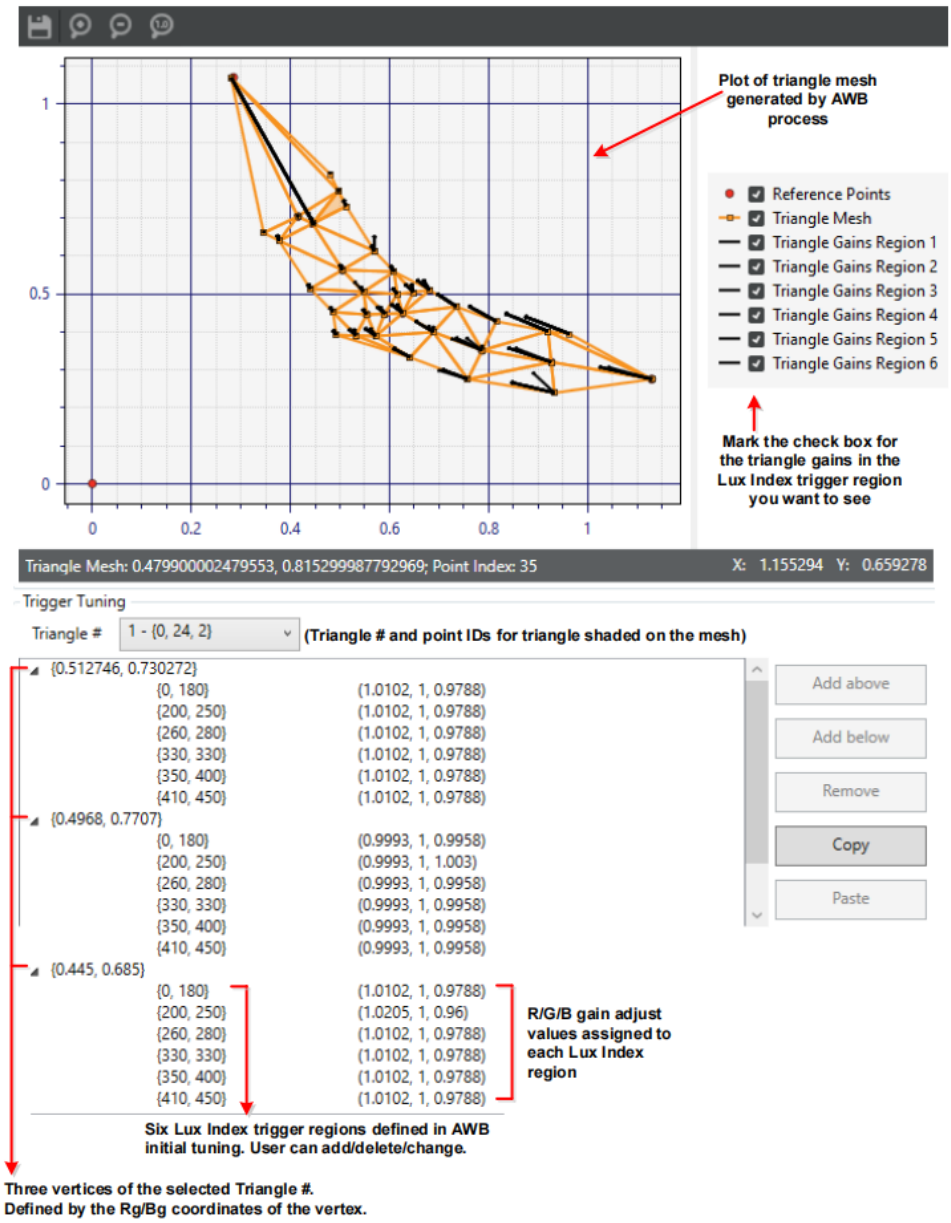
Triangle gain adjust concept

It is important that users be able to adjust the final AWB gain to obtain a user-preferred color tone. AWB processing provides for gain adjust with a triangle mesh-based AWB gain adjust module. This module allows users to have locally optimized control of AWB gain adjust by changing the triangle configuration.

