

1 Patch marking

Autotune uses TE42 image ([Figure 1-1](#)) for tuning. Specifically, the following five regions in the TE42 image are used

1. Central resolution chart
2. High contrast and low contrast slanted edges
3. High contrast dead leaf chart
4. Low contrast dead leaf chart
5. 20 noise patches

These regions are shown in **Error! Reference source not found.**

Details of how to mark these noise patches are provided in the below sections. To facilitate marking these patches, a patch marking GUI is provided as part of the Autotune SmartU2 package.

This is invoked by double clicking on the PatchMarkingUI.exe (in the bin folder). After the GUI opens load the TE42 image file. The supported image formats are .jpg, .bmp and .png.

This will open the TE42 image for patch marking. This window is shown in [Figure 1-1](#). See Sections [1.2.1](#) to [1.2.5](#) for detailed instruction on how to mark the patches for each of 5 different regions.

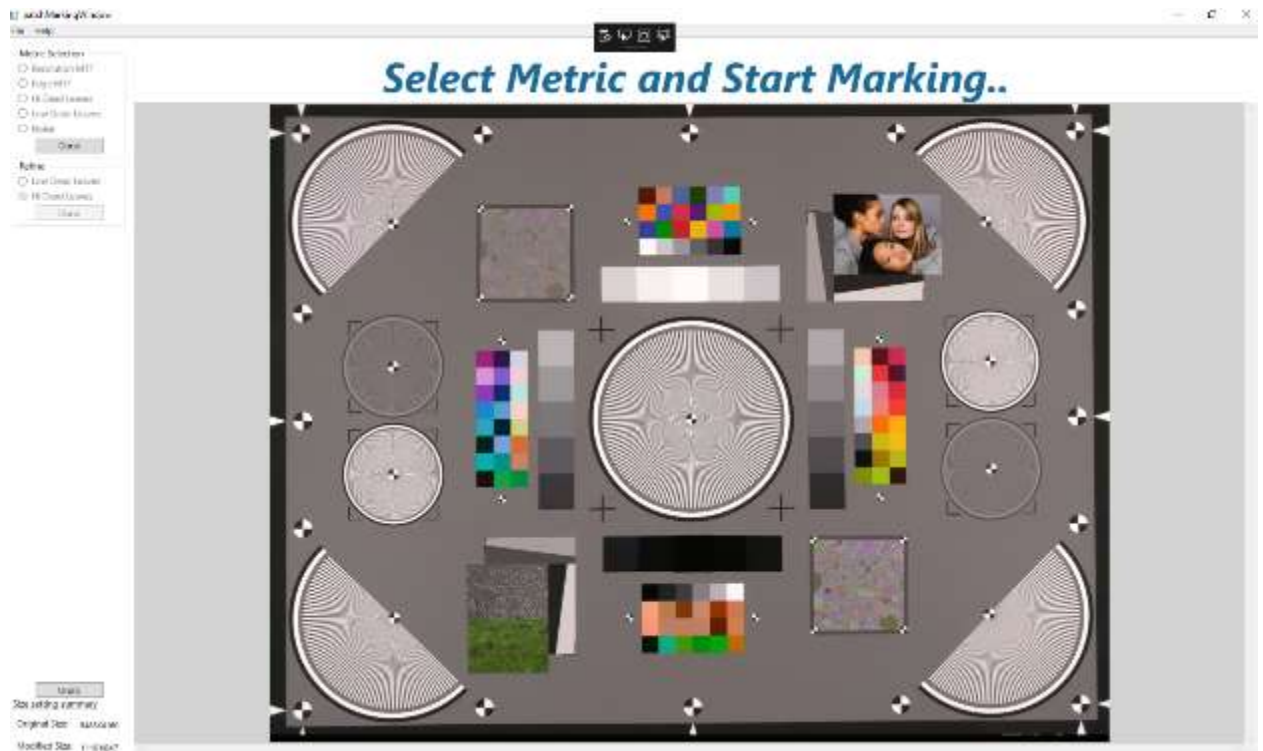


Figure 1-1 TE42 chart which needs to be patch marked for use by Autotune. This screenshot shows the initial window when the TE42 image is loaded into the patch marking GUI

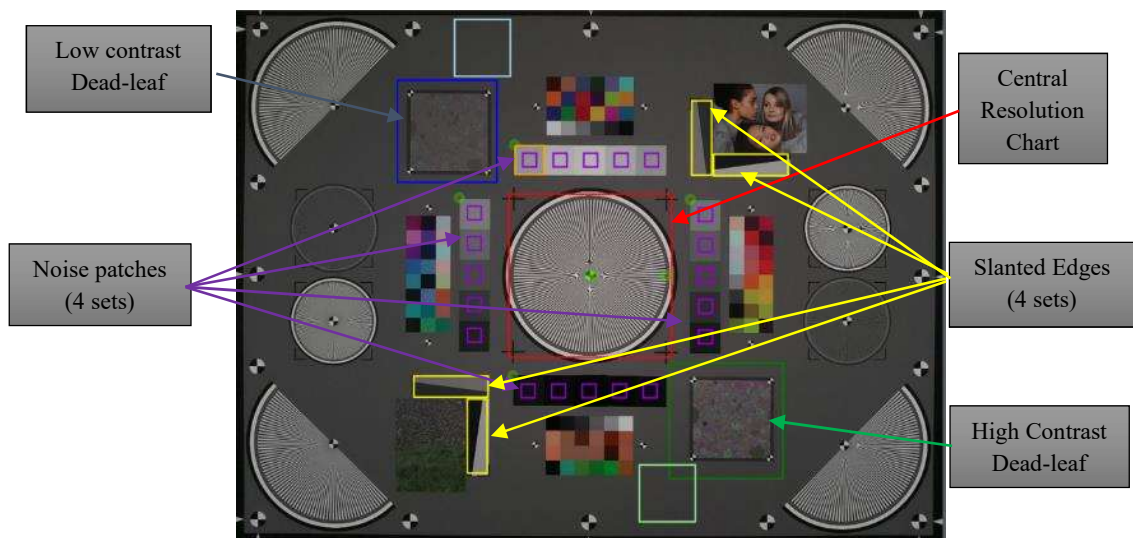


Figure 1-2 Patches used for metric computation

1.1 Automatic Detection of Patches

The tool provides an option to automatically detect the patches in the TE42 image. After this, the required patches are marked in the image. If the auto-detect throws error or some of the patches are not detected properly, it can be marked again as per the details in section 8.2. After this, clicking the Done button allows the user to save the patches into an XML file.

