Acceptance Criteria V3.0

– Based on V2.0 Prototype

No	User stories	Accpetance Criteria	Testing Cases		
			Normal	Boundary	Abnormal
1 & 2	A User wants to do some research on cells, so he/she decides to use our Napari plugins to segment the cell images. User opens the terminal in an environment-configured device, and input napari command to open the plugin	**Napari launches from the terminal without errors, and the main interface displays the left panel with plugin options preloaded.**	Command `napari` works.	Pre-installed minimal environment.	Missing packages causes failure.
3	The Napari will automatically open and the user clicks on the plugin menu on the top left	**Clicking the top-left plugin menu reveals a dropdown list, and all listed plugins (e.g., Annotator 2D) are selectable without delay.**	Click and see Annotator options.	Try before loading images.	Plugin list not shown if install incomplete.
4	Firstly the user clicks on Annotator 2d, and the right side widget will be opened. The user is also able to see few masks in the left widgets	**Upon selecting Annotator 2D, a configuration panel appears on the right side of the window, and the default mask layers are loaded and visible on the left layer panel.**	Click Annotator 2D after load.	Open with no image loaded.	Widget fails to open due to plugin error.
5 & 6	If the user wants to segment a folder of the images, he/she will be able to click on the button 'Select Folder' on the right widget of the napari window and then choose the	**Selecting a folder or dragging in a valid image triggers successful image loading into the Napari viewer, with no crash or delay.**	Load tiff or jpg folder.	Include mixed formats.	Drag unsupported format.

	folder they like to input into napari. If the user wants to only segment one single image, he/she can also simply drag the image inside the napari window.				
7	The user clicks the 'open' button and then the first image inside the folder will be displayed on the napari windows.	**The first image from the selected folder is rendered in full resolution in the central Napari canvas.**	Open a folder with TIFFs.	Folder with mixed file types.	Folder empty or unreadable.
8	The user is able to see which image he/she is up to, then use the slider below to drag the channel of the image to complete the channel switching.	**Dragging the channel slider updates the image display instantly to show the data from the selected channel.**	Switch between 1–4 channels.	Rapid switching across channels.	Use before loading the image.
9	Then the user can click the 'Compute Embeddings' button to compute the specific channel of the specific image. The image is successfully loaded if the user sees this display: "Computed Embedding"	**Clicking 'Compute Embedding' on the selected channel triggers feature extraction and saves a channel-specific embedding in the cache directory.**	Standard size image completes in 10s.	Large image (e.g. 2048x2048).	Fails on missing model.
10	Then the user clicks on the 'Automatic Segmentation' button on the right, the Napari will segment the cell images	**After clicking 'Auto Segmentation', a new segmentation mask is generated and shown in the layer list with a distinct color map.**	Run after embedding is ready.	Run on grayscale noisy images.	Run without embedding → fail.
11	The user is able to see the result of auto-segmentation in the auto-segmentation mask on the left widget. He/she can drag the auto segmentation mask on the top of the list	**The auto-segmentation mask can be dragged to the top of the layer list, and it overlays the original image clearly without shifting.**	Drag to top and verify.	Drag across multiple masks.	Drag fails → order not updated.

