**\*\*\*\*\* Image Processing \*\*\*\*\***

**\*\*\* User Instructions \*\*\***

- **Start**

  1. Run Main;
  2. Press Space key and Enter key in the Terminal;
  3. GUI window will appear (Figure 1).
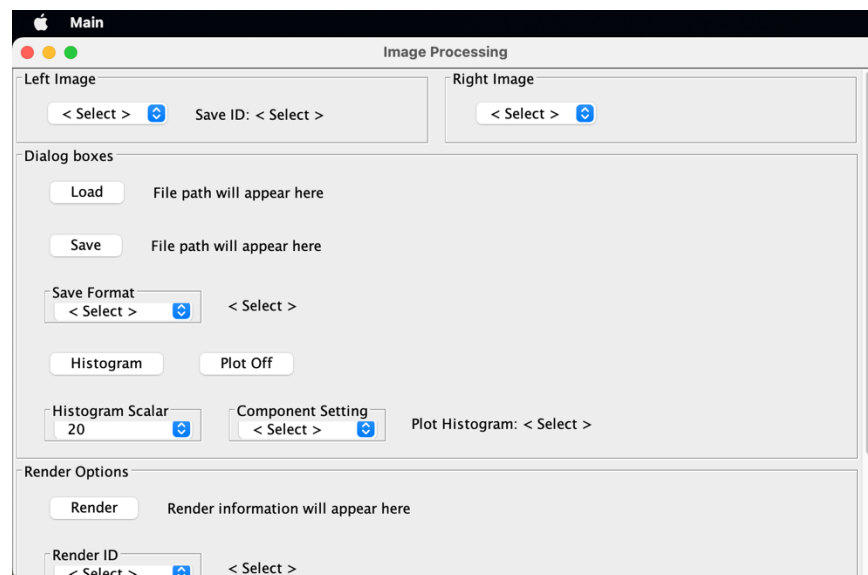


**Figure 1.  GUI view**

- **Load Image**

  1. Click Load button in the Dialog boxes (Figure 2);
  2. Choose the file to load in current directory;
  3. Successful loading displays both on Left Image and Right Image window. (Figure 3)

  Warning: If choose a file with an extension other than ppm, png, jpeg or jpg, warning message will display. (Figure 4)
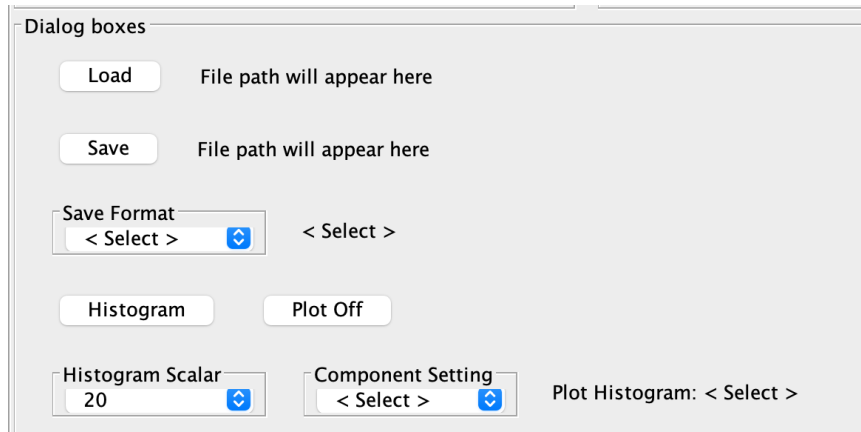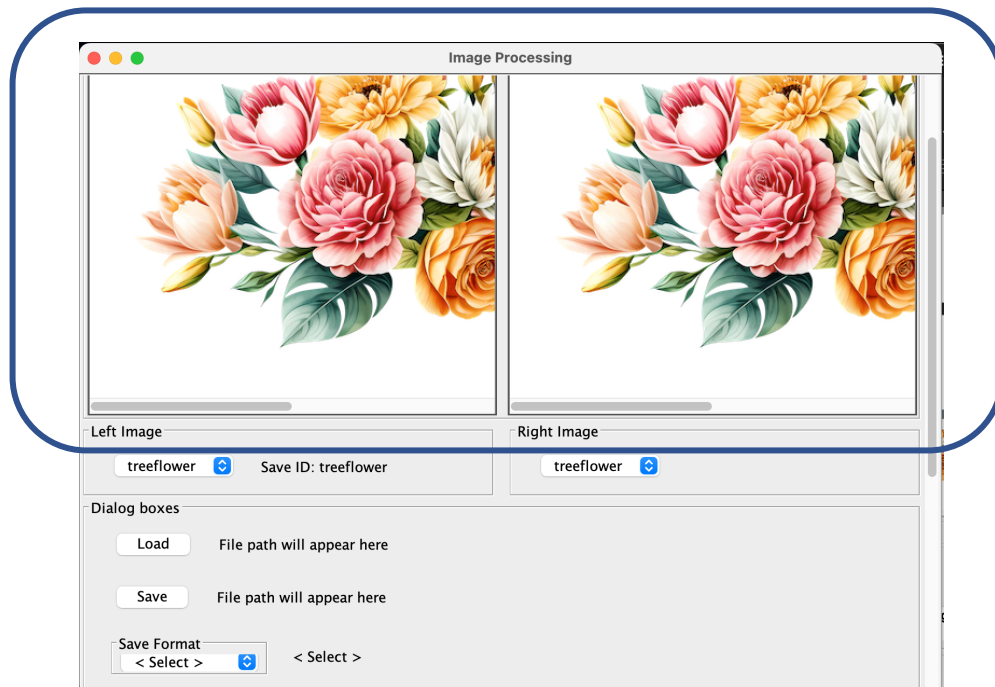
**Figure 2.  Dialog boxes**



