JelloX Biotech Inc.

MetaLite
User's Guide

Contents

1 Introduction

MetaLite software developed by JelloX Biotech Inc. is a Research Use Only (RUO) computer-assisted image analysis software. It is intended to aid pathologists and researchers in imaging annotation and analyzing cells of interest based on marker intensity, size, shape and volume using appropriate tools. This software also assists the users to select fields of view (FOVs) in the digital image with an embedded artificial intelligent based feature recognition model, and provides quantitative data on these FOVs such as marker distribution, distance between markers, and the ratio of different markers.
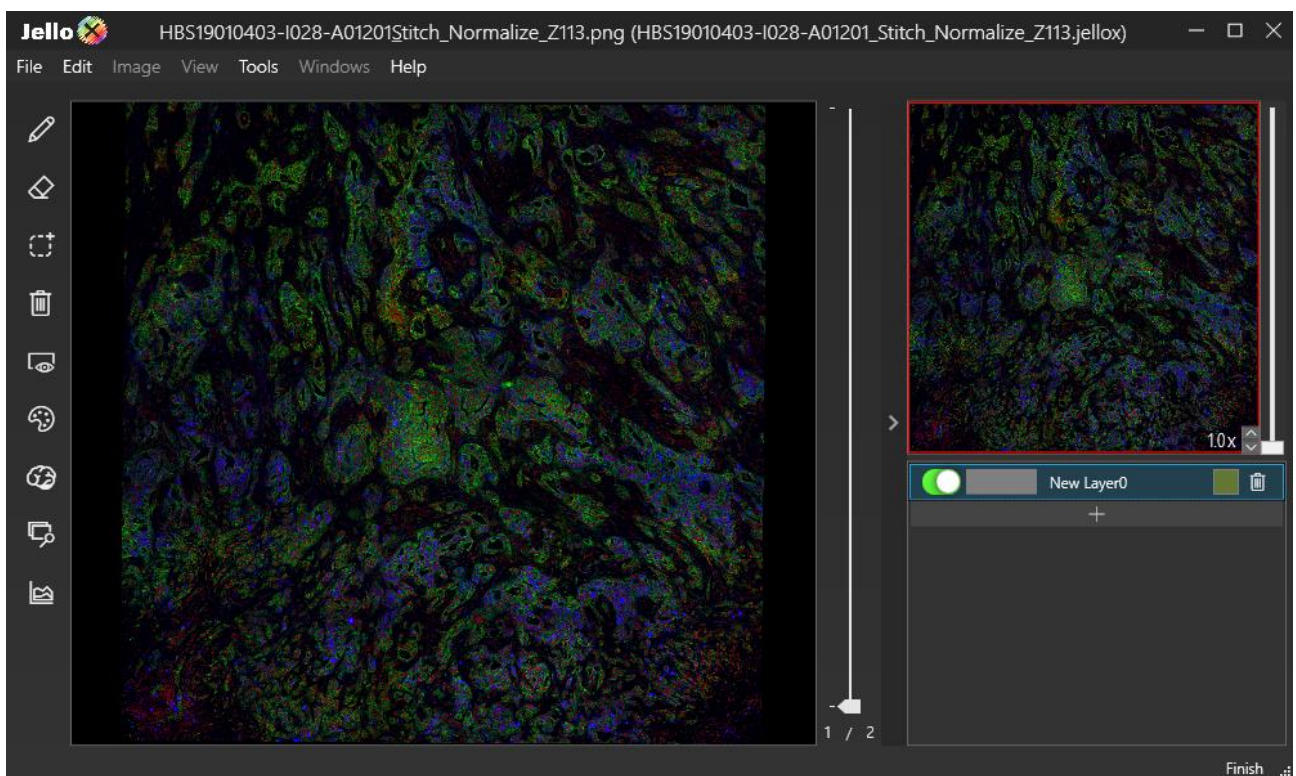
2   Supporting file format

Types of Files That You Can View

MetaLite can load and view different types of data, including:

- ▶ **JPEG and JPG files**
- ▶ **TIFF and TIF files**
- ▶ **PNG files**

3   Installing MetaLite

This chapter contains information of installing the MetaLite software

Before You Start

Review the information in this section prior to installing MetaLite.

Installation

To install MetaLite, follow these steps:

1. Ensure you are logged into Windows as a user with administrative privileges.
2. Double-click "My Computer" or open "Windows Explorer" and navigate to the MetaLite installer file.
3. Double-click the ".msi" file to start the installation wizard.
4. Follow the instructions on your screen to accept the terms of the license agreement to complete installation.