The tuning tool uses a topological configuration for specifying the gain adjust process. This enables more flexibility in making changes to the gain adjust configuration (adding/deleting/modifying gain adjust values) and provides more efficient matching to the reference color.

During AWB initial tuning, a triangle mesh is generated to cover the entire gray zone in the Rg/Bg space. In each point of the mesh, several different gain adjust triples (R_{gain}, G_{gain}, B_{gain}) are specified

along with corresponding lux index triggers. The image below of the Chromatix user interface for triangle gain adjust shows a sample configuration of the related parameters.



In the triangle where the final AWB decision (from the DA) is located, the gain adjust values specified for each vertex of the triangle are used by the triangle gain adjust module to interpolate the final gain adjust. To speed up the process of finding the triangle where the DA decision is located, initial tuning

configures four starting triangle indexes for daylight, F-light, A-light and H-light. The DA data determines which starting triangle is used. This auxiliary information can be modified as necessary.

15.1 Triangle gain adjust parameters

To view the primary triangle gain adjust parameters, open a project and click **Triangle Gain Adjust** in the **List View** tab.

Table 15-1 Triangles/Trigger tuning parameters

Parameter Name	Description	Tuning	Factory Default
Vertex Pt Rg/Bg	Rg and Bg coordinates for the specified triangle vertex	Computed by AWB initial tuning, but customizable.	Computed by AWB initial tuning. The default triangle mesh generated by AWB initial tuning includes 35 vertices and 46 triangles.
Trigger Pt Start/End	Lux index start and end values for trigger region	Six trigger regions are computed by AWB initial tuning. Customizable.	Computed by AWB initial tuning
Trigger Data (Red, Green, Blue)	Red, green, or blue gain adjust values for the applicable trigger range	Computed by AWB initial tuning, but customizable	Computed by AWB initial tuning
Num of Start Position	The number of start triangles to define for the search process.	Do not tune	Fixed at 4
Start Triangle Idx[0-3]	The triangle idenfication number to start the search.	Tuning is done in the Parameter Editor. Set entry [0] to a daylight decision triangle (D75-D50) Set entry [1] to a F-light decision triangle (CW, TL84) Set entry [2] to an A-light decision triangle Set entry [3] to an H-light decision triangle	Four start triangles defined during AWB initial tuning

Table 15-2 CCT-based Adjust Gains tuning parameters

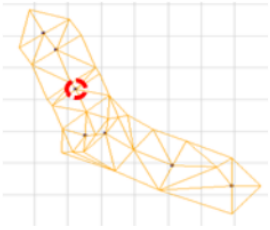
Parameter Name	Description	Tuning	Factory Default
CCT Adjust Gain: Lux Index trigger (first level)	Lux index start and end values for trigger region	Modify default or add more triggers	(0, 999)
CCT Adjust Gain: CCT trigger (second level)	CCT start and end values for trigger region	Modify default or add more triggers.	(1500, 12000)
CCT Adjust Gain: Data (Red, Green, Blue)	Red, green, or blue gain adjust values for the applicable trigger range	Computed by AWB initial tuning, but customizable	(1, 1, 1)

15.2 Examples of triangle gain adjust tuning

These examples illustrate how gain adjusts are tuned so that the final AWB output matches a reference phone as much as possible.

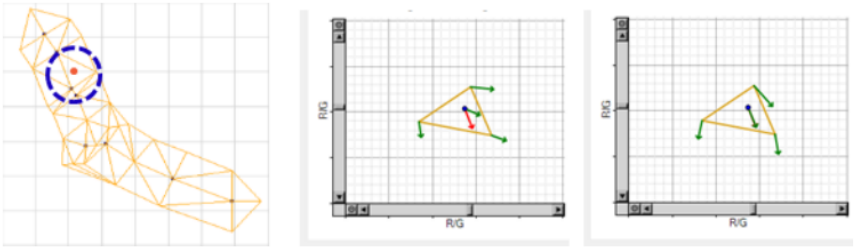
Example 1

Modify the existing gain adjust for day light at the noon reference point.



Example 2

For a day scene, modify the existing gain adjust on a triangle in which the final AWB decision point is located



(L) Current AWB decision; (C) Current gain adjust; (R) New gain adjust

Example 3

For a night scene, add another point to match to the reference color, then set gain adjust for that point..