Post this, the refinement of the dead leaves chart needs to be carried out as per section **Error! Reference source not found..**

1.2 Patch marking

1.2.1 Resolution chart

This consists of 2 steps, selection of the central resolution chart and *precise* marking of the center, inner circle and outer circle.

1.2.1.1 Select an ROI box for starchart

Select “Resolution MTF” radio button under “Metric selection” on top-left of the GUI.

Click mouse right button and select “Select an ROI box for starchart”, use mouse left button to draw a rectangle around the resolution chart as shown in [Figure 1-3](#). The entire resolution chart including the four “plus” signs should be present in the rectangle.

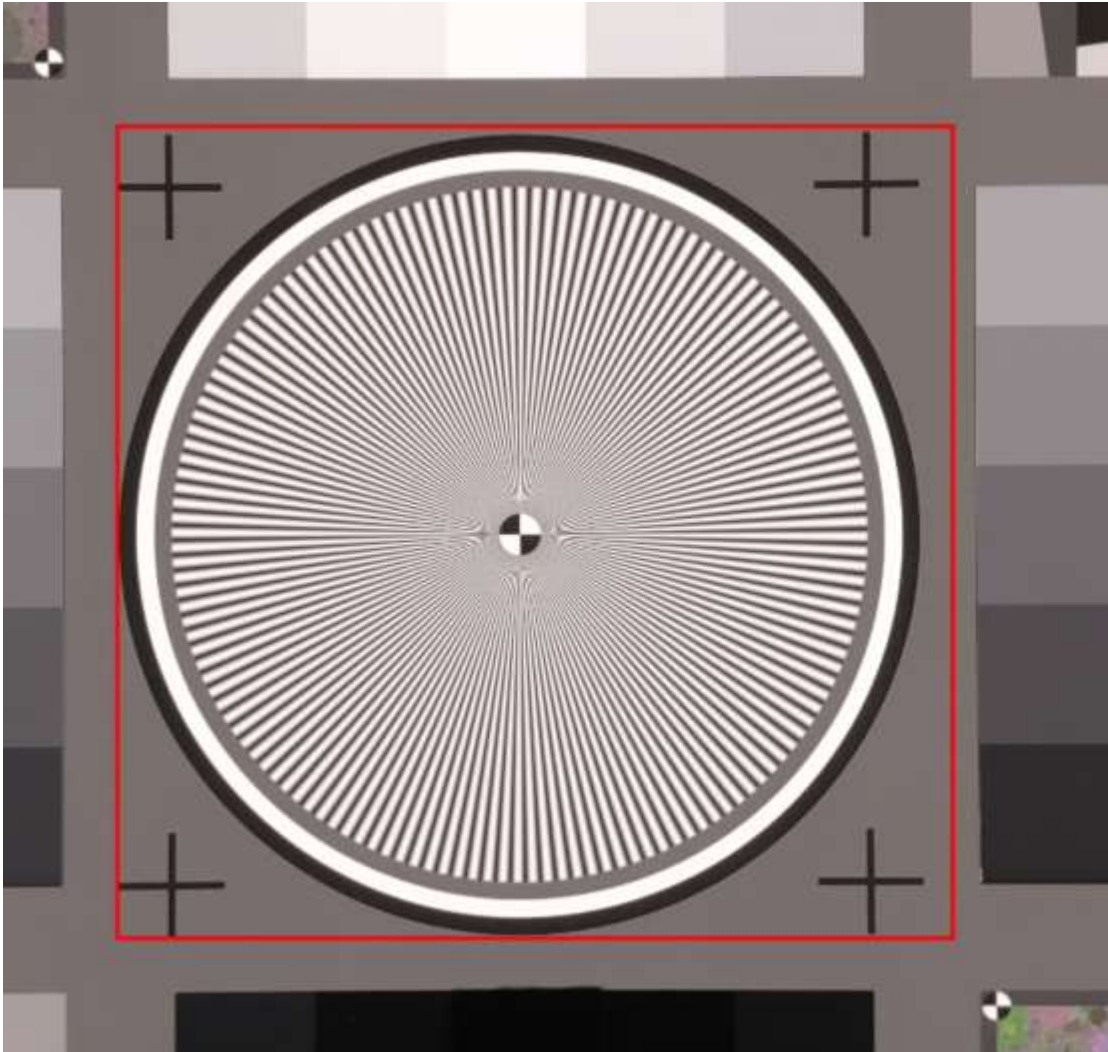


Figure 1-3 Central resolution chart.

1.2.1.2 Select center, inner radius and outer radius

Click mouse right button and select “Select center, inner radius and outer radius”. These need to be marked in order. Zoom in to accurately mark these as resolution MTF computation is sensitive to accurate marking of these points.

1. Center: mark the center of resolution chart this is intersection of the black and white circle sectors at the middle of the resolution chart.
2. Inner radius: this is the radius of the inner circle
3. Outer radius: this is radius of the resolution chart.

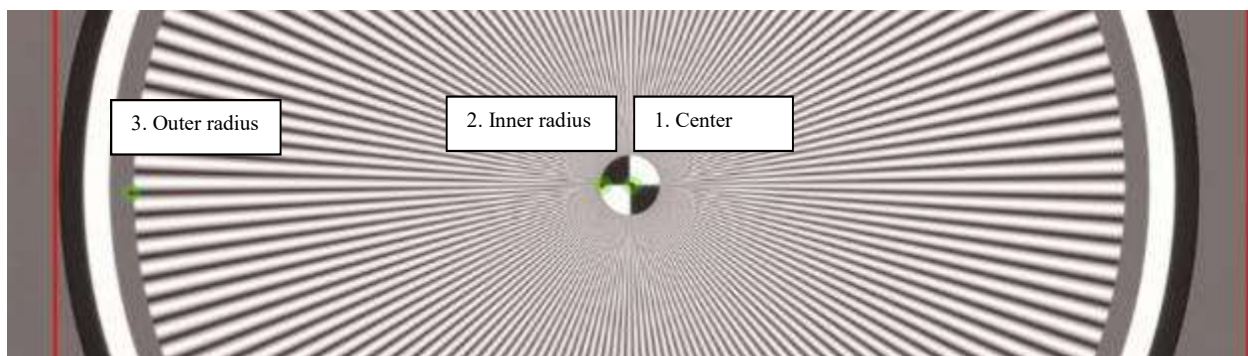


Figure 1-4 Center, inner circle and outer circle for resolution chart

1.2.2 Edge patch

Mouse right click, select “Select SlantedEdgeTRHC”, mark the high contrast slanted edge in the top right portion of the TE42 chart by drawing a rectangle as shown in [Figure 1-5](#). Make sure bottom left of the rectangle lies in the white area and top right of the rectangle lies in the black area of the slanted edge area. Select as large a rectangle as possible.