Modifying or Removing the MetaLite Software

Once MetaLite is installed, you can run the installer again to modify, repair, or remove the MetaLite software. If MetaLite is already installed, select from the following options on the installer window:
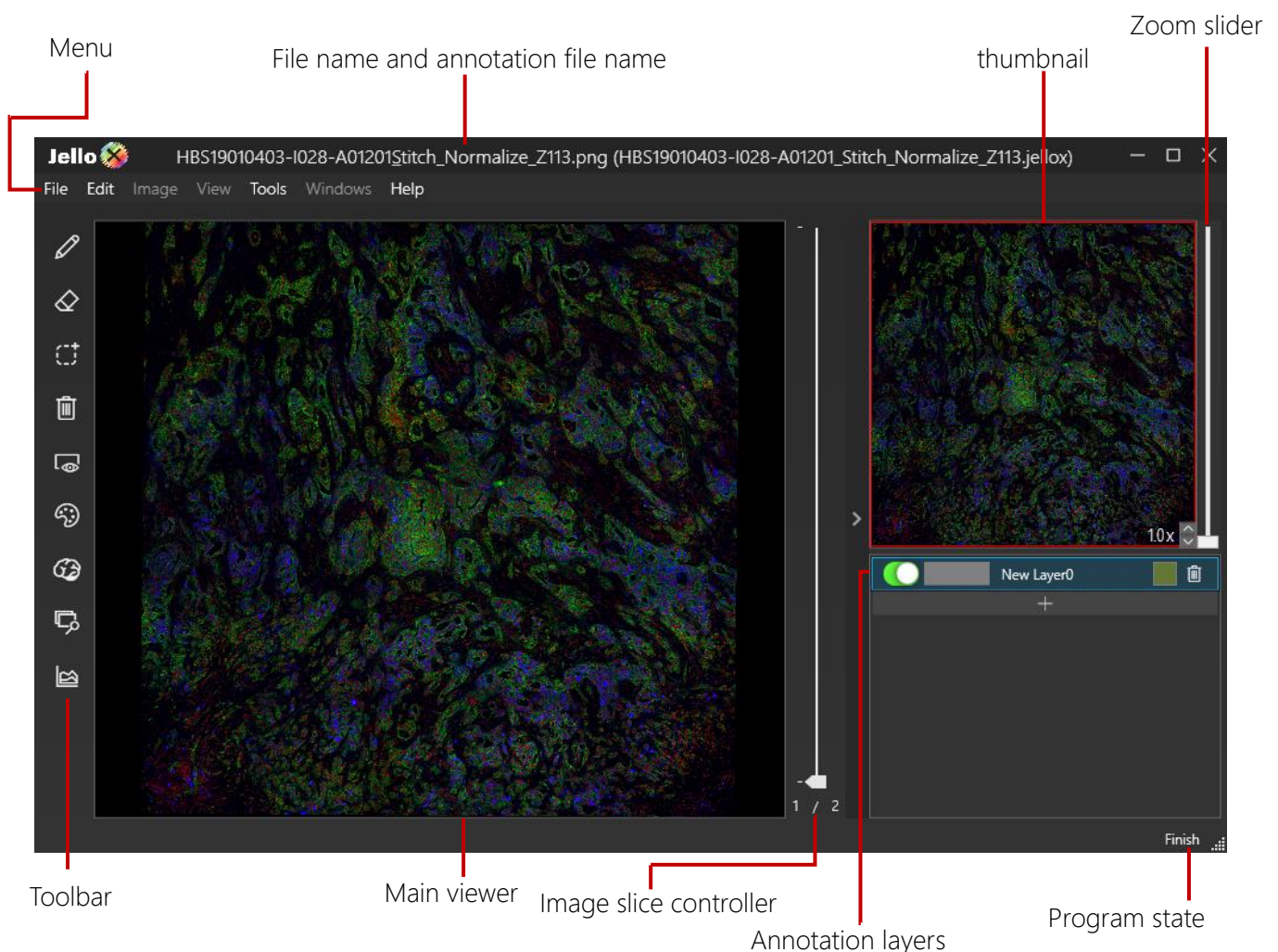
- ▶ Modify to change the MetaLite installation by adding or deleting components.
- ▶ Repair to reinstall all the components previously installed. This is the option to use if you are upgrading a previous installation to new software.
- ▶ Remove to uninstall the MetaLite software.

Starting MetaLite

To start MetaLite, click Start on the Windows taskbar, point to All Programs > MetaLite Beta 1.0, and select MetaLite. Or click the MetaLite Icon on the Desktop.

4   Overview of MetaLite

This chapter provides a tour of the MetaLite main window and describes how to use the navigation and magnification tools.