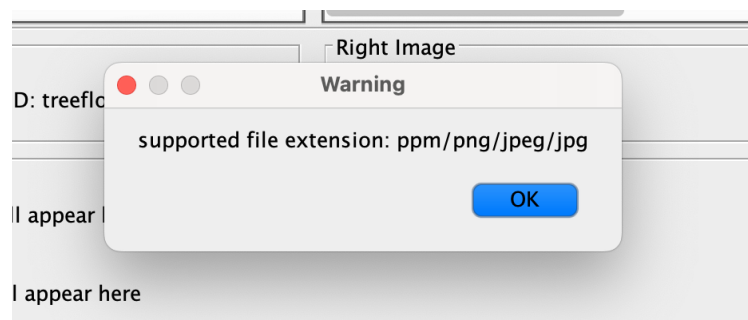**Figure 3.  Successfully loading treeflower.png**



**Figure 4.  Loading invalid file**

- **Render Image**

  1. Click the first drop-down list from Render ID in Render Options (Figure 5);
  2. Click the second drop-down list from Color Transform/ Filtering and Select (Figure 5) and Click Render;
  3. Rendered image will display in the Left Image, together with a new image ID shown in the drop-down list below. (Figure 6)

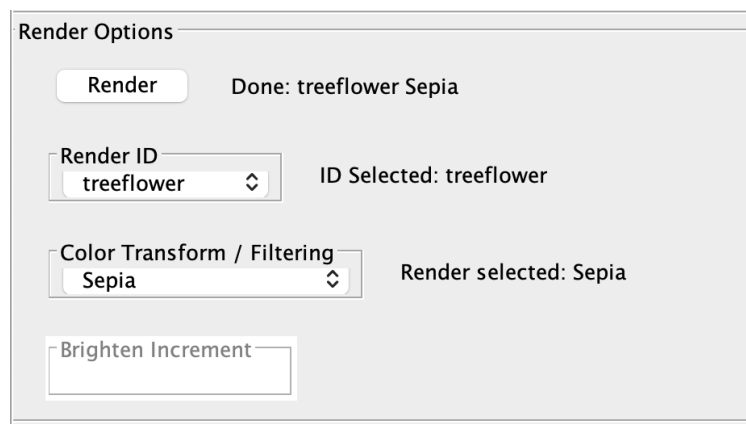  Warning: If any drop-list is not selected, a warning message will display. (Figure 7)
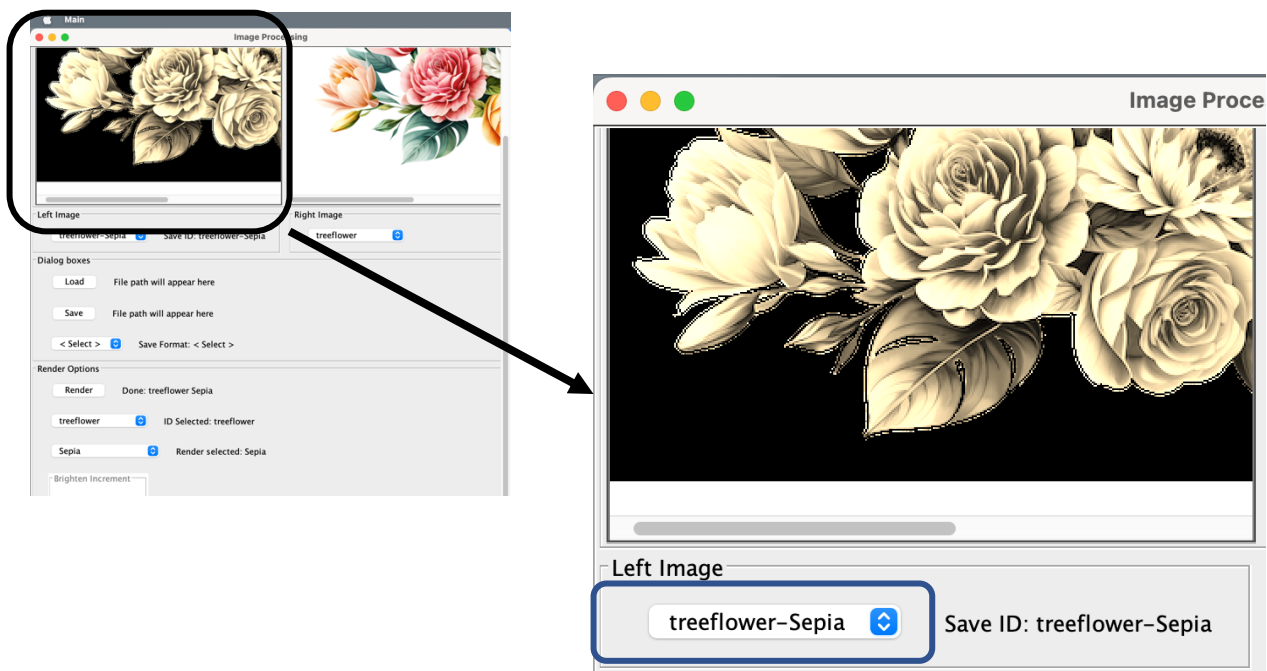