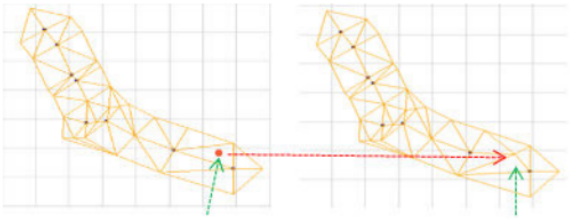


Figure 15-1 (L) Current AWB decision; (R) Set new point in the triangle mesh

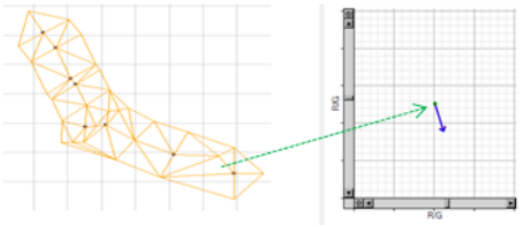


Figure 15-2 Set up gain adjust for the new point

15.3 Fine-tune triangle gain adjust

Prerequisite: Before performing any fine tuning, be sure to run the AWB initial tuning procedure to generate initial parameter values and predefined triangle gain adjust values.

Use this procedure to customize the triangle data generated by AWB initial tuning

Tune existing triangle parameters

1. Open the project and click the **AWB** tab.
2. In the **List View** tab, select **Triangle Gain Adjust**.
3. Click the **Triangles** tab.
4. In the **Trigger Tuning** section, select the triangle you want to modify from the **Triangle #** field.
5. To modify a lux index trigger range, double-click the appropriate pair in the second column to open the values for editing. Enter the change and click outside the edit box to save.
6. To modify the gain adjust data, double-click the appropriate triplet in the third column to open the values for editing. Enter the change and click outside the edit box to save.
7. To save your changes, select **File** > **Save project**.

Add a lux index trigger region

1. Open the project and click the **AWB** tab.
2. In the **List View** tab, select **Triangle Gain Adjust**.
3. Click the **Triangles** tab.
4. In the **Trigger Tuning** section, select the triangle you want to modify from the **Triangle #** field.
5. In the second column, highlight the lux index above or below where you want to add the new trigger region, then click **Add above** or **Add below** to add a new row.

   NOTE The tool does not allow adding a row above the minimum lux index or adding a row below the maximum lux index.
6. Double-click the new second column entry to open the values for editing. Enter the start and end values for the new lux index trigger range. Click outside the edit box to save.
7. Double-click the new third column entry to open the values for editing. Enter the red, green, and blue gain adjust values for the new trigger range. Click outside the edit box to save.
8. To save your changes, select **File** > **Save project**.

Delete a lux index trigger region

1. Open the project and click the **AWB** tab.
2. In the **List View** tab, select **Triangle Gain Adjust**.
3. Click the **Triangles** tab.
4. In the **Trigger Tuning** section, select the triangle you want to modify from the **Triangle #** field.
5. In the second column, highlight the lux index trigger region you want to delete, then click **Remove**.
6. To save your changes, select **File** > **Save project**.

Add a triangle to the mesh

1. Open the project and click the **AWB** tab.
2. In the **List View** tab, select **Triangle Gain Adjust**.
3. Click the **Triangles** tab.
4. In the mesh plot, CTRL + click in the spot where you want to add a vertex. The tool may complete the triangle, but add other vertices if needed.
5. If you need to relocate a vertex of the new triangle, Shift + drag the vertex in the mesh plot.
6. To save your changes, select **File** > **Save project**.

Move a triangle vertex

1. Open the project and click the **AWB** tab.
2. In the **List View** tab, select **Triangle Gain Adjust**.
3. Click the **Triangles** tab.
4. In the mesh plot, Shift + drag the vertex to the new location.
5. To save your changes, select **File** > **Save project**.