Menu   File name and annotation file name   thumbnail   Zoom slider

Toolbar   Main viewer   Image slice controller   Annotation layers   Program state

The main elements of MetaLite viewing window include:

▶ Main viewer – The main viewer of the image.

▶ Menu – The menu bar lists all functions of MetaLite by categorizing them into File, Edit, Image, View, Tools, Windows, and Help. Some of the functions are locked in this version, please contact us to un-lock more details and advanced functions.

- Toolbar – The toolbar contains a list of annotation and statistic functions. See next section for a quick reference list of each MetaLite toolbar icon.
- Zoom slider – The zoom slider can magnify or shrink the current view.
- Image slice controller – The image slice controller appears with multiple images only, and is used to view different focal areas on a z-stack image.
- Thumbnail window – The thumbnail is a navigation tool that shows complete Image.

Main viewer

The main viewer displays the image with a region of interest (ROI). To move the image, press right mouse button on the Main viewer, and drag the image to another ROI while the cursor turns into grasp hand.
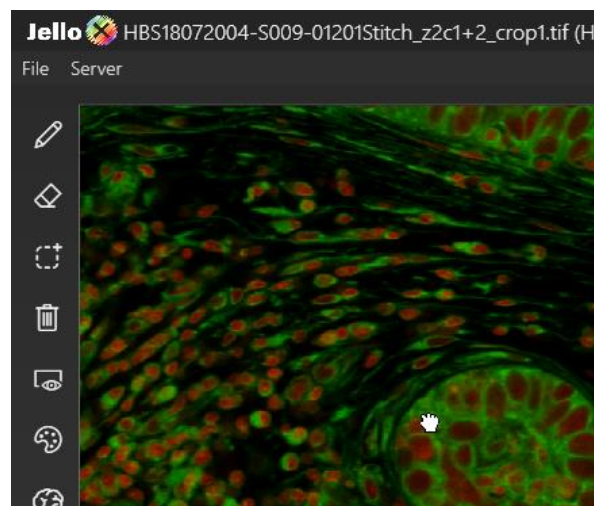
Menu
1. Open File

- Open file – images that are loaded on your computer.
- Open Annotation – open the .jellox file that pre-annotated with Labels of the image. The annotations labeled by MetaLite will be saved as a .jellox file. When loading the image, if there is a same name .jellox file in the same file directory, MetaLite will automatic load the annotation file.
- Open folder – for open multiple slice of images in a folder.

2. Save Annotations

- Save Annotation – Save the labeled annotation layer of current image to the .jellox file (Annotation file will be named based on the currently loaded image).

▶ Save Annotation As – Save the annotation file with a name different from the current image name.

▶ Save All Annotation – Save all the annotation layers of each image at once.

▶ Auto save – Switch on/off the auto save function of the program to periodically save the progress of annotation labeling.
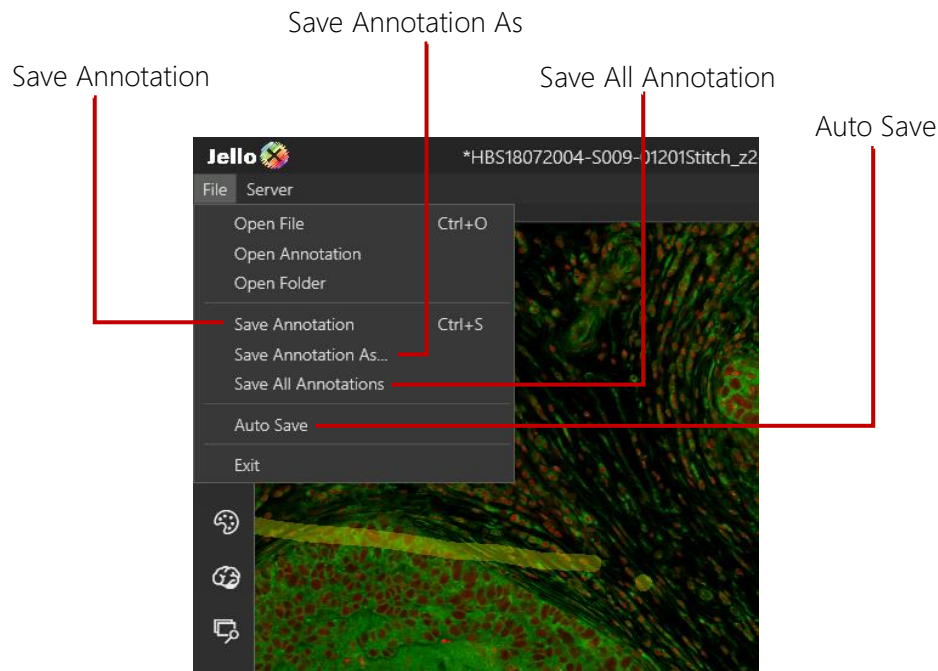
3. Reload Meta-Lite Server

