.

Strength: Enter a value from 1-10 that reflects how much of the filtering effect to

apply to the image. A value of 10 specifies that the full strength (100%) of the filtered result will be applied to each pixel. Values less than 10 cut the full weight of the filter - a value of 1 indicates that only 10% of the difference between the filtered pixel value and the original pixel value should be applied, a value of 2 indicates that 20% of the difference should be applied, and so forth.

Option 2. If Sobel or Roberts is checked, no options are available.

13.9.3 Morphological



Erode: Check this morphological filter if one wants to modify the size of objects in the image. The Erode filter erodes the edges of bright objects and enlarges the edges of dark ones.

Dilate: Check this morphological filter if one wants to modify the size of objects in the image. The Dilation filter dilates bright objects and erodes dark ones.

Open: Check this morphological filter if one wants to modify the shape of objects in the image. Assuming the image contains bright objects on a dark field, the Open filter will smooth object contours, separate narrowly connected objects, and remove small dark holes.

Close: Check this morphological filter if one wants to modify the shape of the objects in the image. Assuming the image contains bright objects on a dark field; the Close filter will fill gaps and enlarge protrusions to connect objects that are close together.

Tophat: Check this filter to detect and emphasize points, or grains, that are brighter than the background. There are 3 kernel sizes for this processing. Click the radio

button to change the kernel size to the value that most closely matches the size of the grains to detect.

Well: Check this filter to detect and emphasize points, or grains, that are darker than the background. There are 3 kernel sizes for this processing. Click the radio button to change the kernel size to the value that most closely matches the size of the grains to detect.

Gradient: Check this filter to enhance edges in an image.

Watershed: Check this filter to separate objects that are touching. The Watershed filter erodes objects until they disappear, then dilates them again, but will not allow them to touch. The Watershed filter will not operate upon True Color images. If one wants to separate objects in a True Color image, he must first convert it to Gray Scale (see Process Frame: Image>Gray Scale).

Thinning: Check this filter to reduce an image to its skeleton. When choosing this filter, one must set the threshold that determines whether a pixel is part of the subject or part of the background (see Options below). The Thinning filter will not operate upon True Color images. If one wants to thin a True Color image, he must first convert it to Gray Scale.

Distance: The distance filter is used to show the distances of pixels within blobs to the outer boundaries of those blobs. After applying the distance filter, the background will be black (i.e. pixels with value 0). Only the area within the blobs will have non-zero values (will be white). The values of each pixel within the blob will be a count of the shortest distance from that pixel to the edge of the blob. Thus, all pixels along the blob's border will have a value of 1 (since they are one pixel away from the edge of the blob); pixels that are a distance of 2 from the border will have the value 2, and so on. This creates a distance map of the image. The Distance filter will not operate upon True Color images. If one wants to use the Distance filter with a True Color image, he must first convert it to Gray Scale.

Options 1. If Erode, Dilate, Open, or Close filters is checked, the options will relate to the kernel size and shape. The following options will be presented:

2 x 2 Square: Check to use the 2x2 square kernel configurations.

3 x 1 Row : Check to use the 3x1 row kernel configuration.

1 x 3 Column : Check to use the 1x3 column kernel configuration.

3 x 3 Cross : Check to use the 3x3 cross kernel configuration.

5 x 5 Circle : Check to use the 5x5 circular kernel configurations.

7 x 7 Circle : Check to use the 7x7 circular kernel configurations. This is a two-pass filter, accomplished using a 5 x 5 circle followed by a 3x3 cross.

11 x 11 Circle : Check to use the 11 x 11 circular kernel configurations. This is a three-pass filter, accomplished using a 5 x 5 circle followed by another 5 x 5 circle, followed by a 3 x 3 cross.

Passes: Set the number of times iterate the filter.

Note: The circular kernels are especially effective on round objects (cells, grains and so on) because their circular configuration preserves the circular shape of the objects better than square configurations.

Option 2. If the Tophat, Well, or Gradient filter is selected, the options will relate to kernel size and shape. The following options will be presented:

3 x 3: Check to use the 3x3 square kernel configurations.

5 x 5: Check to use the 5x5 square kernel configurations.

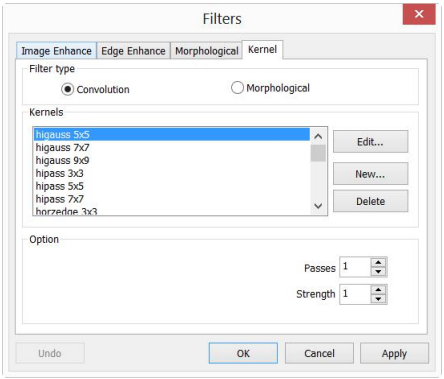
7 x 7: Check to use the 7x7 square kernel configurations.

Option 3. If Watershed, Thinning, or Distance filter is checked, the options will relate to the threshold. The following option will be presented:

Threshold: Enter a percentage value from 1-100 that specifies the intensity value to binarize the image. For example, a Threshold of 50% on a Gray Scale image would set all values ≤127 to 0 (black) and all values ≥128 to the maximum value for that image class (white).

13.9.4 Kernel

The Kernel page allows edit the kernel files for the morphological and convolution filters.



Note: The HiPass, LowPass, Laplacian and Unsharp kernel files are used by the HiPass, LowPass, Laplacian, and Sharpen options listed in the Image Enhancement Filters page dialog window (i.e. there is no difference between selecting one of these kernel files and selecting its Option button in the Filter window -- the 2 methods ultimately do the same thing). Because these kernel files are essential to the operation of these filtering options, they must not be deleted or renamed.

Filter type: Check to modify the kernel for a selected Filter type, either Convolution or Morphological filters.

Edit•••: Invoke the Edit Kernel dialog to modify the selected filter kernel.

Name•••: This combobox contains the name of the selected kernel file. If one wants to save the modified kernel file to the same file, leave it as it is. If one wants to save the file to a new location, enter the new filename here.

Kernel Size: Click the spin buttons or enter the number to change the size of the kernel. Either direction may take into account one to nine pixels. As one modifies the Kernel Size, the shape of the kernel representation changes accordingly. In the center of the dialog, there are white boxes containing coefficients that will be multiplied with each pixel that will be taken into account by the filter kernel. One can change any coefficient by clicking on it and adjust it as desired.

Fill: Click this button to fill every element of the kernel with a particular value. The Fill kernel dialog appears. One may enter a value between 0 and 10. Using the Fill button is useful for setting all coefficients to the same value. One may

then change the coefficients that require a different value.

Offset: The pixel whose value is being modified is usually the center-most pixel. One may, however, designate any pixel. GXCAPTURE-T signals the pixel to be changed by putting a box around it. Choose the X and Y Offset spin buttons to apply

New•••: Click to create a new filter kernel. The Edit Kernel dialog will appear. The functions of the dialog are the same way as the dialog for Edit••• described above), with the exception that the file name for the new kernel file must be provided.

Delete: Click to delete the selected filter kernel file.

Options: The choices in this group box will vary depending upon the kind of selected filter.

13.10 Image Stacking•••

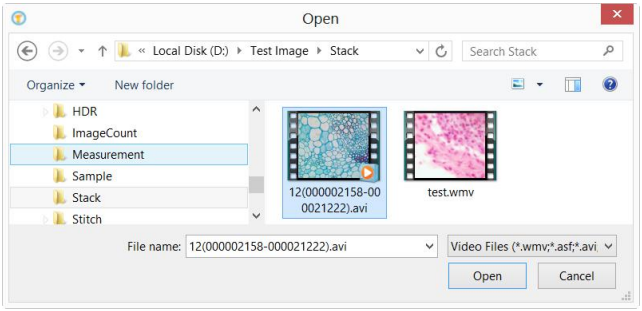
The image-stacking method is a form of speckle imaging commonly used for obtaining high quality images from a number of short exposures with varying image shifts. It has been used in astronomy for several decades, and is the basis for the image stabilization feature on some cameras. The method involves calculation of the differential shifts of the images. This is easily accomplished in astronomical images since they can be aligned with the stars. Once the images have aligned, they are averaged together. It is a basic principle of statistics that variation in a sample can be reduced by averaging together the individual values. In fact, when using an average, the signal-to-noise ratio should be increased by a factor of the square root of the number of images.

Image stacking can also be used for biological microscope image and florescent microscope image to increase the image SNR and dynamical ranges; this is why we introduce image stacking into GXCAPTURE-T.

GXCAPTURE-T Image Stacking introduced advanced image matching techniques for rotated, shifted and scaled images. The user can record a short video to get a high quality stacked image at ease without considering the image rotation, shifting and scaling between a series of images in the video. The steps of Image Stacking are

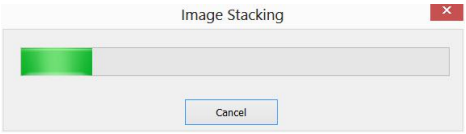
described as below:

1. Choose Processing>Image Stacking••• menu, a Windows Open dialog will pop up as shown below;

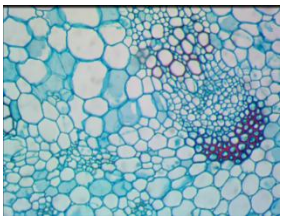


2. Choose the right video file recorded before in the Open dialog, here we can open "test.avi" for demonstration, click Open to open the avi file;

3. Then an Image Stacking dialog will pop up to show the progress of the each image's stacking progress.



4. If Cancel is pressed, the Image Stacking will be canceled. After the stacking is finished, a stacked image will be displayed in a new window for further application. The final image is shown as below. One can find the stacked image signal to noise ratio is greatly improved. From the stacked image has some black edges, this is because the images in the video is moved and in the stacking process, GXCAPTURE-T will added 0 to the image area that has no corresponding pixel in the reference image (we choose the first image in the video file as the reference image).