[Figure 1-8](#) shows an incorrectly marked edge patch. The bottom left of the marked rectangle lies in black area. It should be in the white area (as shown by the green dot).

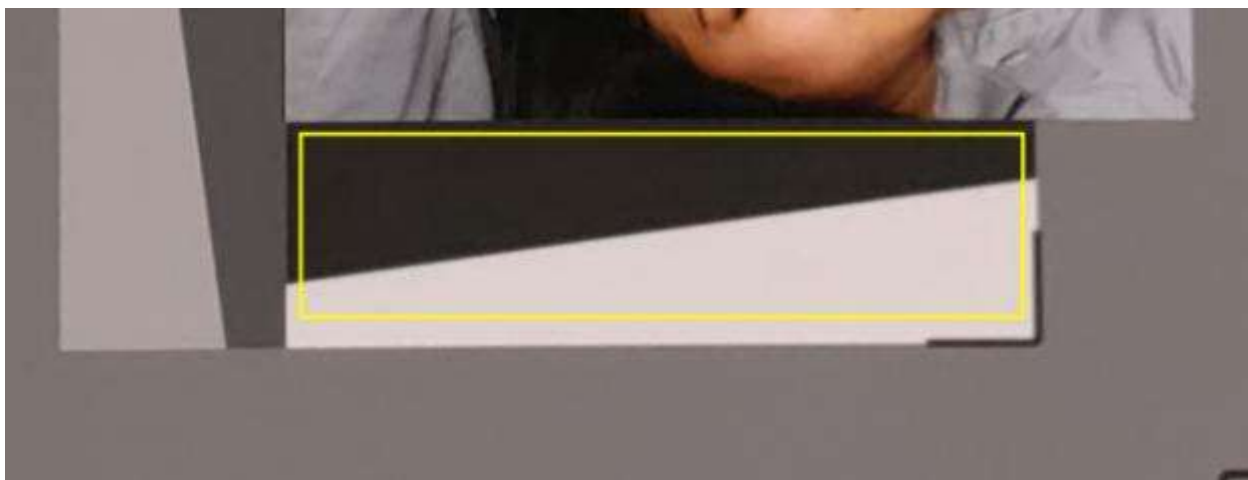


Figure 1-5 High contrast top right slanted edge patch. Bottom left of the rectangle should be in white area and top right of the rectangle should be in the black area.

Similarly select rectangle regions around low contrast edge patch in the top right region by selecting “SlantedEdgeTRLC” (see [Figure 1-7](#)), high contrast edge patch in the bottom left region by selecting “SlantedEdgeBLHC” (see [Figure 1-6](#)) and low contrast edge patch in the bottom left region by selecting “SlantedEdgeBLLC” (see [Figure 1-7](#)).



Figure 1-8 *Incorrectly* marked slanted edge. Bottom right of the rectangle lies in black area.

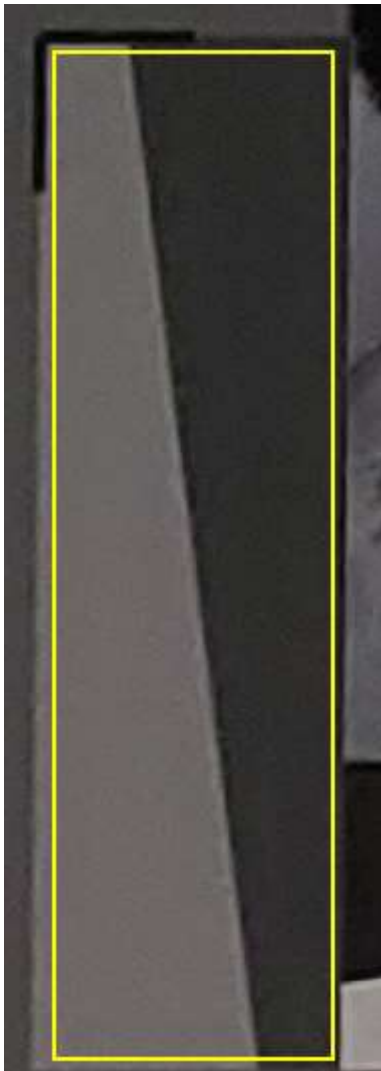


Figure 1-7. Correctly marked low contrast top right slanted edge patch



Figure 1-6. Correctly marked high contrast bottom left slanted edge patch

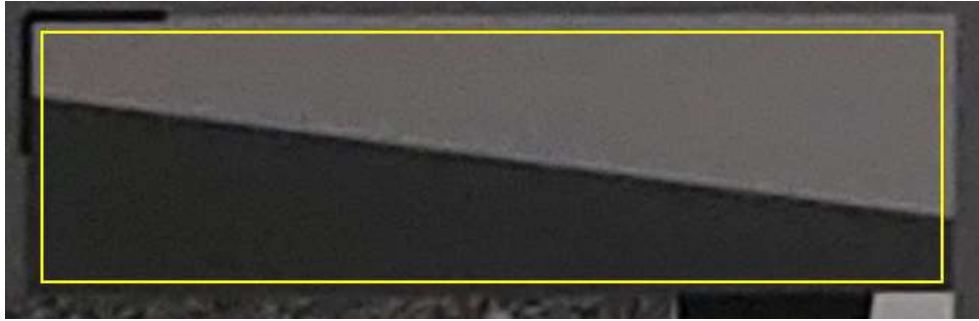


Figure 1-9. Correctly marked low contrast bottom left slanted edge patch

1.2.3 High contrast dead leaves

Mouse right click select “Select dead leaves chart”, mark the high contrast dead leaves by drawing a rectangle as shown in [Figure 1-10](#). Make sure the four markers at the corners of the dead leaf chart are inside the rectangle.