▶ Reload Meta-Lite Server – The statistic calculation of the MetaLite software is working into a virtual machine called "Meta-lite Server". If the server is disconnected or unavailable, you can restart the Meta-Lite server manually.
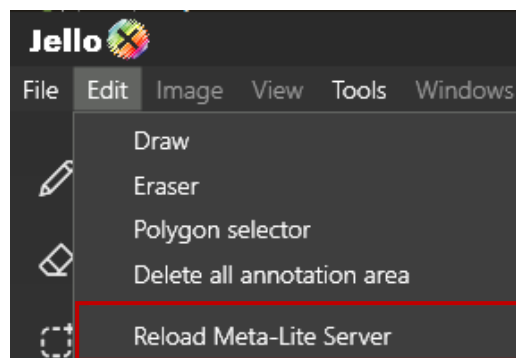
5 Tools

Annotation tools

Tool	Action
	*Draw: A free-form annotation pen drawing tool that labeling the annotation area.
	*Eraser: A free-form annotation erasing tool that can eliminate the annotation area we don't want.
	*Polygon: A polygon annotation region drawing tool.
	*Delete all annotation, this function can delete all the annotation. (MetaLite v1.0 does not support do and undo operation during annotation, be careful when using this function)
	*Show/Hide all annotation layers of the image.

Tips for using annotation tools

- **Draw and Erase** – Use **Ctrl + MouseWheel** to adjust the drawing/erasing brush size. Use **Shift + MouseWheel** to quickly adjust the transparency of annotating brush.

- **Polygon** – Press **Esc** to cancel selection, and press **Enter** to close the selected contour. Double click the main viewer to close the selected contour, or click to the start point.

Statistic tools

| Tool	Action
	*Convert fluorescence image to IHC/H&E appearance through digital staining the fluorescence image with pseudo-IHC/H&E color-code.
	*AI inference can automatically annotate the cancer tissue area. The inference AI model in this version is limited to breast cancer tissue and CPU computing. (If you are interested in other cancer model or GPU hardware acceleration model, please contact us for more information.)
	*Multiple image inference of all image slices at once.
	*Statistic analysis of antibody signal percentage that is covered by current annotation layer. The demo statistic method in this version is for nuclear-specific antibody percentage calculation. (If you are interested in other statistic method such as membrane-specific antibody expression, TIL calculation, please contact us for more information.)

6   **Main operation**

Main viewer zoom in/zoom out.

Scroll the Mouse Wheel up/down on the main viewer to zoom in/zoom out the image view.

Scale sliding bar of the image view

Drag the sliding bar next to the thumbnail view or there is a quick scale button next to the sliding bar.
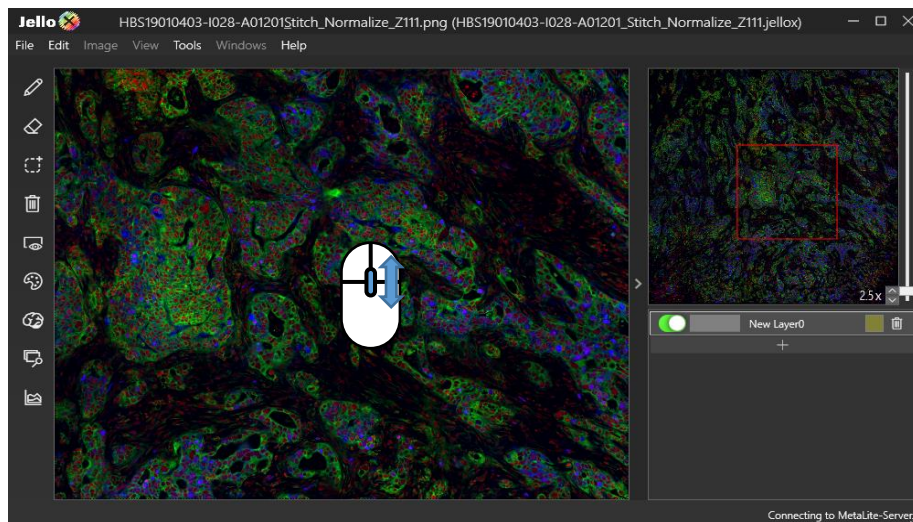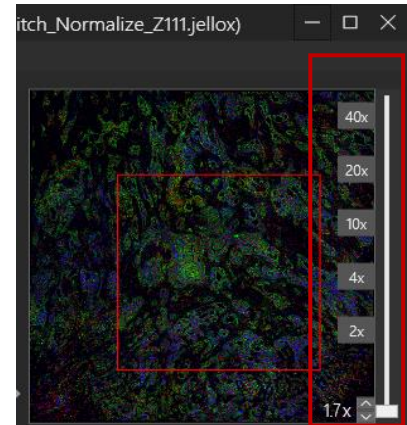

Annotation layer panel

▶   Add annotation – Use to add a new annotation layer to current image.