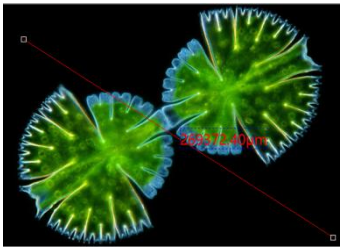


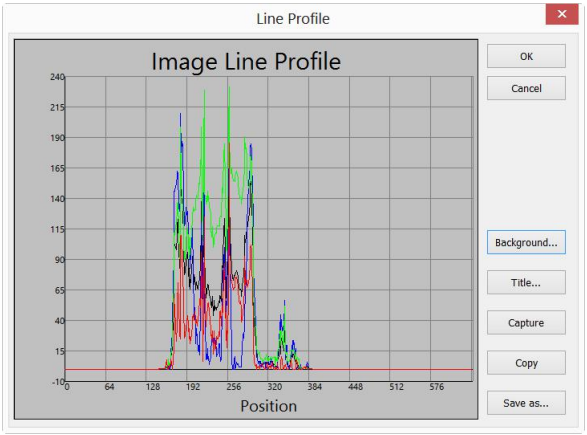
Note: a. GXCAPTURE-T support wmv，asf，avi，mp4，m4v，3gp，3g2，3gp2，3gpp，mov，mkv，flv，rm，rmvb for Image Stacking operation; b) In the Image Stacking process, GXCAPTURE-T takes the first frame as the reference image, this means the first frame is very important and should be assure the first frame to be the right image scene and the subsequent frames have a greater overlap region with the first frame.

13.11 Line Profile•••

Choose the Process>Line Profile••• command to illustrate how pixels along a selected line are distributed by graphing the number of pixels at each color intensity level.

Choose the Measurements>Arbitrary Line, or Measurements>Horizontal Line or Measurements> Vertical Line command to draw a line on the image and choosing the Process>Line Profile will bring up a Line Profile dialog as below(The procedure can be inversed):





Line Profile: In a Line Profile, the X-axis represents the spatial scale, and the Y-axis represents the intensity values which range from 0 to 255. If the image is a gray scale image, the gray value will be profiled. If the image is a HSV color image, the R,G and B values will be profiled separately with the corresponding R, G and B colors

Background: Open the windows color dialog to set the background color of the profile window;

Title: Use this command to set a title on the Line Profile image;

Capture: Capture the image in the Line Profile window as a new untitled image;

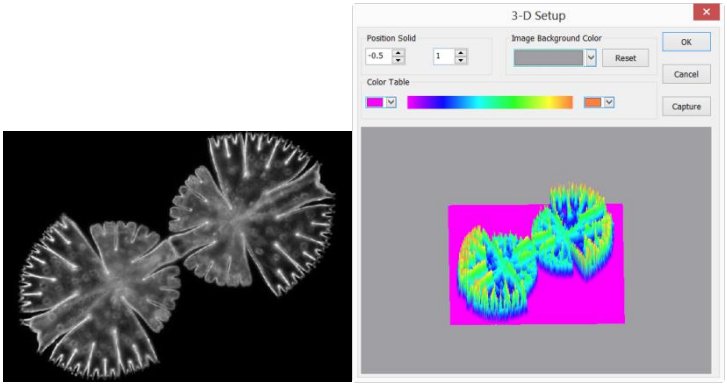
Copy: Copy the Line Profile window's content onto the clipboard;

Save as•••: Save the Line Profile image in bmp format.

13.12 Surface Plot•••

The Process>Surface Plot••• (or 3-D Plot) tool creates a 3-D representation of the intensity of an image. When choosing the Surface Plot command, keep in mind that X=image width and Y=image height, and Z=pixel gray value.

In the viewpoint window, the elevation and rotation of the image can be adjusted by dragging the mouse on the image.



Position Solid: The left edit control indicates the relative position of the entire image in the viewpoint window, whose default value is 0.5. The right edit control indicates the relative height of the display of the Z scale, whose default value is 1.

Reset: Set the Position Solid's two edit controls to their default values.

Image Background Color: Choose this command to display a color dialog where one can adjust the background color of the viewpoint window.

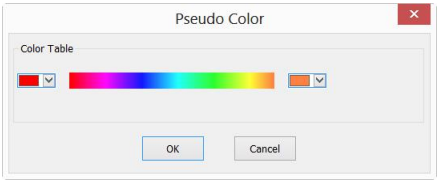
Capture: Capture the active image in the viewpoint window as a new image.

Color Table: Select the colors to map the gray values found in the surface plot. The button at each end of the Color Table brings up the color dialog, which allows select the start and end colors of the range. (Please refer to Pseudo Color for more information)

13.13 Pseudo Color●●●

Note: Image must be in Gray Scale.

Choose the Pseudo Color command to "colorize" the active monochromatic image. This is used to highlight certain features in a gray scale image such as display all densities above a certain point in red, or, the imaging device recorded thermal information, all temperatures below a certain point can be revealed in blue color.



When Pseudo Color a monochromatic image, a special palette need to be build with which the monochromatic image is displayed. Pseudo Coloring an image does not modify the pixels' values in image bitmap (it does not convert image to true color or palette). It simply associates a Pseudo Color palette with the image that interprets the gray-level values in the image as color.

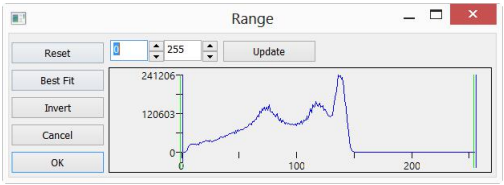
Pseudo Colored images are very similar in structure to palette class images, but they differ in a couple of important ways. First, the pixels' values in a Pseudo Colored image actually represent continuous-tone intensity information, whereas a palette image's pixels carry no intensity significance. Secondly, a palette image includes a palette table that is actually part of the image file.

The colors used to map the gray values can be selected. The buttons at each end of the color strips ( or ) will bring up the color dialog separately, which allows select the start and end colors of the range.

13.14 Range••• Shift+R

The Process>Range••• command allows set the intensity levels of the image to increase the contrast and enhance the display in low-light situations. Choose the Range command to open the Range dialog.

Two vertical markers show the upper and lower limits of the intensity levels. These markers can be moved with mouse through the drag and drop method. For a color image, the histogram will reflect the red, green, and blue values with corresponding colors lines.



Two Edit controls indicate the values of the intensity levels. Choose the spin buttons to increase or decrease these values. All values between 0 and the lower limit will be black and all values between the upper limit and the upper end of the scale will be white. These two edit control values corresponding to the two vertical markers show the upper and lower limits of the intensity levels. Defaults are o and 255 respectively.

Reset: The Reset button allows Reset the black and white levels to the high and low ends of the dynamic Range.

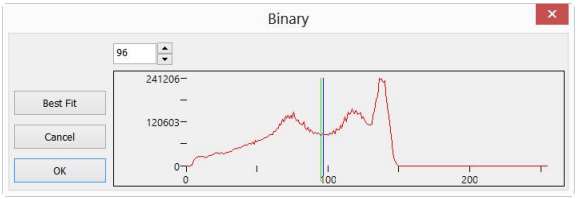
Best Fit: The Best Fit button automatically sets the intensity levels to the Best Fit. Best Fit instructs GXCAPTURE-T to optimize the brightness and contrast values for the particular image.

Invert: The Invert button reverses the color of the image.

Update: Update will refresh the display Range with the most current image information.

13.15 Binary●●● Shift+B

Binary is a kind of gray level process. If the gray of the pixel is greater than the given threshold, the pixel's color will be changed into white. Otherwise, the pixel's color will be changed into black. Although the process may lose some information, it is an important step of other processes.



The curve on the Binary dialog shows the gray distribution of the image.

The Line in the dialog indicates the threshold value. Drag the line to change the threshold, or change the value in the Line position edit box (in the top left corner of the dialog) to move the Line.

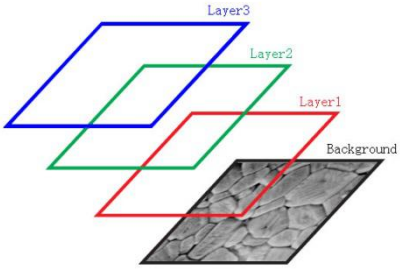
The Line position edit box shows the current position value of the Line; Modify the value will move the Line at the same time;

Click the "Best Fit" button to apply the auto threshold process to the image. It uses an automatic threshold to make the image Binary.

14 Layer

14.1 About layer

GXCAPTURE-T Layer is like sheets of stacked acetate. You can see through transparent areas of a Layer to the Layers below. You add a Layer to position the Objects content on the Layer, like sliding a sheet of acetate in a stack. You can also hide/show a layer to make content invisible/visible.



You use layers to perform tasks such as perform the Measurement on the image without polluting the image and save it for the future adjustment or further analysis.

14.2 Organizing layers

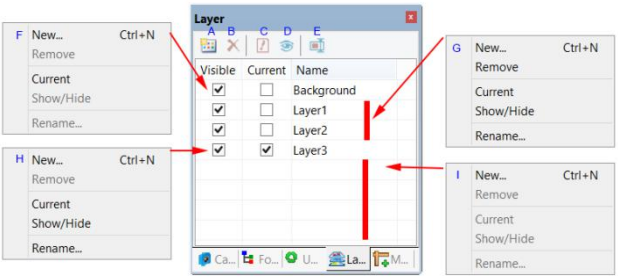
A new image has a single Layer called Background layer. The number of additional layers you can add to an image is limited only by your computer's memory.

You work with layers in the Layers Sidebar. The Layer Sidebar help you organize and manage layers just like the Layer menu.

14.3 Layers for non-destructive measurement and label

Rather than edit image pixels directly, you can label the image with text and measure the image and leave the underlying pixels unchanged. Because of the non-destructively to images, you can later tweak or remove the label and the Objects.

14.4 Layer Sidebar



A: Make a New layer;

B: Remove a layer;

C: Set the Current layer;

D: Show/Hide a layer;

E:Rename a layer;

F: Right mouse button context menu for the Background layer;

G: Right mouse button context menu for the Current not checked layer;

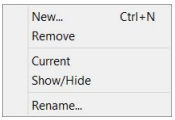
H: Right mouse button context menu for the Current checked layer;

I : Right mouse button context menu in the blank area;

Note: a). Only one layer can be checked as Current Layer. If a layer's "Current" is checked, the Visible will be checked automatically; b). The Current and Background layers cannot be removed. Only the non-current and non- background layers can be removed; c). All the Objects on the Current Layer can be selected, edited or exported; d). The non-current Layer can be Visible (checked) or invisible (unchecked).