**Figure 5. Render Options**



**Figure 6. successfully Sepia Rendered image**
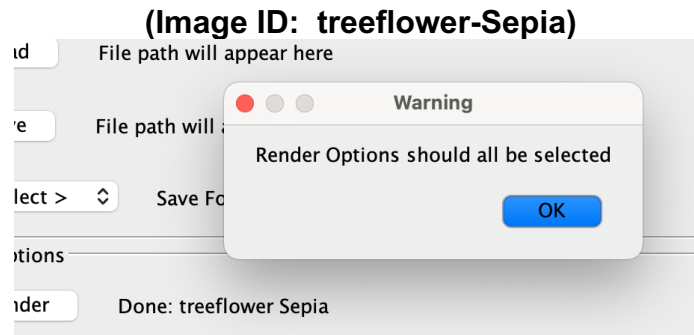
**(Image ID: treeflower-Sepia)**



Figure 7. **Warning message**

- **Brighten/Darken Image**

1. Click the first drop-down list from Render ID and Select;
2. Click the second drop-down list from Color Transform/ Filtering and Choose Brighten (Figure 8);
3. Brighten Increment text area will be enabled;
4. Enter an Integer between -255 ~ 255 in the text area;
5. Brightened/darkened image will display in the Left Image, together with a new image ID shown in the drop-down list below. (Figure 9)