▶   Annotation Name – Double click to rename the Annotation Name. The gray bar in the background represents the transparency of that annotation layer.

▶   Color Selector – Select the annotation color.

▶   Delete annotation – Delete selected the annotation layer.

▶   Annotation Switch – Show/Hide the annotation layer. Notice, even the annotation is hidden, the Draw and Erase functions can still work on the annotation layer.

▶   Hide annotation board – Hide/Show the annotation board and thumbnail.

Hide annotation   Annotation name   Delete annotation

Annotation switch

Add annotation   Color selector
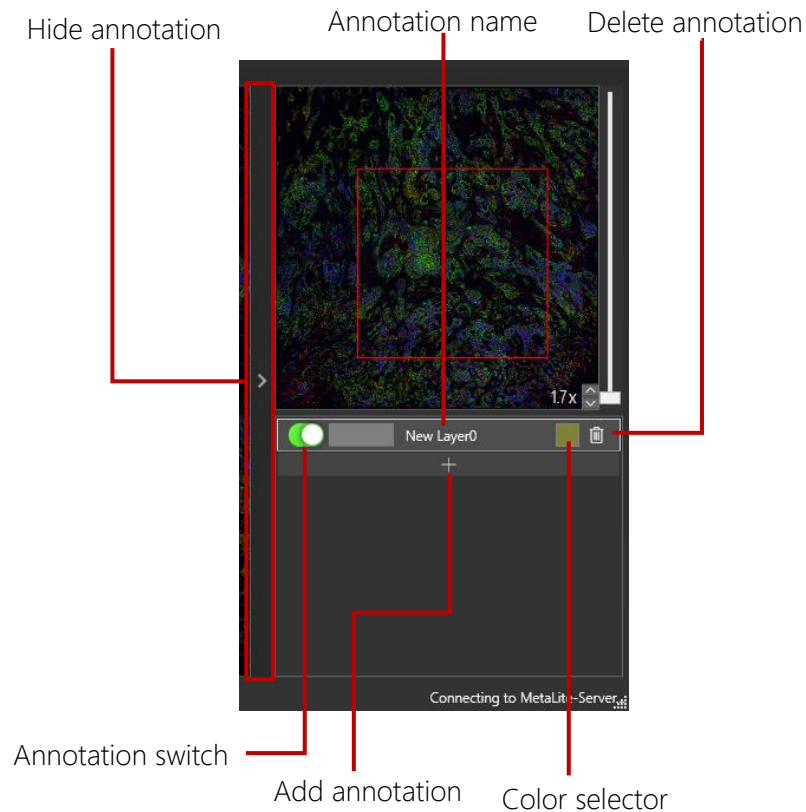
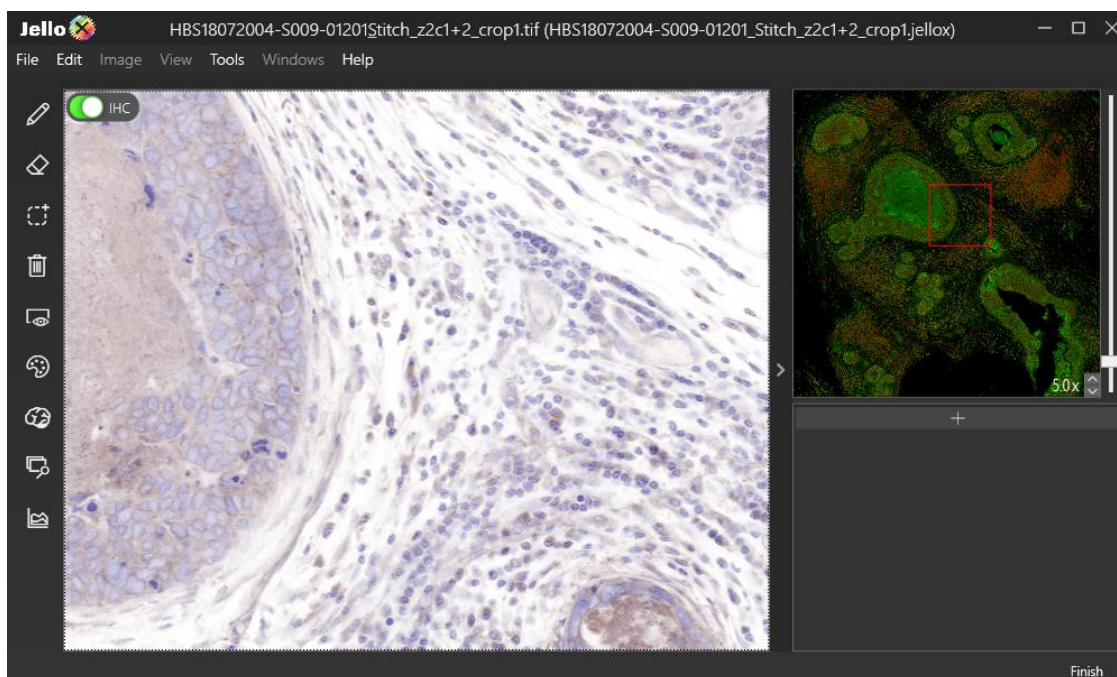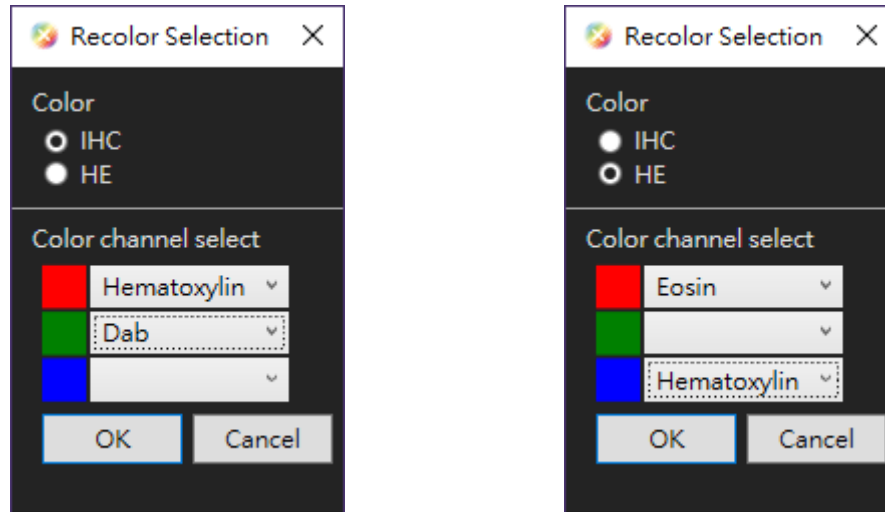# 7   **Function Detail**