14.5 Layer menu and layer sidebar page context menu

The function of the Layer menu and Layer Sidebar right mouse button context menu are the same. They are:



14.6 New••• Ctrl+N

Setup a new layer. After the new layer is setup, it will be added to the end of the Layer Sidebar's items and the Visible and Current will be checked.

14.7 Remove●●● 

Remove the non-current Layer.

Note: the Background and Current Layer cannot be removed.

14.8 Current●●● 

Set the selected layer as the Current Layer. User then can edit the Object on the Current Layer or added new Object on the Current Layer.

14.9 Show/Hide●●● 

Set the non-current Layer visible or invisible. The Current Layer cannot be toggled between Visible and invisible state. It is always Visible.

14.10 Rename●●● 

Rename a Layer.

14.11 Export to Image F2

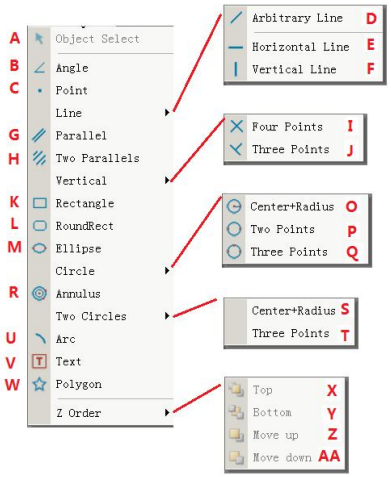
Export all the layers' Objects to the image, this will pollute the image and cannot be recovered anymore.

14.12 Export to Microsoft Excel  F3

Export the image plus all the Objects on the Current Layer to the Excel file.

15 Measurements

The Measurements menu is mainly used for the image measurement. With this menu, you can measure the image with many geometrical shape at ease. GXCAPTURE-T use Layer technique to manage the measurement object. This will never pollute the image pixels. The Measurements menus and its submenus are shown below.



About the Layer technique, please check the Layer menu and Layer Sidebar in Sec.14.

About the Measurements setup, please check Options>Measurement••• and Measurement Sidebar in View>Sidebar menu in Sec.8.

About the Measurements menu's toolbar buttons, please check GXCAPTURE-T's toolbar in Sec.4: UI toolbar.

15.1 Object Select

The Measurements>Object Select menu or the toolbar button  will be enabled only when a new Measurement is made over the Background Layer.

After the Measurement is done on the specific layer, choose this menu to select the Objects.

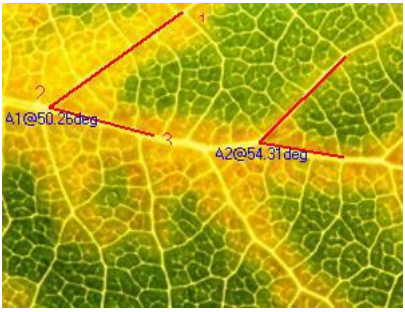
1. The Object can be selected by clicking on it;

2. Select a group of Objects by including them in a rectangular area with Object Select command or by press down the Shift key and clicking the Object with left mouse button until all the desired Objects are selected.

Note: a) To check or modify the parameters of the selected Object, just select a single Object and the Measurement Sidebar will be activated automatically. Here you can edit the corresponding object parameters to modify its properties; b) The Appearance, Coordinates on Measurement Sidebar will be enabled only when a single Object is selected. The Calculation will be effective for a single selected Object or multiple selected Objects. Its calculated items will depend on the selected Object type (The type could be the same or different).

15.2 Angle 

15.2.1 Angle (3 Points) 



1. Move the mouse on the image to point 1, mark it by clicking the left mouse button;

2. Move the mouse to point 2, mark it by clicking the left mouse button;

3. Move the mouse to point 3, mark the final point by clicking the left mouse button. A label 50.26° will be shown near point 2;

15.2.2 Angle (4 Points) 

1. Move the mouse on the image to point 1, mark it by clicking the left mouse button;

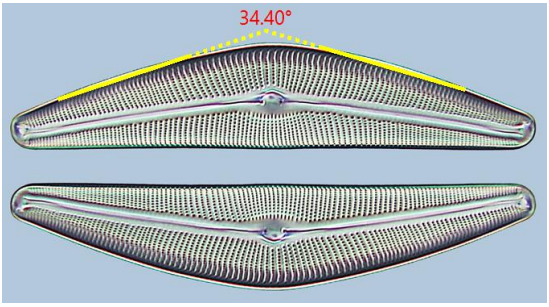
2. Move the mouse to point 2, mark it by clicking the left mouse button; Point 1 and point 2 will be connected automatically to form L12

3. Move the mouse to point 3, mark the final point by clicking the left mouse button.

4. Move the mouse to point 4, mark it by clicking the left mouse button; Point 3 and point 4 will be connected automatically to form L34

After the above process, L12 and L34 will be extended with the dot line to form an angle between L12 and L34.

A label 34.40° will be shown near vertex;



15.3 Point

Move mouse to the point; click the left mouse to mark it. It will show the point Label Pn and its position x and y over the image.

Note: a) To check or modify the parameters of the selected Object, just select a single Object and the Measurement Sidebar will be activated automatically. Here you can edit the corresponding Object parameters to modify its properties; b) The

Appearance, Coordinates on Measurement Sidebar will be enabled only when a single Object is selected. The Calculation will be effective for a single selected Object or multiple selected Objects. Its calculated items will depend on the selected Object type (The type could be the same or different).

15.4 Line

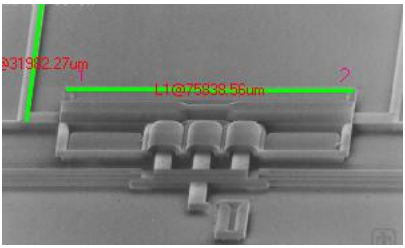
15.4.1 Line>Arbitrary Line

Draw Arbitrary Line between the two points on the specified layer.

1. Choose the Measurements>Line> Arbitrary Line command;

2. Move mouse to the 1st point; click the left mouse to mark it;

3. Move mouse to the 2nd point, click the left mouse to mark it again, a line with L1 and its length will be shown.



Note: a) To check or modify the parameters of the selected Object, just select a single Object and the Measurement Sidebar will be activated automatically. Here you can edit the corresponding Object parameters to modify its properties; b) The Appearance, Coordinates on Measurement Sidebar will be enabled only when a single Object is selected. The Calculation will be effective for a single selected Object or multiple selected Objects. Its calculated items will depend on the selected Object type (The type could be the same or different).

15.4.2 Line> Horizontal Line

Draw a Horizontal Line between the two points on the specified layer. When the 1st point is marked, the 2nd point's y coordinate will be restricted to equal to the first point's y coordinate automatically.

Note: a) To check or modify the parameters of the selected Object, just select a single Object and the Measurement Sidebar will be activated automatically. Here you can edit the corresponding Object parameters to modify its properties; b) The Appearance, Coordinates on Measurement Sidebar will be enabled only when a single Object is selected. The Calculation will be effective for a single selected Object or multiple selected Objects. Its calculated items will depend on the selected Object type (The type could be the same or different).

15.4.3 Line> Vertical Line 

Draw a Vertical Line between the two points on the specified layer. When the first point is marked, the second point's x coordinate will be restricted to equal to the first point's x coordinate automatically.

Note: a) To check or modify the parameters of the selected Object, just select a single Object and the Measurement Sidebar will be activated automatically. Here you can edit the corresponding Object parameters to modify its properties; b) The Appearance, Coordinates on Measurement Sidebar will be enabled only when a single Object is selected. The Calculation will be effective for a single selected Object or multiple selected Objects. Its calculated items will depend on the selected Object type (The type could be the same or different).

15.5 Parallel 

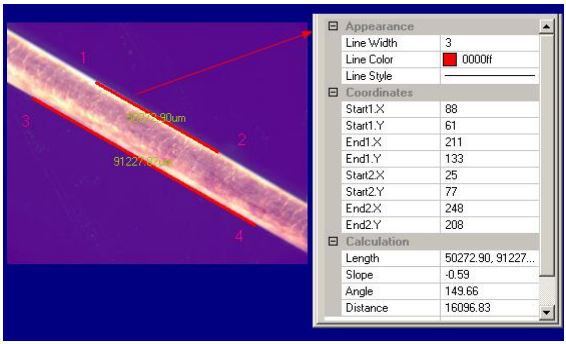
1. Choose the Measurements>Parallel command;

2. Move mouse and click to mark the 1st point;

3. Move mouse and click to mark the 2nd point;

4. Move mouse and click to mark the 3rd point;

5. Move mouse again, one will find the 4th point is always restricted to parallel to the line connecting point 1 and point 2. Click to mark the 4th point. Two parallel lines will be labeled and numbered.



Note: a) To check or modify the parameters of the selected Object, just select a single Object and the Measurement Sidebar will be activated automatically. Here you can edit the corresponding Object parameters to modify its properties; b) The Appearance, Coordinates on Measurement Sidebar will be enabled only when a single Object is selected. The Calculation will be effective for a single selected Object or multiple selected Objects. Its calculated items will depend on the selected Object type (The type could be the same or different).

15.6 Two Parallels

1. Move mouse and click its left button to mark the 1st point.

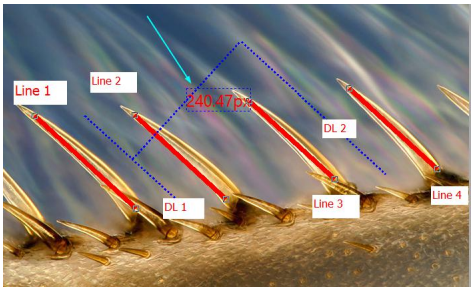
2. Move mouse and click its left button to mark the 2nd point. Line 1 (the 1st line) connect these two points will be overlaid on the image

3. Move mouse and click its left button to mark the 3rd point.

4. Move mouse again, one will find the 4th point is always restricted to parallel to the Line 1 connecting point 1 and point 2. Click to mark the 4th point. Line 2 will be drawn which is parallel to Line 1. A dot line DL 1 located at the center of Line 1 and Line 2 will also be marked. Thus the 1st parallel is finished.