Delete a triangle from the mesh

1. Open the project and click the **AWB** tab.
2. In the **List View** tab, select **Triangle Gain Adjust**.
3. Click the **Triangles** tab.
4. Select the triangle that you want to delete using one of these methods:
   - In the **Trigger Tuning** section, select the triangle you want to delete from the **Triangle #** field. The triangle is highlighted in the mesh.
   - In the mesh plot, click on the triangle you want to delete to highlight it.
5. Press the Delete key.
6. To save your changes, select **File** > **Save project**.

Tune CCT-based gain adjust parameters

1. Open the project and click the **AWB** tab.
2. In the **List View** tab, select **Triangle Gain Adjust**.
3. Click the **CCT-based adjust gains** tab.
4. To modify a Lux Index trigger range, double-click the appropriate pair in the first column to open the values for editing. Enter the change and click outside the edit box to save.
5. To modify a CCT trigger range, double-click the appropriate pair in the second column to open the values for editing. Enter the change and click outside the edit box to save.
6. To modify the gain adjust data, double-click the appropriate triplet in the third column to open the values for editing. Enter the change and click outside the edit box to save.
7. To save your changes, select **File** > **Save project**.

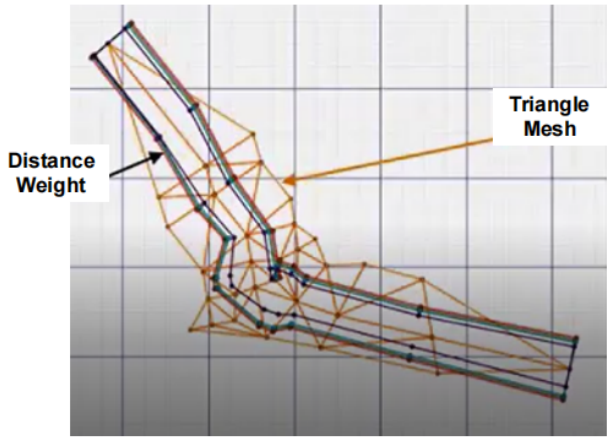
Add a CCT-based gain adjust trigger region

1. Open the project and click the **AWB** tab.
2. In the **List View** tab, select **Triangle Gain Adjust**.
3. Click the **CCT-based gain adjust** tab.
4. In the first column, highlight the lux index above or below where you want to add the new trigger region, then click **Add above** or **Add below** to add a new row.

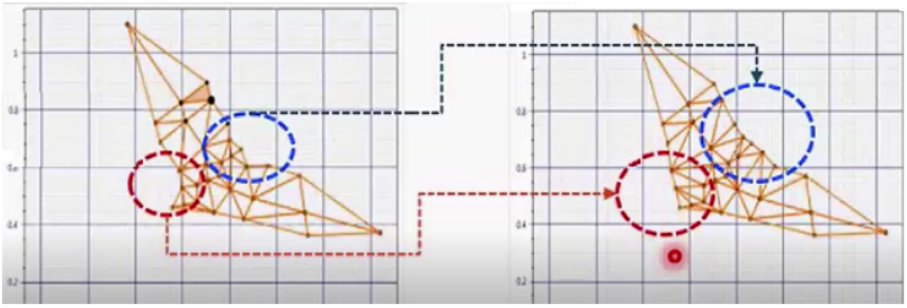
   NOTE The tool does not allow adding a row above the minimum lux index or adding a row below the maximum lux index.
5. Double-click the new first column entry to open the values for editing. Enter the start and end values for the new lux index trigger range. Click outside the edit box to save.
6. Double-click the new second column entry to open the values for editing. Enter the start and end values for the new CCT trigger range. Click outside the edit box to save.
7. Double-click the new third column entry to open the values for editing. Enter the red, green, and blue gain adjust values for the new trigger range. Click outside the edit box to save.
8. To save your changes, select **File** > **Save project**.

Useful tuning guidelines

- It is better for the triangle mesh to cover a larger area than the distance weight. This is a safeguard when the AWB decision is determined by stats that are located in the buffer zone.



- If there are convex shapes on the triangle mesh boundary, it is better to remove the convex shape by moving the vertices adjacent to the convex shape.



(L) Convex shapes (R) Adjusted shapes

- When you select the start triangle index, it is better to select each index from the areas shown in the diagram.