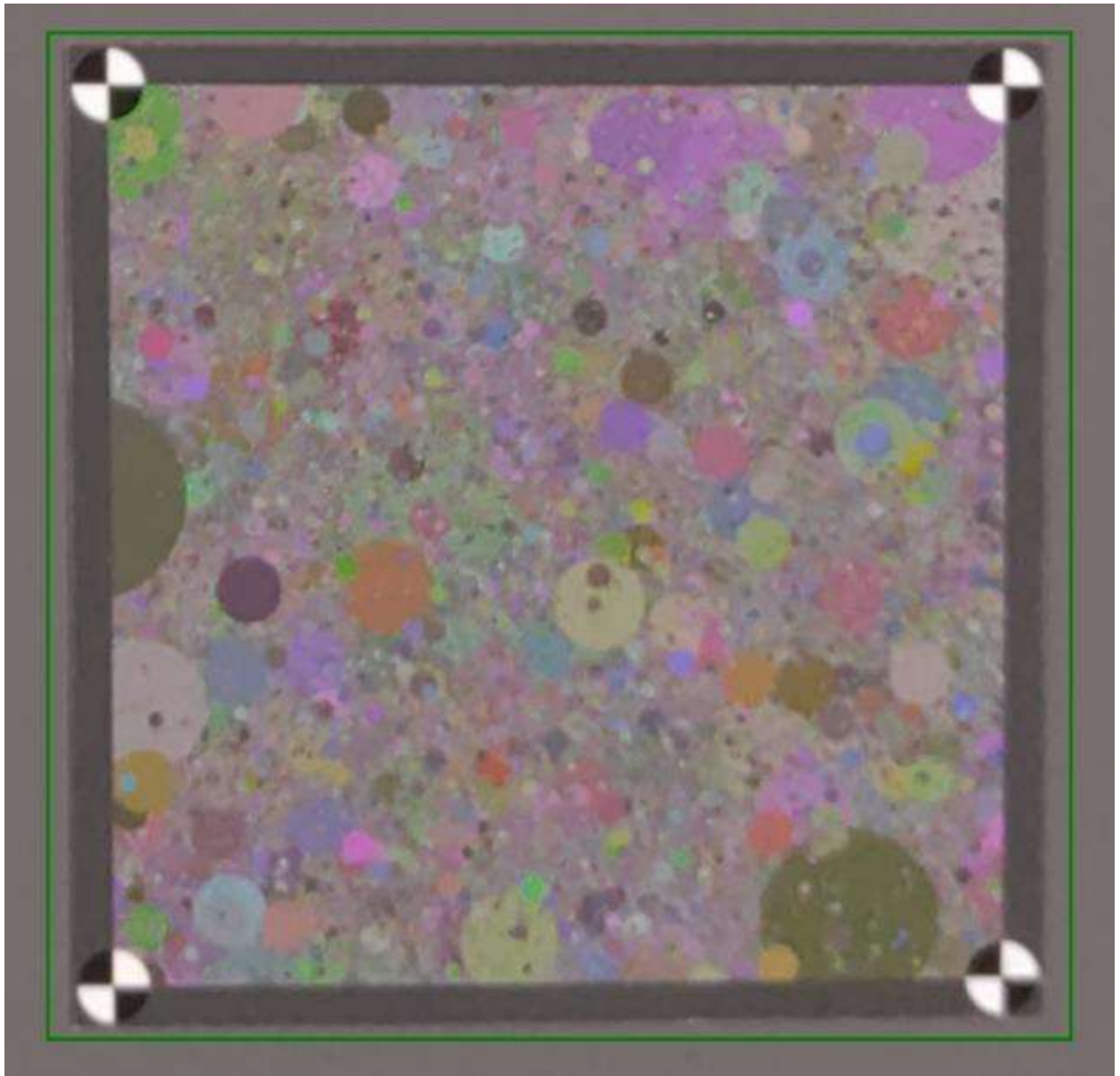


Figure 1-10 High contrast dead leaf

Mouse right click select “Select plain gray area”, draw a rectangle to select gray area to the right of the dead leaves chart. Select as large a region as possible (but ensure that entire rectangle only contains gray patch). This is shown in [Figure 1-11](#)

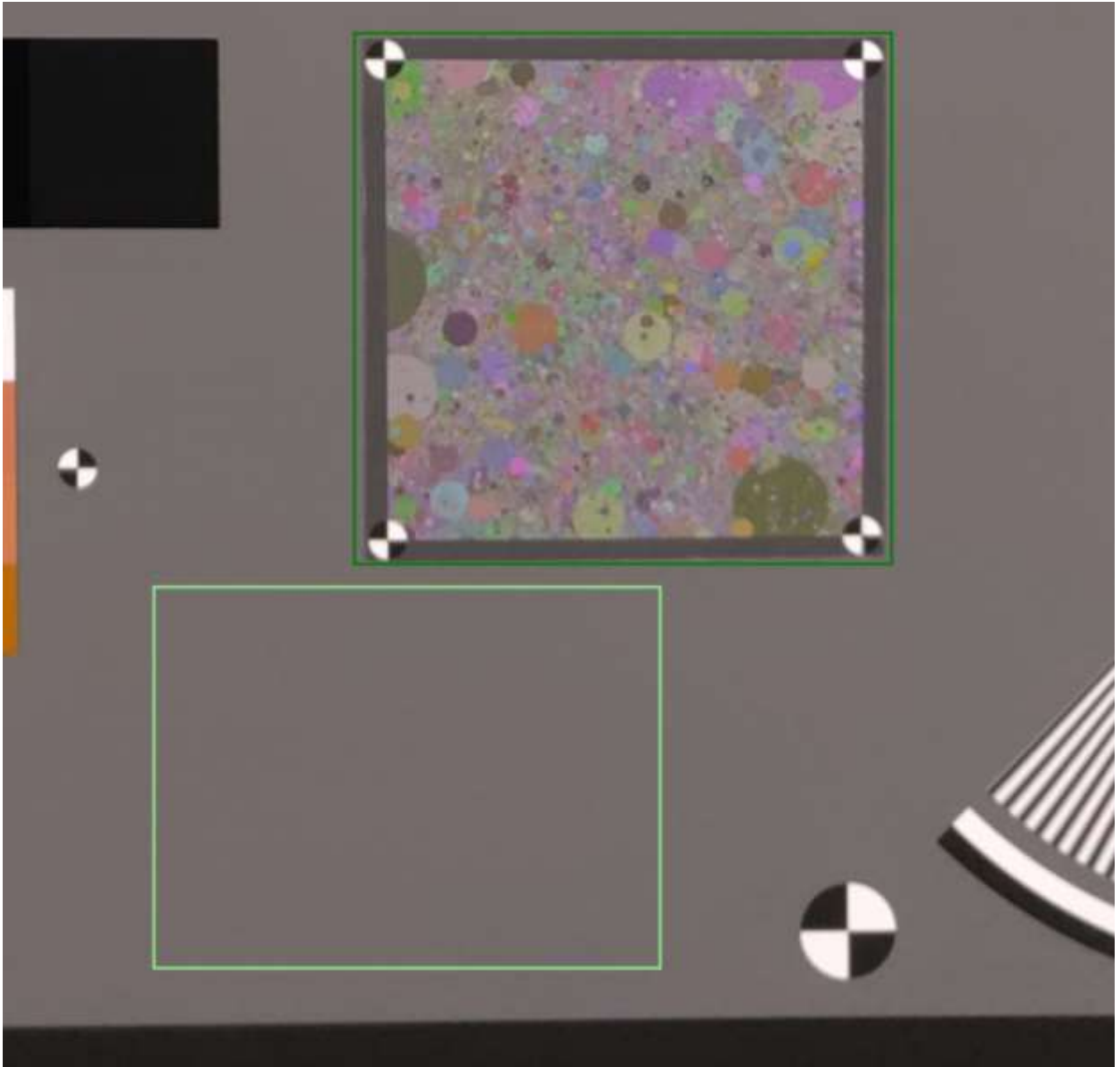


Figure 1-11 High contrast dead leaf and associated gray patch

1.2.4 Low contrast dead leaves

Similar to high contrast dead leaves, mark rectangles for low contrast dead leaf and associated gray patch as shown in [Figure 1-12](#)