5. Repeated step 1~4 will draw Line 3 and Line 4. A dot line DL 2 located between the center of Line 3 and Line 4 will also be marked. Thus the 2nd parallel is finished.

6. GXCAPTURE-T will label the distance between DL1 and DL2 in with Unit specified in the Unit combo box. The final result is shown below:



15.7 Vertical

15.7.1 Vertical>Four Points.

1. Move mouse and click its left button to mark the 1st point.

2. Move mouse and click its left button to mark the 2nd point. A line (the 1st line) connect these two point be overlaid on the image

3. Move mouse and click its left button to mark the 3rd point.

4. Move mouse again, one will find the 4th point is always restricted to perpendicular to the line of point 1 and point 2. Click to mark the 4th point. Two vertical lines will be labeled and numbered.

Note: a) To check or modify the parameters of the selected Object, just select a single Object and the Measurement Sidebar will be activated automatically. Here you can edit the corresponding Object parameters to modify its properties; b) The Appearance, Coordinates on Measurement Sidebar will be enabled only when a single Object is selected. The Calculation will be effective for a single selected Object or multiple selected Objects. Its calculated items will depend on the selected Object type (The type could be the same or different).

15.7.2 Vertical>Three Points 

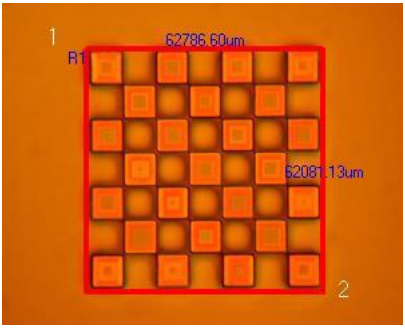
1. Move mouse and click its left button to mark the 1st point;

2. Move mouse and click its left button to mark the 2nd point. A line (the 1st line) connecting these two points will be overlaid on the image;

3. Move mouse and click its left button to mark the 3rd point. The 2nd line will be overlaid on the image which is perpendicular to the 1st one.

Note: a) To check or modify the parameters of the selected Object, just select a single Object and the Measurement Sidebar will be activated automatically. Here you can edit the corresponding Object parameters to modify its properties; b) The Appearance, Coordinates on Measurement Sidebar will be enabled only when a single Object is selected. The Calculation will be effective for a single selected Object or multiple selected Objects. Its calculated items will depend on the selected Object type (The type could be the same or different).

15.8 Rectangle 



1. Move mouse to the 1st point; click its left mouse button to mark it;

2. Move mouse to the 2ed point; click its left mouse button to mark it. A Rectangle will be overlaid on the image according these two diagonal points.

Note: a) To check or modify the parameters of the selected Object, just select a single Object and the Measurement Sidebar will be activated automatically. Here you can edit the corresponding Object parameters to modify its properties; b) The

Appearance, Coordinates on Measurement Sidebar will be enabled only when a single Object is selected. The Calculation will be effective for a single selected Object or multiple selected Objects. Its calculated items will depend on the selected Object type (The type could be the same or different).

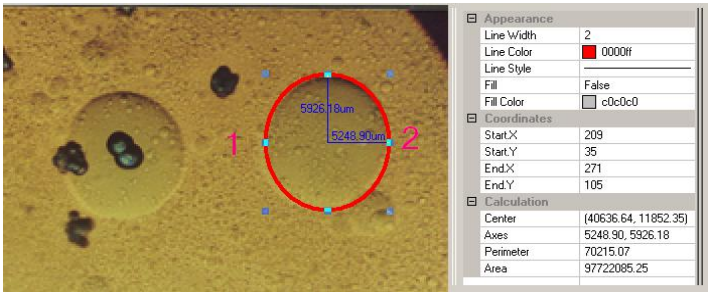
15.9 Ellipse 

1. Choose the Measurements>Ellipse command;

2. Move mouse to mark the 1st point;

3. Move mouse to mark the 2nd point;

4. If it is not superposing with the shape on the image, choose the Measurements>Object Select command to adjust the position to adjust the Ellipse in order to coincide with the image shape.

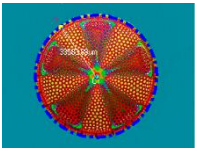


Note: a) To check or modify the parameters of the selected Object, just select a single Object and the Measurement Sidebar will be activated automatically. Here you can edit the corresponding Object parameters to modify its properties; b) The Appearance, Coordinates on Measurement Sidebar will be enabled only when a single Object is selected. The Calculation will be effective for a single selected Object or multiple selected Objects. Its calculated items will depend on the selected Object type (The type could be the same or different).

15.10 Circle 

15.10.1 Circle>Center+Radius 

Choose the Measurements>Circle>Center+Radius command to draw a circle with Center+Radius method on the specified Layer. Its radius is C1@33583.88um.



Note: a) To check or modify the parameters of the selected Object, just select a single Object and the Measurement Sidebar will be activated automatically. Here you can edit the corresponding Object parameters to modify its properties; b) The Appearance, Coordinates on Measurement Sidebar will be enabled only when a single Object is selected. The Calculation will be effective for a single selected Object or multiple selected Objects. Its calculated items will depend on the selected Object type (The type could be the same or different).

15.10.2 Circle>Two Points

Choose the Measurements>Circle>Two Points command to draw a circle with Two Points method on the specified layer.

Note: a) To check or modify the parameters of the selected Object, just select a single Object and the Measurement Sidebar will be activated automatically. Here you can edit the corresponding Object parameters to modify its properties; b) The Appearance, Coordinates on Measurement Sidebar will be enabled only when a single Object is selected. The Calculation will be effective for a single selected Object or multiple selected Objects. Its calculated items will depend on the selected Object type (The type could be the same or different).

15.10.3 Circle>Three Points

Choose the Measurements>Circle>Three Points command to draw a circle with Three Points method on the specified layer.

Note: a) To check or modify the parameters of the selected Object, just select a single Object and the Measurement Sidebar will be activated automatically. Here you can edit the corresponding Object parameters to modify its properties; b) The

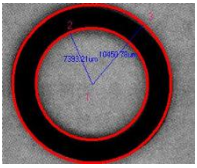
Appearance, Coordinates on Measurement Sidebar will be enabled only when a single Object is selected. The Calculation will be effective for a single selected Object or multiple selected Objects. Its calculated items will depend on the selected Object type (The type could be the same or different).

15.11 Annulus

1. Find the Annulus center 1 and click mouse button to mark the Annulus center;

2. Move mouse to let the first circle superpose with the image circle, clicking the mouse left button;

3. Move mouse to let the second circle superpose the image circle, clicking the left mouse button. Two radiuses with number and the units will be displayed on the Annulus;



Note: a) To check or modify the parameters of the selected Object, just select a single Object and the Measurement Sidebar will be activated automatically. Here you can edit the corresponding Object parameters to modify its properties; b) The Appearance, Coordinates on Measurement Sidebar will be enabled only when a single Object is selected. The Calculation will be effective for a single selected Object or multiple selected Objects. Its calculated items will depend on the selected Object type (The type could be the same or different).

15.12 Two Circles

15.12.1 Two Circle>Center+Radius

Draw two circles with Center+Radius method on the specified layer. After the two circles are drawn, a line connecting these two circle centers will be drawn.

Note: a) To check or modify the parameters of the selected Object, just select a single Object and the Measurement Sidebar will be activated automatically. Here you

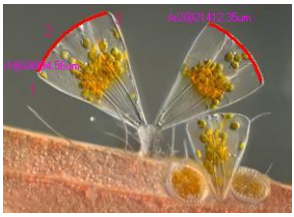
can edit the corresponding Object parameters to modify its properties; b) The Appearance, Coordinates on Measurement Sidebar will be enabled only when a single Object is selected. The Calculation will be effective for a single selected Object or multiple selected Objects. Its calculated items will depend on the selected Object type (The type could be the same or different).

15.12.2 Two Circle>Three Points

Draw two circles with Three Points method on the specified layer. After the two circles are drawn, a line connecting these two circle centers will be drawn.

Note: a) To check or modify the parameters of the selected Object, just select a single Object and the Measurement Sidebar will be activated automatically. Here you can edit the corresponding Object parameters to modify its properties; b) The Appearance, Coordinates on Measurement Sidebar will be enabled only when a single Object is selected. The Calculation will be effective for a single selected Object or multiple selected Objects. Its calculated items will depend on the selected Object type (The type could be the same or different).

15.13 Arc



1. Move mouse to mark the 1st point;

2. Move mouse to mark the 2nd point;

3. Move mouse to mark the 3rd point, then an Arc with Label and its Length will be drawn connecting these three points.

Note: a) To check or modify the parameters of the selected Object, just select a single Object and the Measurement Sidebar will be activated automatically. Here you can edit the corresponding Object parameters to modify its properties; b) The Appearance, Coordinates on Measurement Sidebar will be enabled only when a

single Object is selected. The Calculation will be effective for a single selected Object or multiple selected Objects. Its calculated items will depend on the selected Object type (The type could be the same or different).

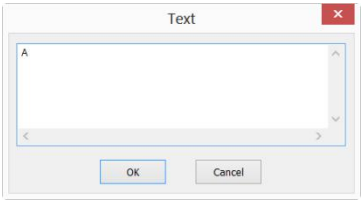
15.14 Text

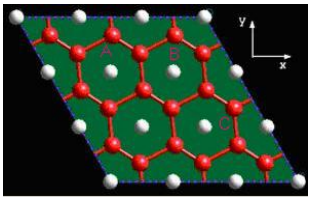
1. Choose the Measurements>Text command;

2. Move mouse to mark the 1st point;

3. Move mouse to mark the 2nd point, a rectangle with dash line restrict the Text window size. After the mouse button is released, a dialog called Text will bring up for you to enter the Text and define the Text, Frame styles and adjust the Text positions.