	on the left mask widget.				
12	As the drop down list shows below, if the user chooses ‘pixels’ in the preserve mode, the segmentation result can be saved into the same mask.	**With ‘pixels’ mode selected, all segmentation results are written into the same mask layer, preserving spatial accuracy and replacing previous content.**	Choose mode → segment multiple times.	Toggle between pixels/objects.	Mode unset → save fails.
13	If the user chooses ‘objects’ in the preserve mode, the segmentation result of each automatic segmentation can be saved into different masks and be displayed on the left widgets.	**With ‘objects’ mode selected, each segmentation run creates a new mask layer, labeled and stacked independently in the left panel.**	Choose mode → see multiple layers.	Segment the same region twice.	No separation happens.
14	The user gets the result of channel 1 already, he/she decides to get the result of channel 2, 3 and 4 as well, and then he can just change the channel by the sider on the bottom of the Napari windows.	**Switching to another channel (e.g., Channel 2, 3, or 4) updates the display to the new grayscale image of the selected channel.**	Slide to a new channel.	Loop through all 4 channels.	Unrecognized channel index.
15	Each time when the user wants to segment a new channel, the result he/she must give a label number on that, like shown below: The user can just simply click on ‘+’ or ‘-’ to change the label id.	**Before segmentation, adjusting the label ID ensures that the resulting mask is saved under the correct semantic label (e.g., Cell = 1, Nucleus = 2).**	Click + to change the label.	Re-use same ID on different channels.	No ID set → save fails.
16	After all above, the user needs to press the ‘Commit’ button to commit the result into a new mask, and redo stories 9 - 15, to commit each	**Clicking ‘Commit’ transfers the current mask result into a new layer tagged as finalized, ready for export or further editing.**	Click after each segmentation.	Commit twice for the same channel.	Skip commit → result lost.

	segmentation result into one mask.				
17	The user find that the result in channel x, for example, the user need to segment the nucleus of the cells, means the user need to adjust the parameters of the model, he/she can just simply change the parameters	**Adjusting parameters such as 'threshold', 'min area', or 'stability' alters the segmentation output dynamically after re-run.**	Change one slider at a time.	Set high/low extremes.	Invalid value crashes plugin.
18	The user finds that the result accuracy of auto-segmentation on Channel x is still a bit low after the parameters adjustment. And then he/she uses box-segmentation to choose the cells that have been wrongly segmented.	**After drawing a bounding box, clicking 'Segment' triggers region-specific segmentation, updating only the selected box area.**	Draw on a single object.	Overlap with multiple masks.	Click segment without box.
19	The user clicks on the prompt mask in the mask list of the left widget on Napari.	**Selecting a prompt-enabled mask activates interaction tools such as point and box prompts, shown as active in the UI.**	Select active mask before prompt.	Change prompt twice in row.	No mask selected → prompt fails.
20	The user chooses the Bounding box button on the top of the left widget, and uses the draw box button on the top left of the window to draw the box.	**Clicking the draw box tool allows the user to outline a rectangular ROI, which is rendered as a visible overlay on the image.**	Draw near object.	Overlap edge of image.	Draw before selecting mode.
21	The user still does not get what he/she wants, then the user clicks the point_prompts on the left widget.	**Toggling point-prompt mode switches the tool into manual prompting, with cursor state reflecting the current mode.**	Enable after prompt mask load.	Toggle between box/point modes.	Enabled without a target mask.

22	The user clicks the ‘add-point’ button so that the plugin can automatically add new points and segments itself. Then it will separate those two cells with points.	**Adding a point between overlapping cells triggers re-segmentation that separates them into distinct labeled regions.**	Click between objects.	Click the same spot repeatedly.	Add before image loads.
23	The user can also adjust the ‘positive’ or ‘negative’ for his point segmentation.	**Assigning a point as positive or negative changes the refinement behavior accordingly, and the updated mask reflects these instructions.**	Add one positive and one negative.	Add multiple of the same kind.	Mix type and forget to confirm.
24	The user still needs to adjust some detailed cells, so he can use the eraser to adjust the segmentation result.	**Using the eraser tool removes the selected region from the active mask layer, and the update is visible immediately.**	Erase one region.	Erase edge of mask.	Erase with no mask selected.
25	The user is able to click on the ‘seen/unseen’ button on the left of each mask.	**Clicking the eye icon toggles the visibility of the corresponding mask, allowing users to isolate or hide overlays during editing.**	Toggle one then another.	Toggle multiple layers quickly.	Click unseen with no effect.
26	After all, the user is able to store the result of different auto-segmentation of each different channel on different images in the folder by pressing the ‘Export to TIFF’ button on the bottom of the right sidebar. The image below shows the output result re-display on the window under the ‘label’ mask.	**Clicking ‘Export to TIFF’ generates output files for each committed mask, grouped by image and channel, and saves them in the designated output directory.**	Export after all commits.	Export subset of results.	Export without any commits.