Hide all annotation

Hide all annotation layers to quickly check the tissue covered by the annotation.
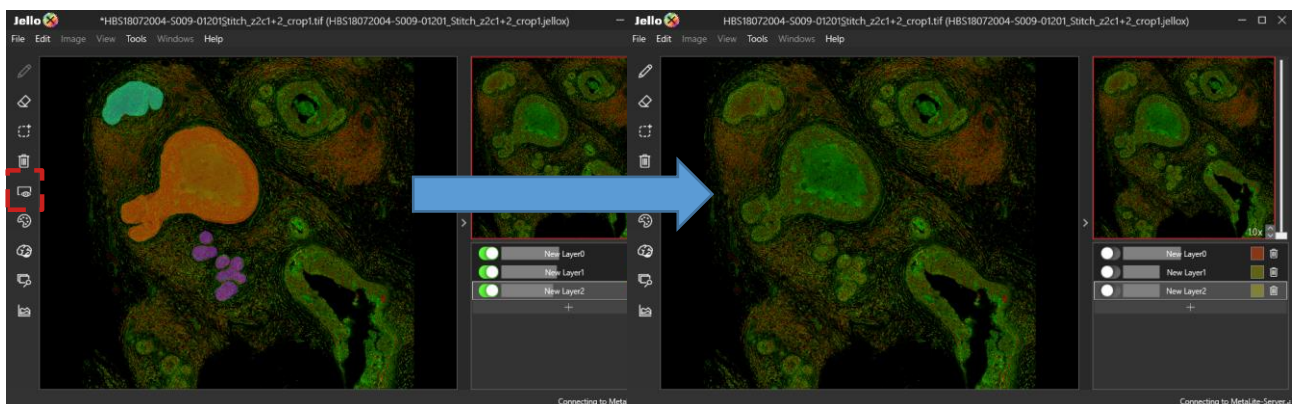
IHC/H&E Stain

Recolor the image from RGB fluorescence image colors to IHC/H&E color-code. You can press Recolor Image Button and select a representative color channel for Hematoxylin, Dab, and Eosin.