4. Enter the text and click the right mouse button to end the Text object.





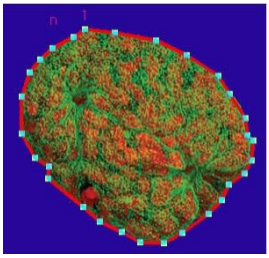
Note: a) To check or modify the parameters of the selected Object, just select a single Object and the Measurement Sidebar will be activated automatically. Here you can edit the corresponding Object parameters to modify its properties; b) The Appearance, Coordinates on Measurement Sidebar will be enabled only when a single Object is selected. The Calculation will be effective for a single selected Object or multiple selected Objects. Its calculated items will depend on the selected Object type (The type could be the same or different).

15.15 Polygon

1. Choose the Measurements>Polygon command;
2. Move mouse and click the left mouse button to mark the 1st point;
3. Move mouse and click the left mouse button to mark the 2nd point.

•••;

n. Move mouse and click the left mouse button to mark the nth point;
Click the right mouse button to end the Polygon command.



Note: a) To check or modify the parameters of the selected Object, just select a single Object and the Measurement Sidebar will be activated automatically. Here you can edit the corresponding Object parameters to modify its properties; b) The Appearance, Coordinates on Measurement Sidebar will be enabled only when a single Object is selected. The Calculation will be effective for a single selected Object or multiple selected Objects. Its calculated items will depend on the selected Object type (The type could be the same or different).

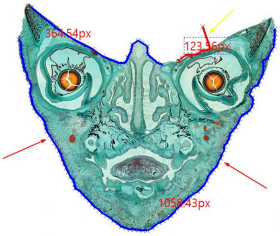
15.16 Curve

15.16.1 Curve>Model 1

1. Press down the left mouse button and move mouse according to the requirement to draw any curve in Model 1 format.

2. If the mouse left mouse button is released and move the mouse to a new position and then click the left mouse button again will draw a line to connect the last point.

3. Release the left mouse button and click the right mouse button to end Mode 1 Curve.



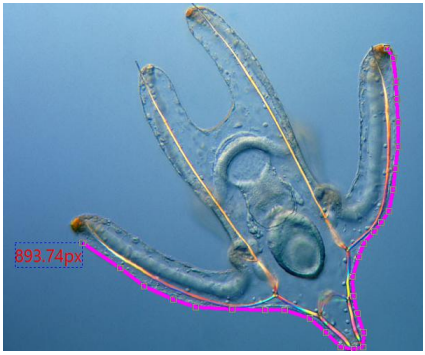
15.16.2 Curve>Model 2

The Model 2 Curve operation is almost the same that of the Polygon,

1. Choose the Measurements>Curve>Mode 2 command;
2. Move mouse to a point and click the left mouse button to mark the 1st point;
3. Move mouse to a point and click the left mouse button to mark the 2nd point.
4. •••;

n-1. Move mouse to a point and click the left mouse button to mark the (n-1)th point;

n. Move mouse to the final point and click the left mouse button to mark the nth point, then click the right mouse button to end the current Mode 2 Curve process.

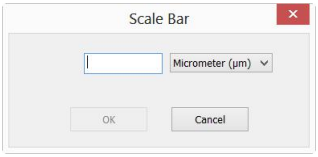


Choosing button can adjust the finished Model 2 Curve.

15.17 Scale bar

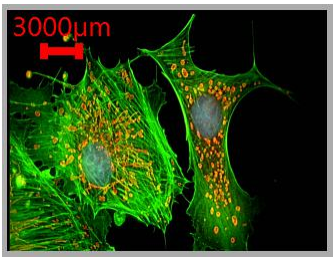
Choose the Measurements>Scale bar command will bring up a Scale Bar dialog as

below (if the Unit is not pixel):



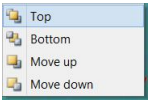
Input the number in the length edit box to determine the scale bar length. The Unit is chosen according to the current Unit in the Options>Measurement>Length Unit page. If the Unit is pixel, then Scale Bar dialog will be change to

Change the default value(100) to the desired length or directly click OK, a Scale bar will display on the image in measurement style. One can move the Scale bar to where ever he wants. The final result should be:



15.18 Z Order

The Z Order submenu is shown below:



Top: Modify the selected Object's relative position to the uppermost place of all Objects on the Current layer;

Bottom: Modify the selected Object's relative position to the lowest place of all Objects on the Current layer;

Move Up: Modify the selected Object's relative position to the higher place of the two on the Current layer;

Move Down: Modify the selected Object's relative position to the lower place of the two on the Current layer;

16 Options

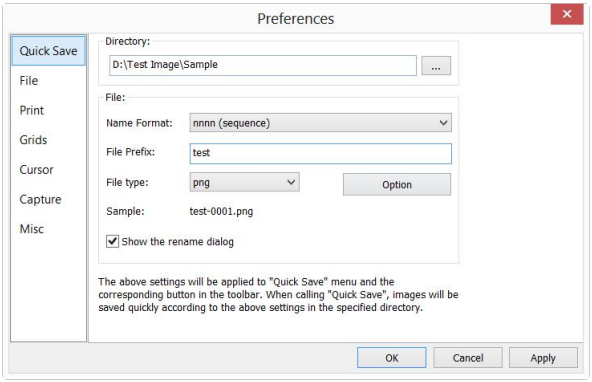
16.1 Preferences•••

There are 7 pages for the Preference dialog. They are Quick Save, File, Print, Grids, Cursor, Capture and Misc pages.

16.1.1 Quick Save Page

The File>Quick Save menu or the Quick Save icon on the toolbar will be enabled when a)a new image window with the captured image from the camera; b)an image window is created by choosing the File>Paste as New File menu.

File>Quick Save can save the file at quick way with no need to specify the file directory, file name and file format. All those are specified in Options>Preferences•••>Quick Save property page.



Directory: Enter the name of the drive and directory where the new image will be saved. You may either type the path information, or use the Browse button ... to locate it from a standard Browse Folder dialog;

Name Format: The year, month, date, hour, minute and second or nnnn(sequence) are used as part of the file name. If more files are saved with in a second, a (xx) suffix is attached to the end of Name Format to avoid the possible name confliction. For the nnnn(sequence) Name Format, no suffix is needed.

File Prefix: Enter a file name prefix for Quick Save when generating files names for a series of images. This prefix will be combined with Name Format to form a final file name naming paradigm.

File Type: In this combobox, select the format in which you want the image to be saved (can be BMP, JPG, PNG, TIF). Click Option button to set the different parameters for encoding the file (For BMP format, the Option will be disabled. See File>Save As••• menu about the details of the format encoding methods); If there are Objects over the image, the File Type will be chosen as "GXCAPTURE-T File Type (*.tft)" by GXCAPTURE-T.

Sample: The final file name is shown at the right of the Sample label for reference.

Show the rename file dialog: The file name can be renamed according to this item's setup. When this item is checked, a Rename dialog will pop up after choosing File>Quick Save command or click the Quick Save icon  on the toolbar. The new name can be specified again according to the requirement.

16.1.2 File Page

One can check a file Extension for the specified file Format and its Abbr.(abbreviation), to determine whether or not it will be displayed in the Browse window or not (The checked Format can be displayed in the Browse window).

Extension: Used to identify the file extension;

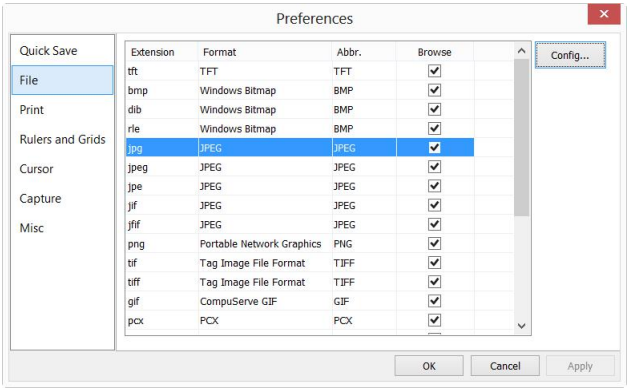
Format: English full name of file formats;

Abbr.: File Format's abbreviation;

Browse: Check/uncheck to determine whether or not the file format can be displayed in the Browse window;

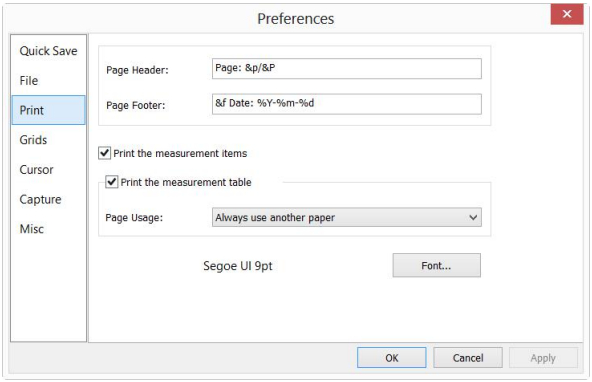
Config...: To configure the image file Save As Option for JPEG, Portable Network

Graphics, Tag Image File Format, CompuServ, JPEG 2000 Standard, JPEG Codestream. For details, please refer to the Option button explanation in the File>Save As dialog.



16.1.3 Print Page

One can set the Page Header and Page Footer in following format:



&f File Name

&p Current Page

&P Total Pages

%A Full weekday name

%b Abbreviated month name

%B Full month name

%c Date and time representation appropriate for locale

%d Day of month as decimal number (01 - 31)

%H Hour in 24-hour format (00 - 23)
%I Hour in 12-hour format (01 - 12)
%j Day of year as decimal number (001 - 366)
%m Month as decimal number (01 - 12)
%M Minute as decimal number (00 - 59)
%p Current local times A.M./P.M. indicator for 12-hour clock
%S Second as decimal number (00 - 59)
%U Week of year as decimal number, with Sunday as first day of week(00-53)
%w Weekday as decimal number (0 - 6; Sunday is 0)
%W Week of year as decimal number, with Monday as first day of week(00-53)
%x Date representation for current locale
%X Time representation for current locale
%y Year without century, as decimal number (00 - 99)
%Y Year with century, as decimal number
%z %Z Time-zone name or abbreviation; no characters if time zone is unknown
%% Percent sign

For example:

Choosing &f Date:%Y-%m-%d will print the file name and Date with yyyy-mm-dd format on the page header.