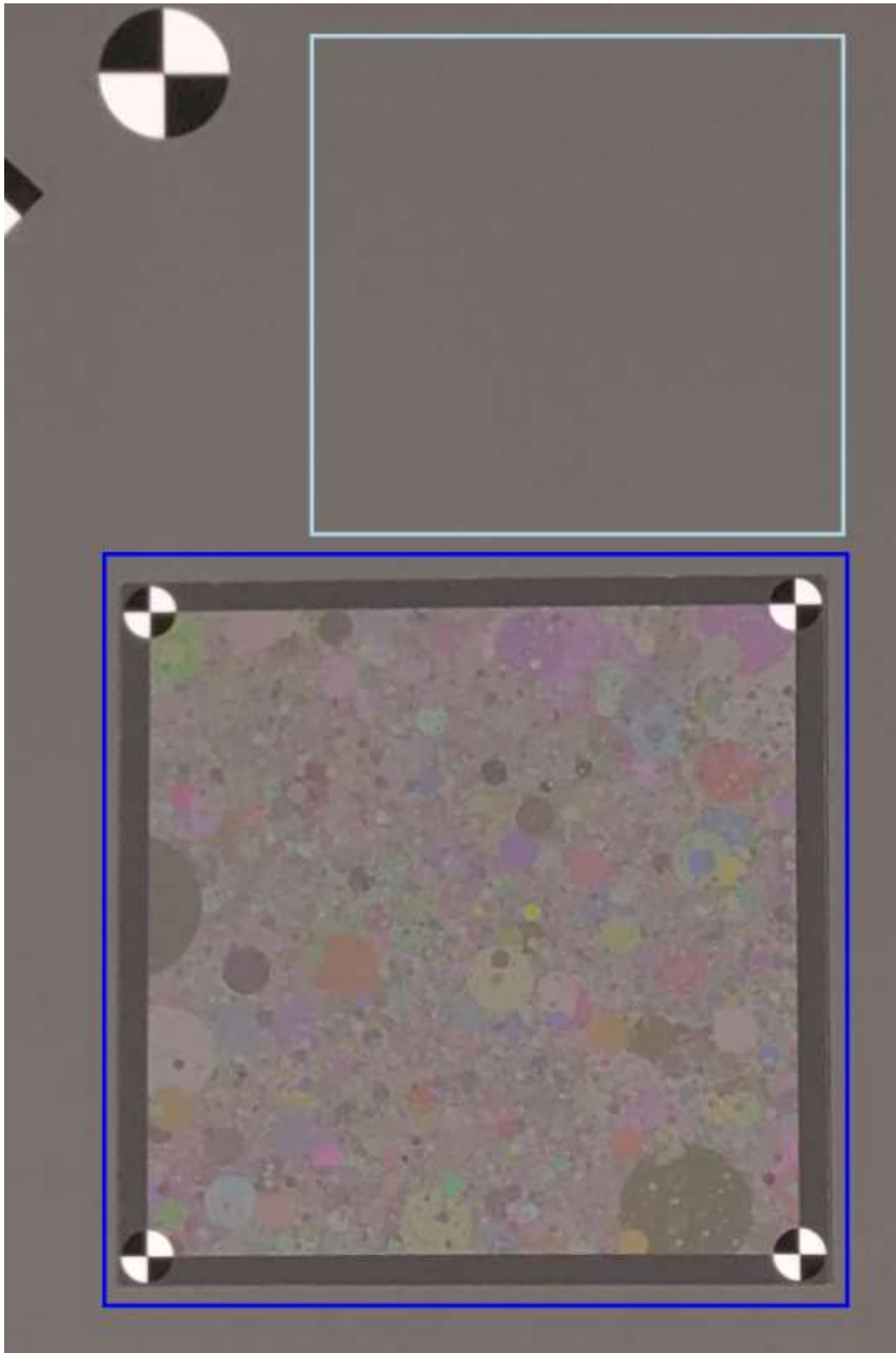


Figure 1-12 Low contrast dead leaf and associated gray patch

1.2.5 Noise patches

Autotune uses 20 luma noise patches located at top, left, right and bottom of the central resolution chart. Marking the noise patch consists of two steps

1. Marking the start locations of the 4 noise patch sets
2. Selecting any one noise patch

1.2.5.1 Select start location

Mouse right click select “Select start locations”, mark the top left of each of the 4 sets of noise patches in this order i) TOP, ii) LEFT, iii) RIGHT, and iv) BOTTOM. This is shown in Figure 1-13