AI inference

We use pre-train AI model to predict tumor region. Once you press the AI prediction button, it will create a new annotation layer and label the tumor region on the layer. For now, we only release breast cancer model, the rest of other cancer models will be released in the future.

Notice: The version of MetaLite is based on CPU AI inference. For inference 2000x2000 image on AMD Ryzen 5 2600 Six-Core Processor computer will take about 30~40

seconds. It could be accelerated by Nvidia GeForce RTX 2080Ti 11GB GPU to 3~4 seconds. If you are interested in GPU hardware acceleration version, please contact us for more information.

The Multiple image AI prediction is doing the same operation as AI inference on each image.
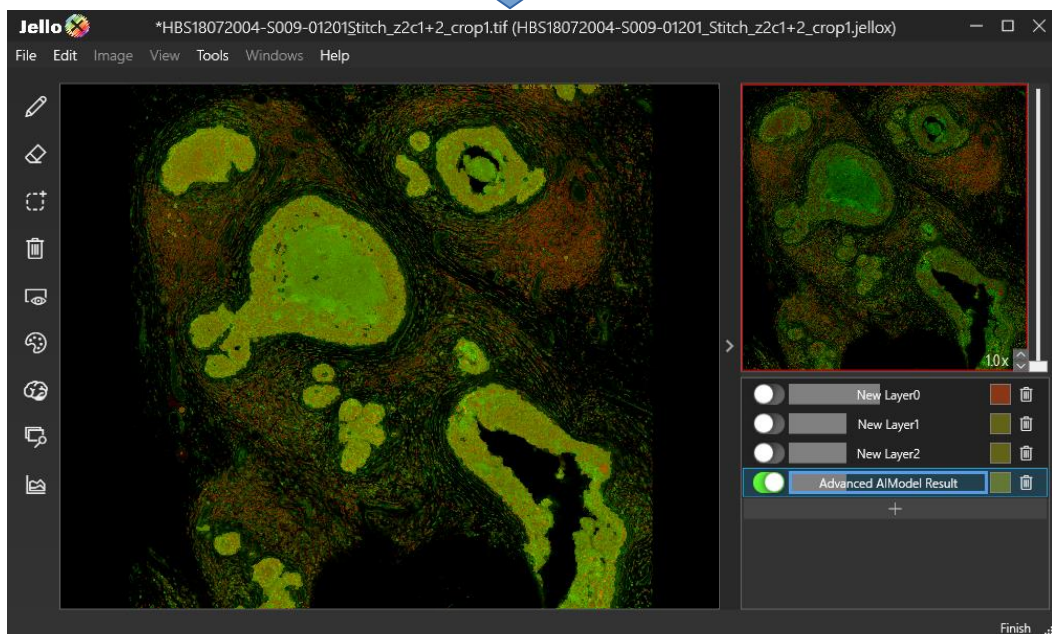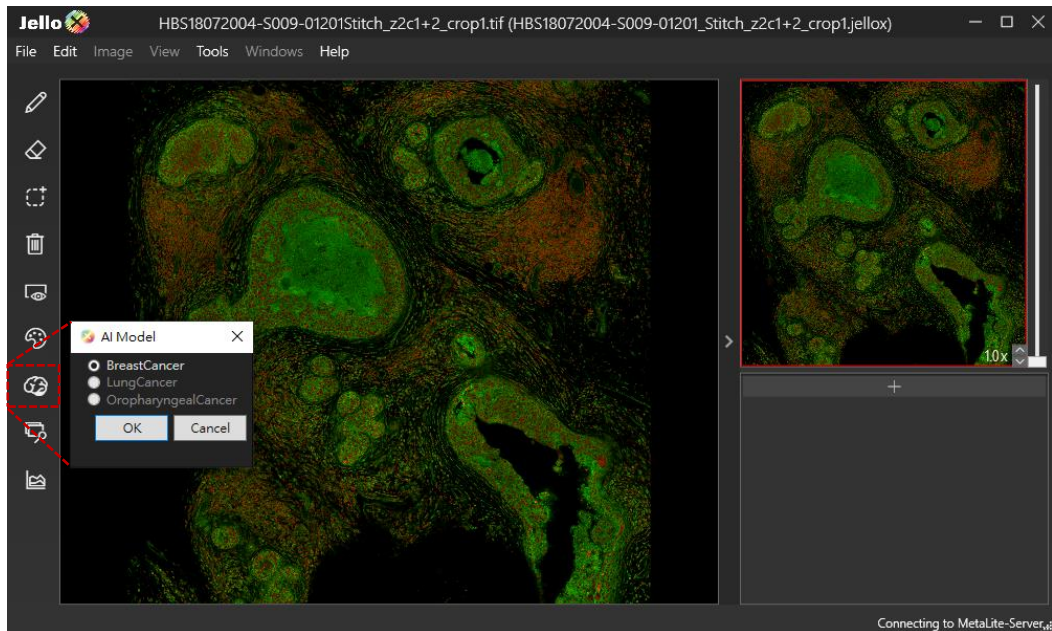
Statistic