Choosing Page:&p/&P will print Page: 01/11 on the page footer(Suppose the current page is page 1 and the total pages is 11).

Print the measurement item: If there are measurement item overlaid on the image, check it will print these objects on the image. Measurement Sheet on the page;

Print the measurement table: If there are measurement item overlaid on the image, check it will print these objects' Measurement Sheet on the page with;

Always use another paper: Print the Measurement Sheet data on a separate page;

Auto: Print the Measurement Sheet data just behind the image (if the image and data can be arrange in a single page) of on a separate page (if not);

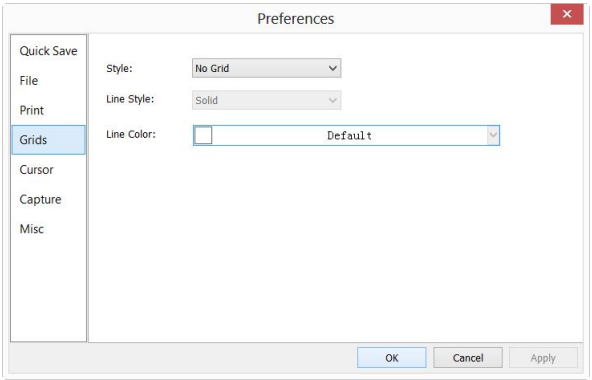
Do not use another paper: Print the Measurement Sheet data just behind the image page;

Font: Choose the Font for the data.

16.1.4 Grids Page

Choosing the View>Grid>Setting••• command, or choosing the Preference>••• command and clicking the Grids page realize the same function.

Choosing the Preference>••• command and clicking the Grids page can set the Grid Style, Line Style, and Line Color for the Grid overlaid on the video and image window can also be set.



Grid Style: The Grid Style can be No Grid, Auto Grid or Manual Grid. Default is No Grid;

Grid Line Style: The Line Style for the grid can be Solid, Dash, Dot or DashDot et al. Default is Solid;

Grid Line Color: The color of the grid line. Default is Red (255,0,0).

16.1.5 Cursor Page

This command will set the mouse cursor for the video and image window operations.

Select the Horizontal cross in:

None (window default), Single (single line), Double(1 Pixel), Double(3 Pixels), Double(5 Pixels), Double(7 Pixels), and Double(9 Pixels) formats.

Select the Vertical cursor in:

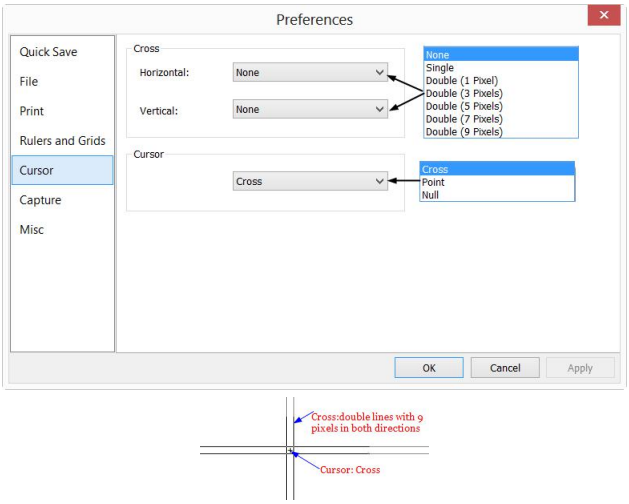
None (window default), Single (single line), Double(1 Pixel), Double(3 Pixels),

Double(5 Pixels), Double(7 Pixels), and Double(9 Pixels) formats.

Single means single line. Double means two parallel lines. 1 Pixel means the line space between the two lines is 1 pixel in distance. The other sizes also have this meaning.

Select the cursor shape from Cross, Point, and Null.

In the figure below, a cursor with Double horizontal and vertical lines with 9 Pixels cross (for the alignment application, the longer one) and the Cursor as a Cross was defined



16.1.6 Capture Page

If one wish to capture an image with many Objects overlaid on the video window, the following settings should be defined first.

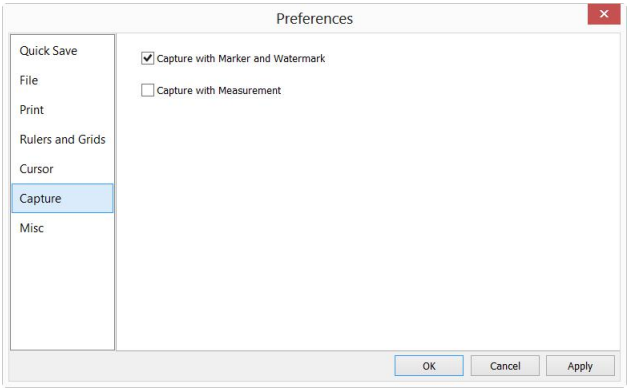
1.Choosing the Options>Preferences•••>Capture command, a dialog called Preferences will be brought up as shown below;

2.Clicking the Capture page and then checking Capture with Marker and Watermark or Capture with Measurement;

3.Click Ok to end the setup, or Apply to apply the setup, or Cancel to cancel the setup.

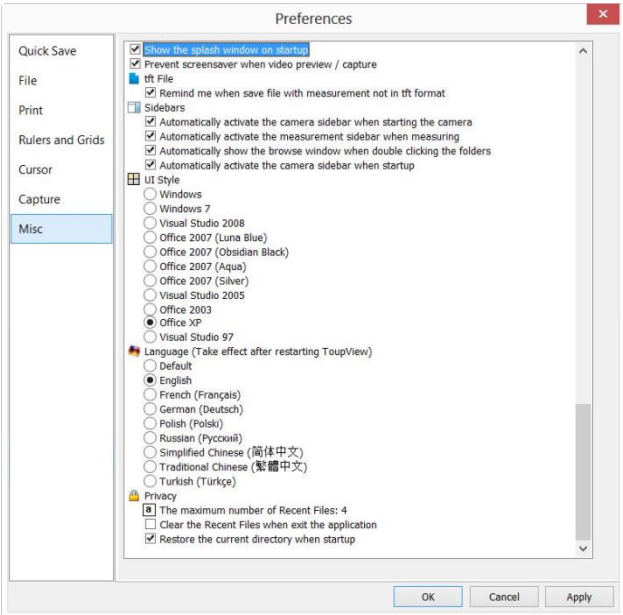
4.After the above steps are finished, if there are Marker, Watermark or Objects overlaid above the video, choosing the Capture>Capture Image or clicking 

on the Camera Sidebar will capture the image with Marker, Watermark or Objects overlaid on the image.



16.1.7 Misc Page

The Misc page is mainly used for the control of the GXCAPTURE-T UI. It mainly includes:



1. GXCAPTURE-T' special file format warning information;
2. Sidebars;
3. UI Style;
4. Language;
5. Privacy;

settings et al.

16.2 Measurements●●●

This sheet has many pages. They are:

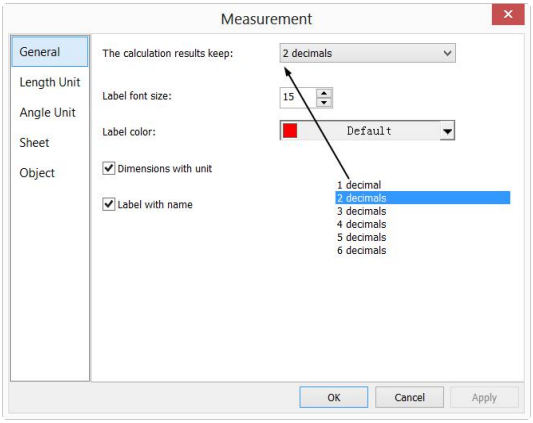
16.2.1 General page

The General page is shown below:

The calculation results keep: The combo box allows you to set the calculation results accuracy among 1decimal and 6 decimals. Default is 2 decimals;

Label font size: The Label is used to display the Objects dimensions. the Label font size is among 5 and 15; Default is 15;

Label Color: The Label Font color for the Objects dimensions; Default is red;



Dimensions with unit: If this box is checked, the Dimension will be displayed together with the unit for the Objects. If unchecked, only the Dimension will be displayed with the Objects.

Label with name: Checking Label with name will add a Prefix before the Objects

number. The Prefix for the different Object can be specified in the Measurement Sidebar where there is an item called: Name. Here, we show an example for Line Object with and without Prefix L1 as below:

16.2.2 Length Unit page

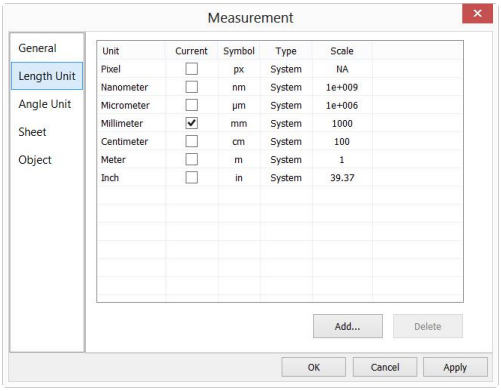
Length Unit page: One can select the Length Unit for the Measurements menu's Objects on the Layer Measurement operation.