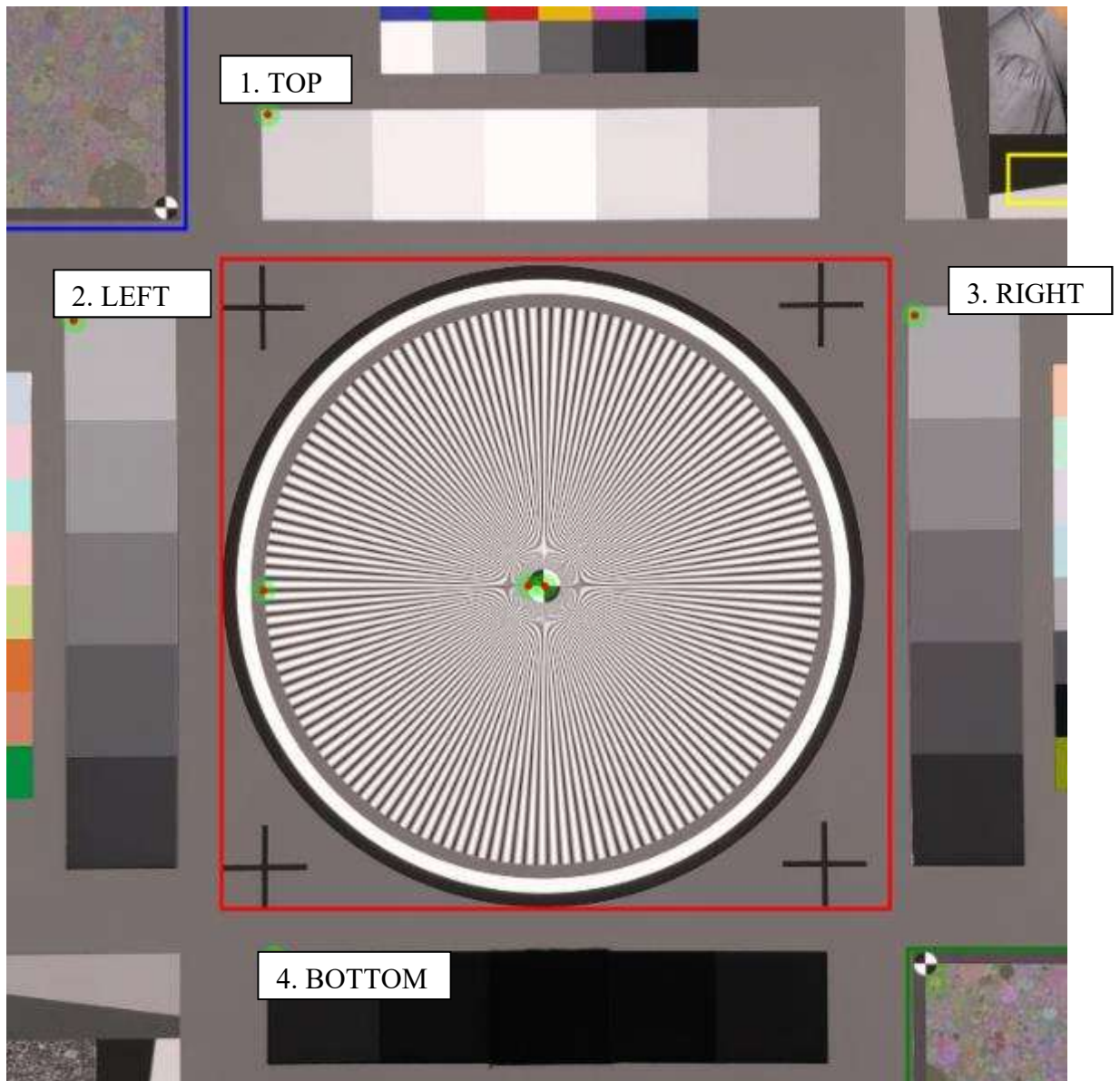


Figure 1-13 Four start location for four sets of noise patches – mark in following order top, left, right, bottom

1.2.5.2 Select one noise patch

Mouse right click select “Select one noise patch” Mark a rectangle to select any one noise patch. Please mark as large a region as possible (but ensure that selected region is completely inside the noise patch). This is shown in [Figure 1-14](#).

Note: recommended that the noise patch is marked in the left or right noise patch strips, as these are easier to mark.

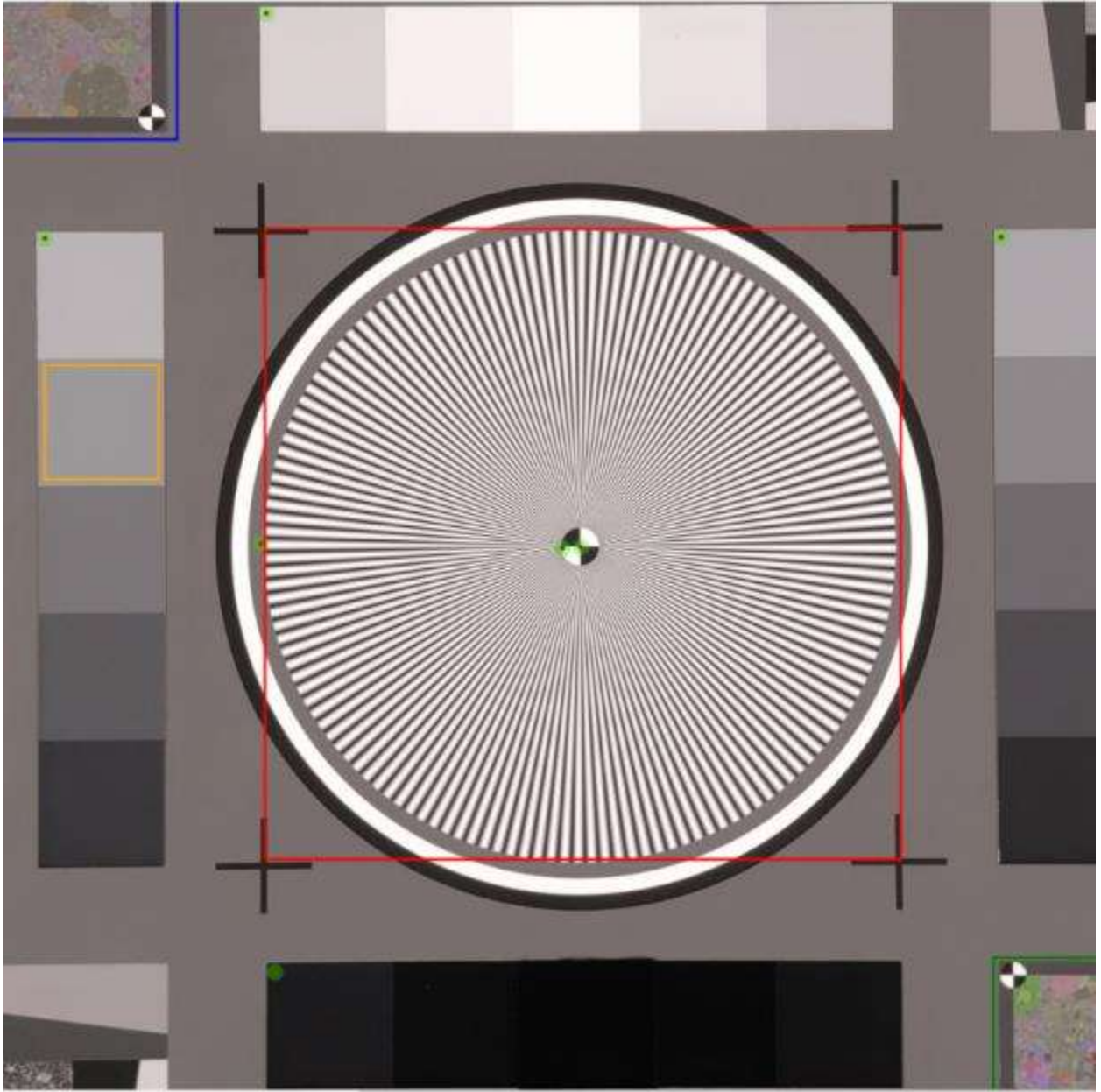


Figure 1-14 Mark one noise patch – select as large an area within any one of the 20 noise patches

1.2.6 Final patch marked image

The final patch marked will look as shown in Figure 1-15.