We calculate nuclear-specific antibody covered percentage area of the nuclear counter stain to measure the expression level (High/Low then 14%). First, select the color channel corresponding to each cell component, and click "OK". Notice, the calculation will only apply to the area covered by annotation layer drawing area on current annotation layer. If there is no labeled context in the annotation, it will create an annotation full filled with default annotation color to statistic the expression level value of entire image.
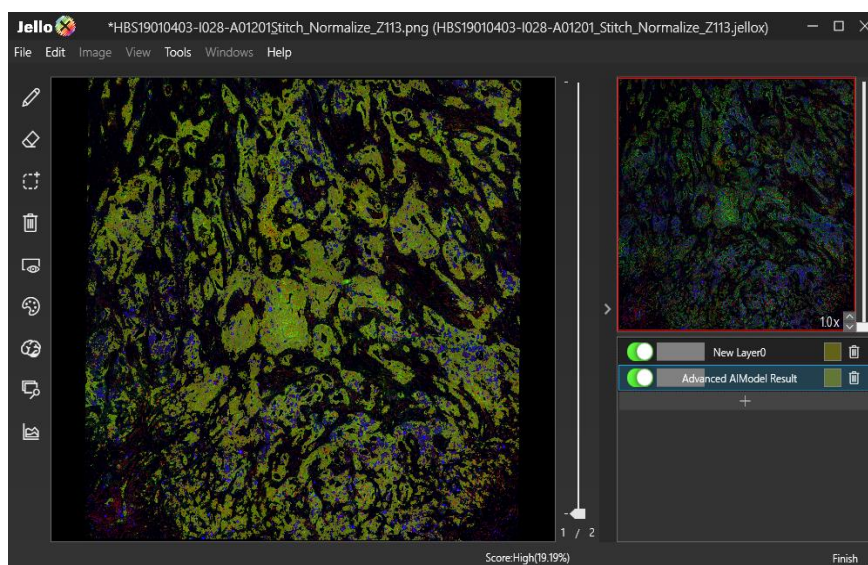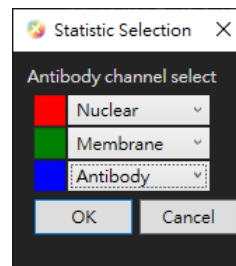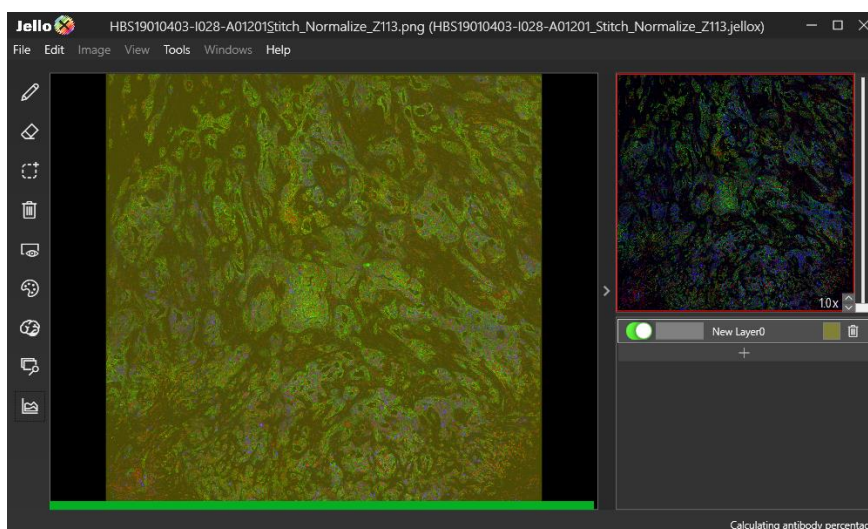

Figure 1: Statistic with AI Inference result

Figure 2: Statistic with empty annotation context