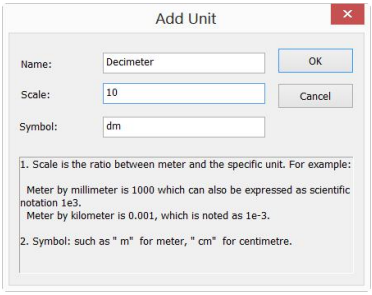
Unit: The system unit defined by the GXCAPTURE-T. It cannot be deleted;

Current: The Unit selected or checked;

Type: Type of unit. It can be System (Defined by GXCAPTURE-T) or User (Defined by the user) type;

Scale: Represents the ratio of "Meter by unit". For example, if the unit is μm, then "Meter by μm" should be 1000000, the Scale should be 1e+6;

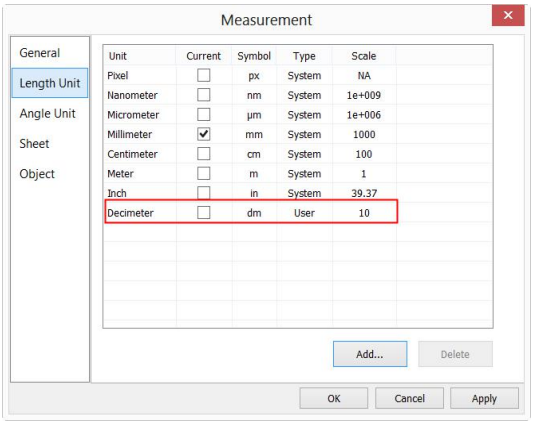




Add: User can also define his own Unit. Clicking Add••• button and the Add Unit dialog will be brought up as above;

Here, one can enter the unit Name and Symbol in their fields. Here, we enter a name called Decimeter and its Symbol is dm, its Scale for Meter by Decimeter is 10. Click OK to end the Add Unit operation, or Cancel to cancel the Add Unit operation.

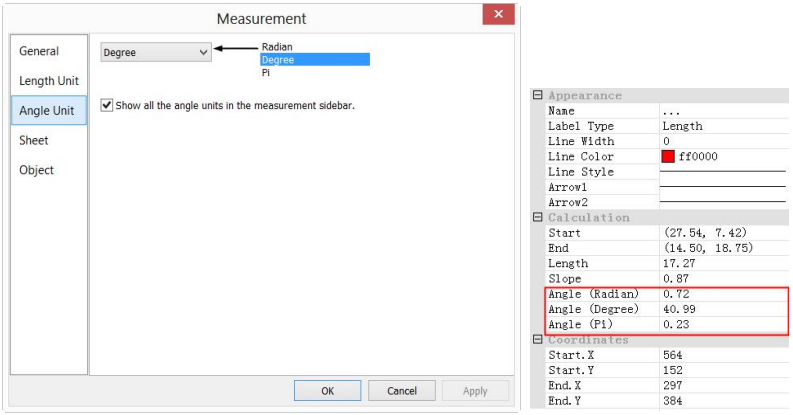
The final Length Unit list looks like the figure below:



You can find the Type is now named User. This means that this Unit is not defined by the System, but by the User.

16.2.3 Angle Unit page

On the Angle Unit page, one can select Radian, Degree, or PI as the Angle Unit.



Show all the angle units in the measurement sidebar will list all the Object Units in the Measurement Sidebar as shown above for reference.

16.2.4 Sheet page

See the View>Measurement Sheet••• menu to understand its functions.

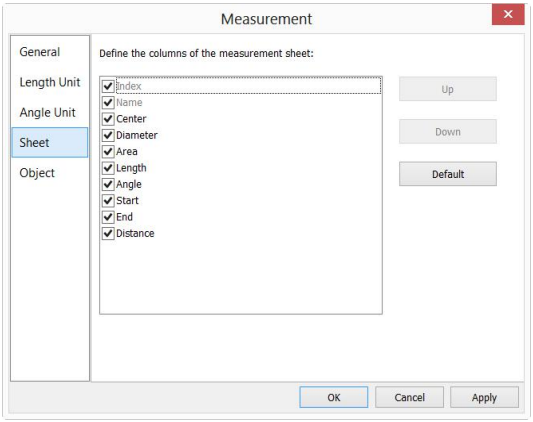
1. To modify the Measurement Sheet's item order, click the item to highlight it, the Up or Down buttons will be enabled (If the item is in the third position, the Up button will be disabled, if the item is in the last position, the Down button will be disabled). Click the Up or Down buttons to modify the item position;

Note: The item Index and Name are always in grayed states, this means these two items cannot be modified (Both their hide/show states and their positions).

2. Checking/Unchecking the item will show/hide the item in the Measurement Sheet;

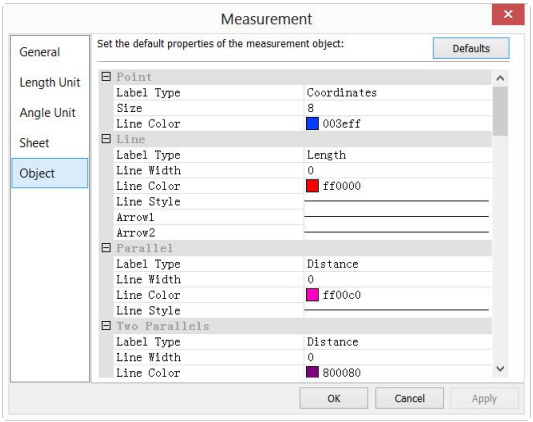
3. Clicking Default will return to the GXCAPTURE-T's default settings;

4. Both the name and order for Item 1(Index) and item 2(Name) cannot be changed.



16.2.5 Object page

The Object page list the Point, Line, Parallel, Two Parallels, Vertical, Angle, Rectangle, Circle, Arc, Annulus, Two Circles, Ellipse, Polygon, Scale Bar, Text characteristics. Their characteristics can be modified in this page according to the requirement. Different Object has different characteristics.

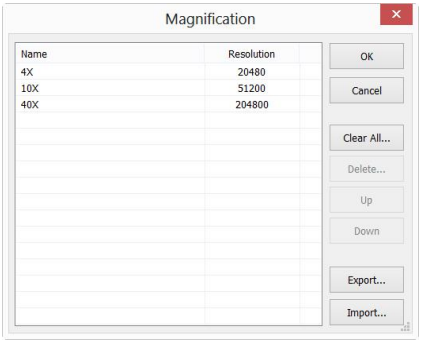


Click Defaults can return the all the modifications to the Default one.

16.3 Magnifications•••

Choose the Options>Magnification••• command to manage the calibrated Magnification.

If one has defined the 4x, 10X, 40X, 100X Magnifications, the Magnification dialog should look like:



1. Highlight the Magnification item and the Delete••• button will be enabled. Click Delete••• to delete the selected item;

2. Highlight the Magnification item, click the Up or Down button to modify the Magnification list order; The Up or Down button will be disabled when the highlight item is at the first or last position;

3. Click Clear All••• to delete all of the Magnification items; If one wishes to use the Magnification late, a backup should be made first;

4. Click Export••• to back up the Magnification in a safe media. The file extension is "*.magn";

5. After the new installation is finished, the Magnification can be import by choosing the Options>Magnification••• command and click Import••• to load the previously saved "*.magn" file;

6. If everything is ok, press OK to end the Magnification management dialog.

16.4 Calibrate•••

The detailed calibration steps are as follows:

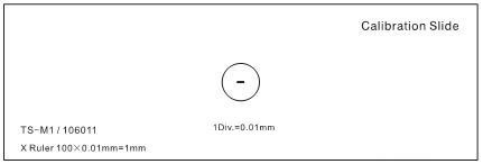
1. Run GXCAPTURE-T;

2. Connect the camera to the computer and microscope;

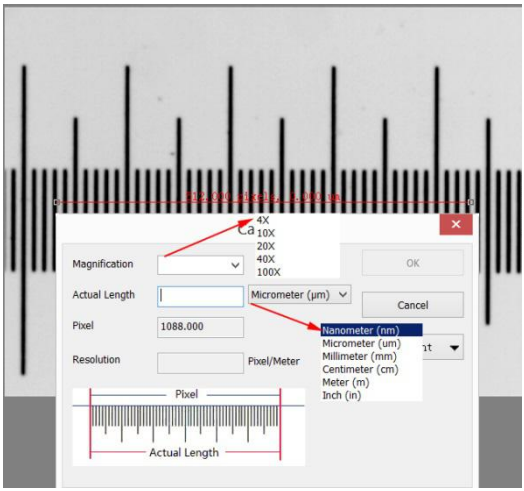
3. Start the camera (Here, it is U3CMOS03100KPA);

4. Switch the microscope object to 10X and put the TS-M1 micrometer in the middle of the microscope field and try to find the ruler clearly. Set the Unit to Pixel and the video Resolution to the maximum one (2048X1534 for U3CMOS03100KPA) and Zoom ratio to 100% (see 

);



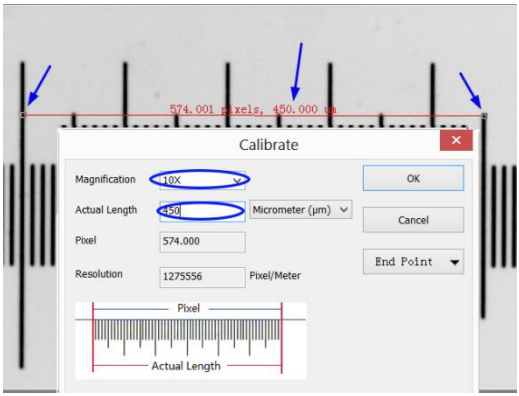
5. Choosing the Options>Calibrate••• command or clicking "  " on the toolbar, a red line with pixels number and 0.000um length is overlaid on the video window. At the same time, a dialog called Calibrate will be displayed over the video window;



6. Try to align the two ends of the red line with the video ruler scale (Try to pull the red line as long as possible to keep the calibration accuracy);

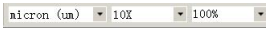
7. Enter or select the current microscope objective lens Magnification in the Magnification field. The current Magnification is 10X;

8. Read the overlaid (by the red line) micro-ruler actual length and fill it in the Actual Length field, the current Actual Length is 450um. This Actual Length will also be displayed in the middle of the red line just behind the pixel number. At the same time, the Resolution will be calculated and displayed simultaneously in the Resolution field.