You will be prompted to save the patch property XML.

This XML will be used for refinement of the low contrast and high contrast dead leaves in the next step.

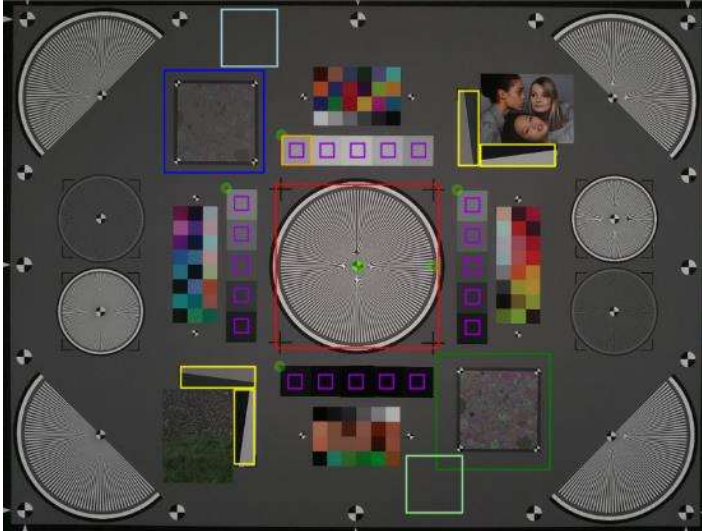


Figure 1-15 Final patch marked image

1.3 Refinement

1.3.1 Low dead leaves

Click on low dead leaves radio button under “Refine” section at top left of the UI. This will bring up prompt to load a patch property XML file. Please load the patch property XML you created in [Section 1.2](#)

This will bring up the below window ([Figure 1-16](#)).

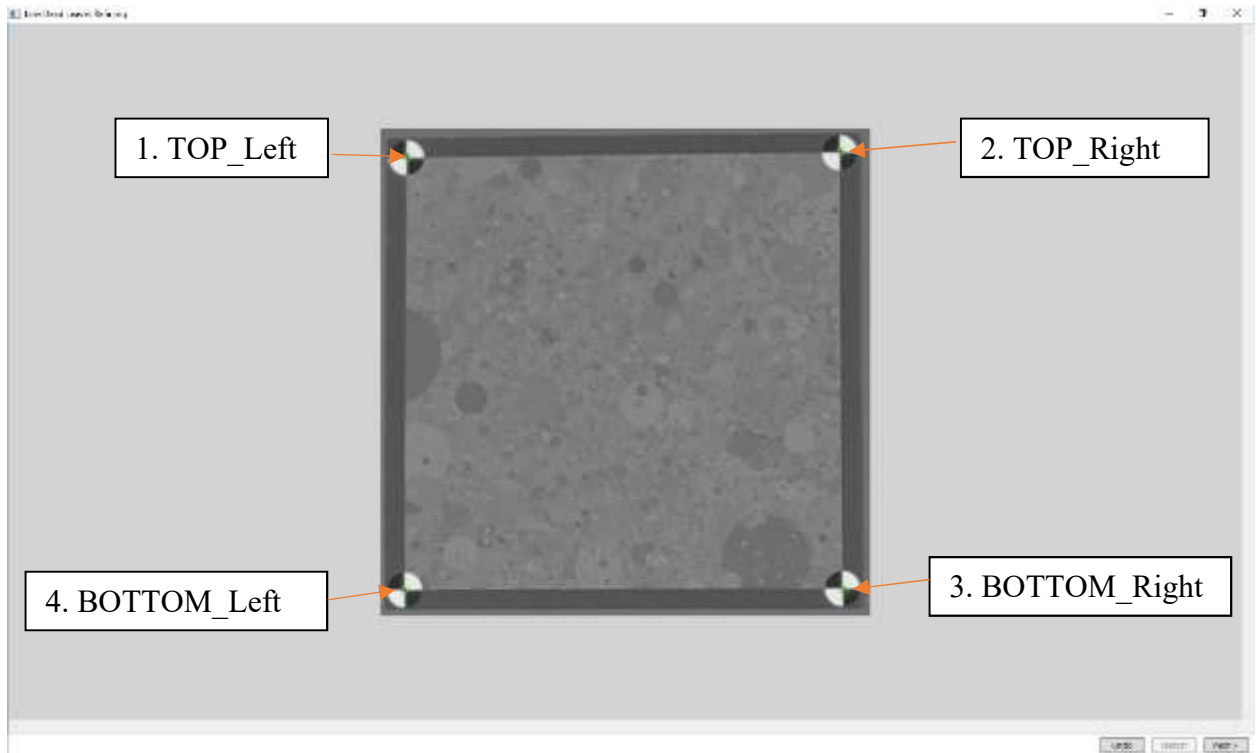


Figure 1-16 Low dead leaf refinement – Step 1

Step 1: Mark the center of the four markers at corners of dead leaf (shown as green dot in the figure) in following order i) Top_Left, ii) Top_Right, iii) Bottom_Right iv) Bottom_Left. (Note that the tool tip will indicate which marker you need to mark).

Click next

Step 2: Mark the center of the four markers again in the new window.

Click next

A new window will show the low contrast dead leaves images warped and projected onto the reference low contrast dead leaves images. If the marking has been done accurately you will *not* observe a green or pink in the image. If not done accurately a green or pink tinge will be present. If tinge is present (see [Figure 1-17](#)) click restart and repeat steps 1 and 2, else click end and proceed to High contrast dead leaves.

See [Figure 1-18](#), the tinge is significantly reduced compared to [Figure 1-17](#)

This needs to be repeated until the greenish/pinkish tinge is minimized.

Note that it might not be possible to completely eliminate the tinge, repeat the steps until it is minimized.

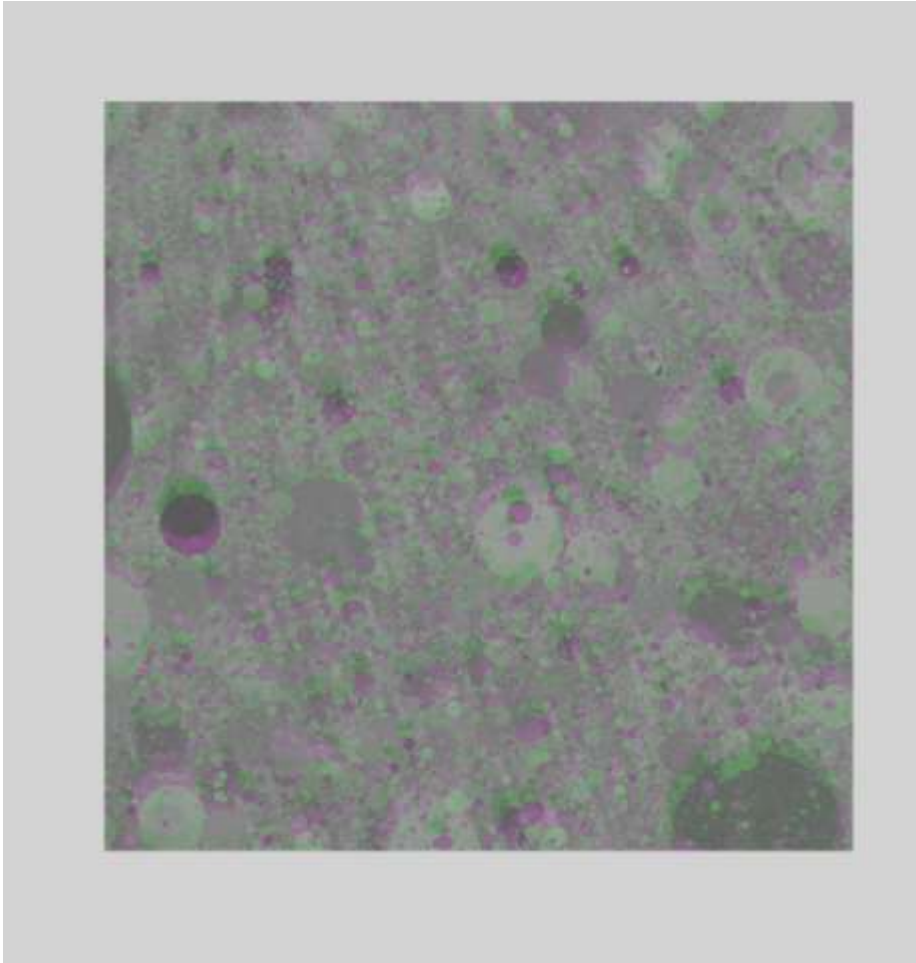


Figure 1-17 Incorrectly warped image greenish and pinkish tinge

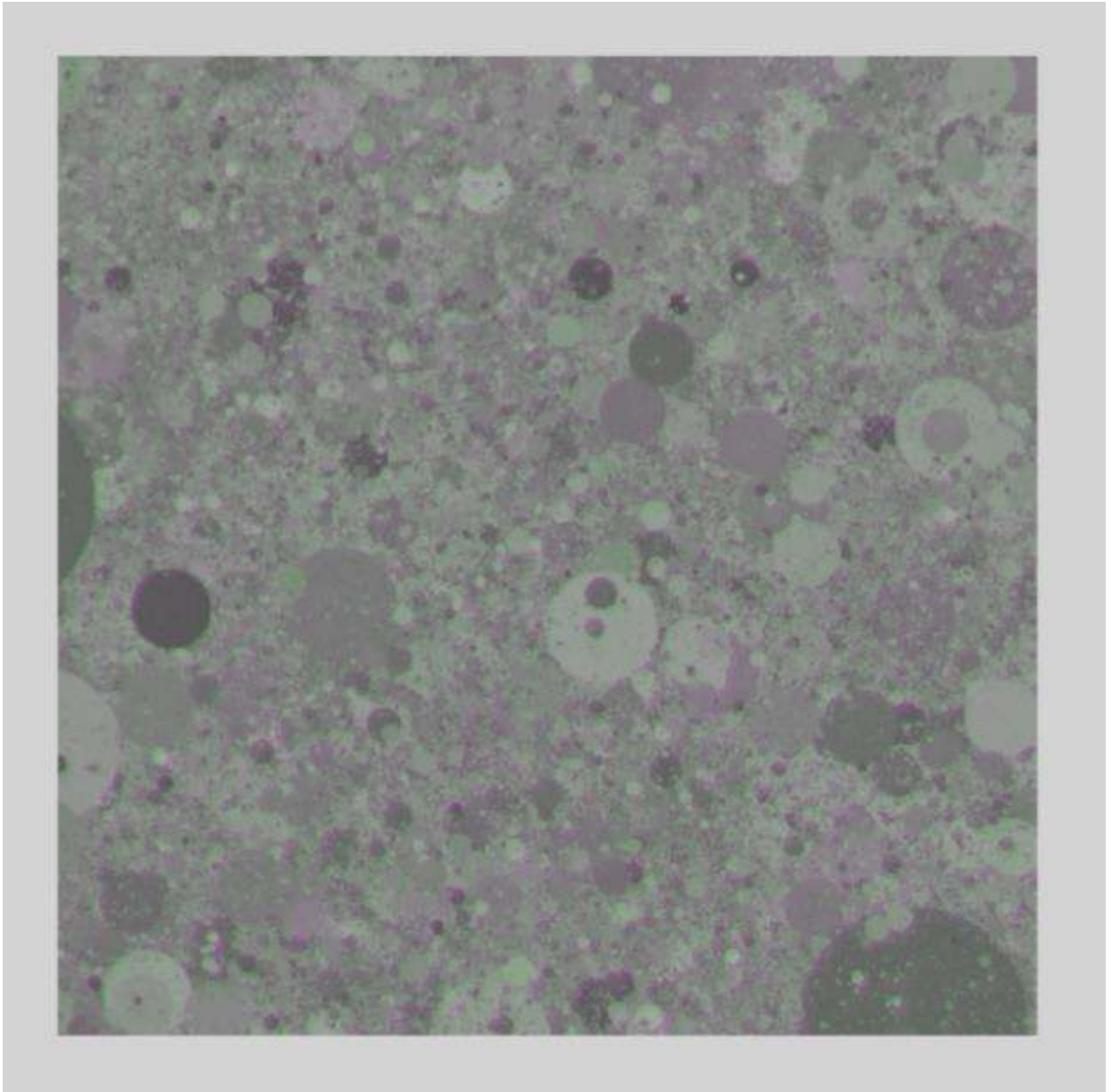


Figure 1-18 Better marking than [Figure 1-17](#). Tinge is much lower.

1.3.2 High contrast dead leaves

Once low contrast dead leaves is completed, the same procedure as in [1.3.1](#) needs to be repeated for high contrast dead leaves.

After completion of high contrast dead leaves click on DONE under refine and save the final patch marked XML.