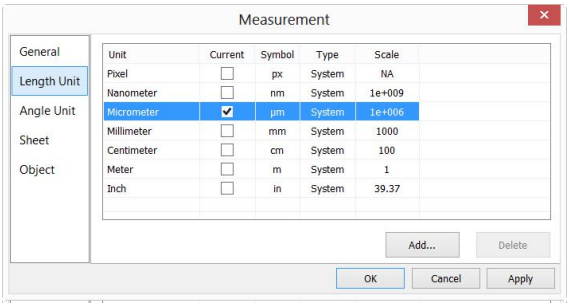


9. If everything is ok, click Ok to end the calibration. The Magnification 10X (This is the number you entered in the Magnification edit box) will be available in the Magnification dropdown combobox on the video window toolbar 

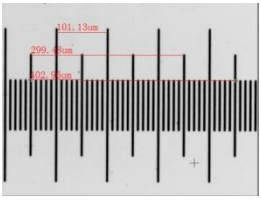
;

10. If you wish to make the measurement under this Magnification, choose 10X in the above Magnification dropdown combobox first and then choose Unit in the Unit dropdown list box(

) which is just in the left of the Magnification's dropdown combobox (User can also choose Unit through the Option>Measurements••• menu, a dialog called Measurement will be brought up. Click Length Unit page to display the Length Unit page and and checking Unit in the Current item.



Now, you can measure the objects with the selected Unit at ease.



11. The selected Resolution can be saved for the future image Measurement operations. If the Measurements are performed on the video, the objects and Resolution can be saved in the image with GXCAPTURE-T File Format (*.tft) for the future applications;

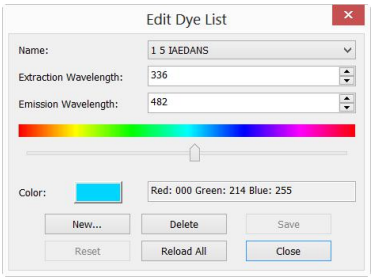
12.The other microscope Magnification such as 4X, 40X,100X can also be defined just as the above steps. Thus when you switch the microscope objective lens, you just need to select the Magnification (

for example) on the toolbar to perform

the Measurement operations.

16.5 Edit Dye List•••

The Dye List can be used for the Process>Color Composite operation. The new Dye List feature in GXCAPTURE-T allows you to select from a list of dyes, or add your custom dyes to the list. The list of dyes (GXCAPTURE-T.dye) is stored under C:\Program Files\ToupTek\GXCAPTURE-T directory.



When you choose Options>Edit Dye List••• command, you will see the Edit Dye List dialog box:

The list includes any dye definitions found in the current location. When this feature is used to prompt for a specific dye, the list indicates the currently selected dye, or you may select a dye from the drop-down list.

Name: This list includes all dye definitions found in the current dye file. You may select a different dye from the drop-down list, and all the remaining controls will be updated to show the characteristics of the new dye.

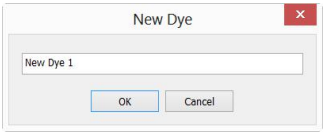
Emissions Wavelength: This field displays the emissions wavelength for the dye you have chosen. You can adjust he emissions wavelength by entering a new value. The default color will change in response to changes in the emissions wavelength.

Excitation wavelength: The default wavelength for your dye is displayed here. You can adjust the wavelength by entering a new value.

Color: Use the slider to adjust the emissions wavelength for your dye, which also sets the default display color. (You can also use the Color button to select a specific color using a standard Windows color selection dialog) The color will change in

response to changes in the emissions wavelength. Here you can change the color associated with the selected dye, or define a custom color. The color default is linked to the selection of a wavelength for your dye. If you change the Emissions Wavelength, the color displayed will be the standard color for that wavelength. To set a custom color, first you should set the wavelength and then edit the color.

New: Clicking New will setup a new dye, this will invoke a dialog called New Dye. Input your New Dye name and click Ok to end the dialog and click Cancel to cancel the input. This will return to the Edit Dye List again and the new name will be the default on in the Name list box. Try to set the Emissions wavelength, Excitation wavelength, Color for your new dye.

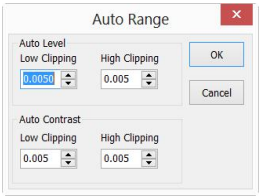


Save: Click Save on Edit Dye List to save your dye selection

Close: Click the Close button to end the Edit Dye List dialog:

16.6 Auto Correction●●●

Set the low and high ranges for the Image>Adjust>Auto Level and Image>Adjust>Auto Contrast menus. The default value is 0.5% for both, but GXCAPTURE-T suggests this value be smaller than 1%.



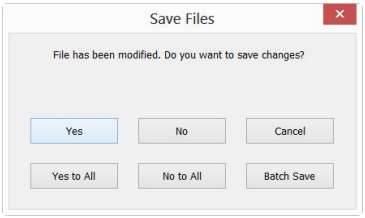
See Image>Adjust>Auto Level and Image>Adjust>Auto Contrast for details.

17 Window

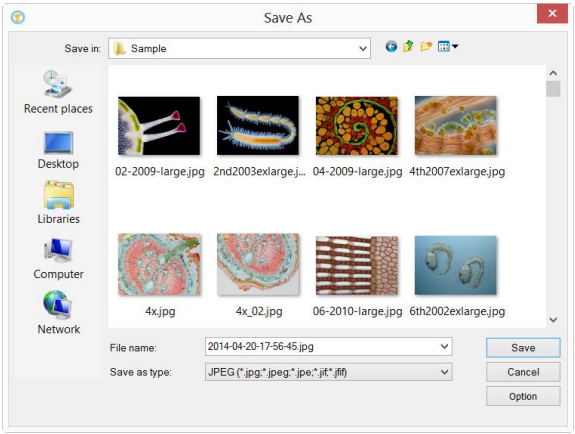
17.1 Close All

Choosing the Closes All command to close all of the pictures opened or captured inside GXCAPTURE-T frame. If you have made any modifications to the pictures or if you have captured some pictures from the camera, choosing the Close All will let you finish the saving operations quickly.

If the above image windows exist, choosing the Window>Close All command will bring up a Save Files dialog as below:



1. Clicking Yes on the Save Files dialog will close the Video , Browse, Image windows directly that are not changed without ask anything. If there are newly created Image window, GXCAPTURE-T will bring up a Save As dialog to prompt user to enter the File name to save file.



If Save or Cancel is clicked in the Save As dialog, GXCAPTURE-T will return to the Save Files dialog to continue the next file close operation;

2. Clicking No on Save Files dialog will close the current image window without saving operation and return to the Save Files dialog to continue the next file operation;

3. Clicking Cancel will cancel the Save Files dialog without doing anything;

4. Clicking Yes to All on Save Files dialog will always bring up a Save As dialog to let you enter the File name to save files one by one until all of the files are saved;

5. Clicking No to All on Save Files dialog will close all of the image windows without saving them;

6. Clicking Batch Save on Save Files dialog will transfer the save process to File>Batch Save••• command. Please check the File>Batch Save••• menu for details;

Note: If you have a lot of pictures opened and have made some modifications on them and want to close them quickly without saving anything, you may uses this command and choose Step 5. All the images will be closed instantly, no warning will be given.

17.2 Reset Window Layout

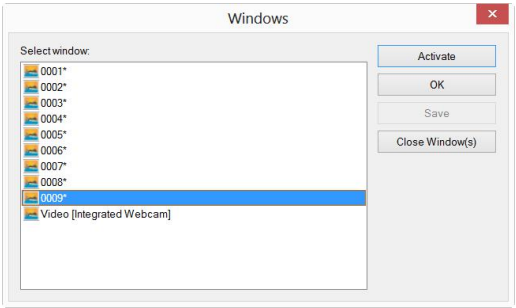
Choosing Window>Reset Window Layout will reset the GXCAPTURE-T window layout to the original one. The reset will be effective after restart.

17.3 Windows•••

Choosing the Window>Windows••• will open a dialog box that lets you manage the currently opened windows.

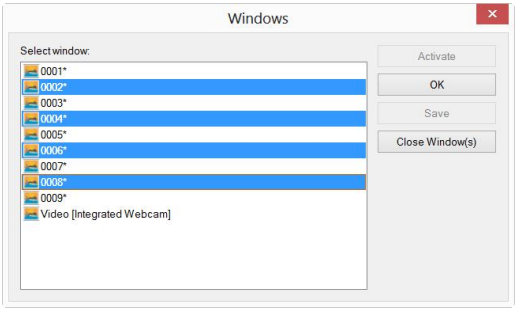
The dialog allows you to manage large lists of open windows by assigning them into

groups. Let us say you have 10 windows opened, but want to close 4 of them scattered through the list.



1. Choose the Window>Windows••• command;

2. Select the windows you want to close. Hold Ctrl or Shift key to select more than one at a time. Here, 4 items are selected;



3. Click Close Window(s) button, those 4 selected windows will be closed, leaving the other files or captures available for editing;

4. User can use this command to switch to the checked window on a list by hitting Activate (or "bring up" from an icon multiple windows).

18 Help

18.1 Help Contents F1

Choose the Help>Help Contents command to load GXCAPTURE-T help file. The help file is in Portable Document Format (PDF).

PDF is a file format used to represent documents in a manner independent of application software, hardware, and operating systems. Each PDF file encapsulates a complete description of a fixed-layout flat document, including the text, fonts, graphics, and other information needed to display it. In 1991, Adobe Systems co-founder John Warnock outlined a system called "Camelot" that evolved into PDF.

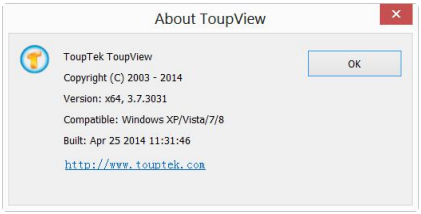
While the PDF specification has been available free of charge since at least 2001, PDF was originally a proprietary format controlled by Adobe. It was officially released as an open standard on July 1, 2008, and published by the International Organization for Standardization as ISO 32000-1:2008. In 2008, Adobe published a Public Patent License to ISO 32000-1 granting royalty-free rights for all patents owned by Adobe that are necessary to make, use, sell and distribute PDF compliant implementations.

If your computer still does not install the PDF reader, please try to download it from:

http://www.adobe.com/downloads/

18.2 About●●●

Display the related information about GXCAPTURE-T, including GXCAPTURE-T version, Compatible, Built date and its developer's www etc.



Clicking on the URL link will direct you to the address of the application supplier. If you have any problem with the camera or application, please feel free to contact your supplier.