Warning: If any drop-list is not selected or invalid increment is filled, a warning message will display. (Figure 10)
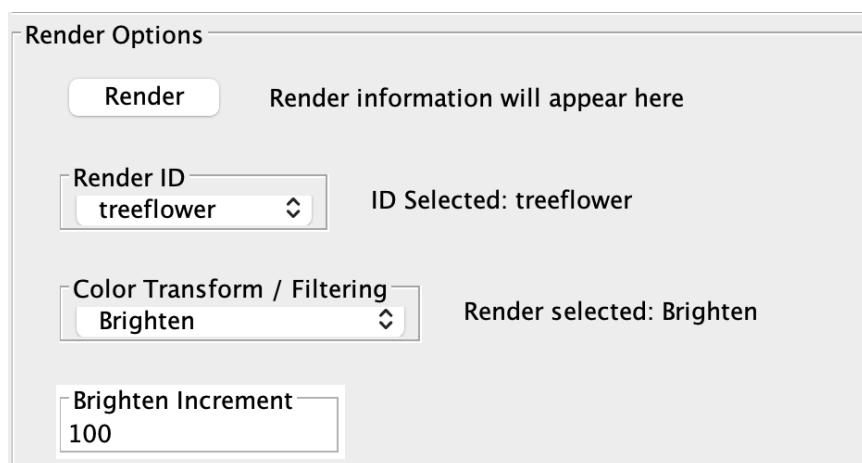


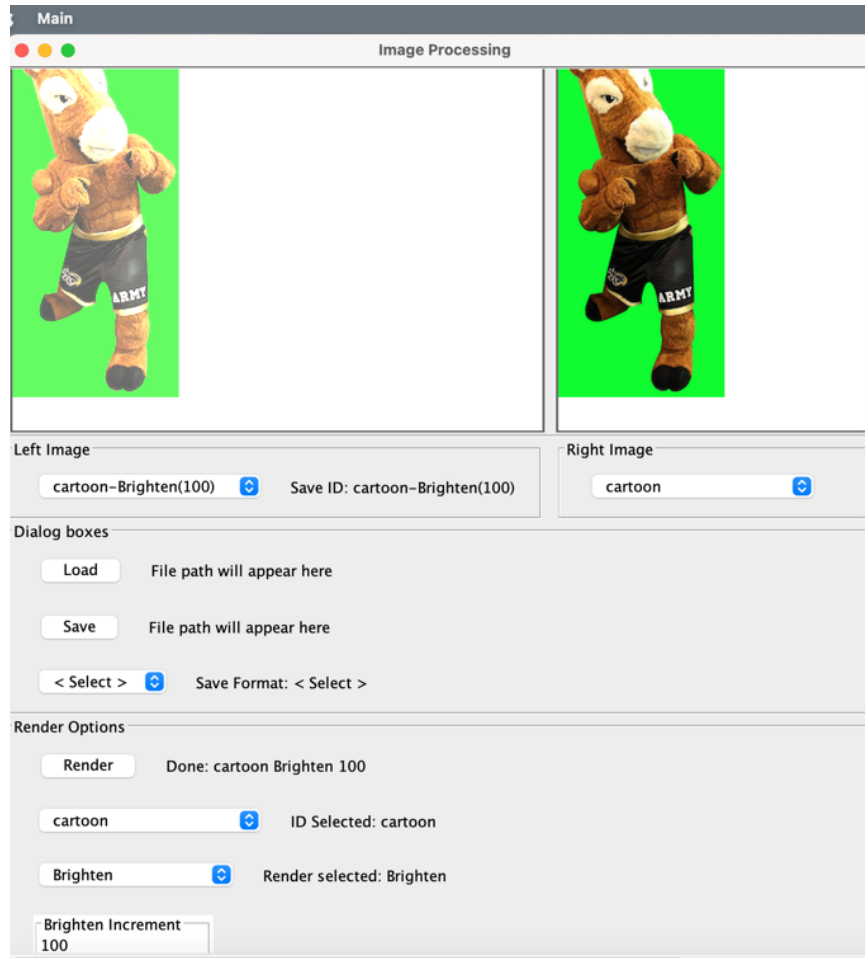**Figure 8. Brighten Transform selected**

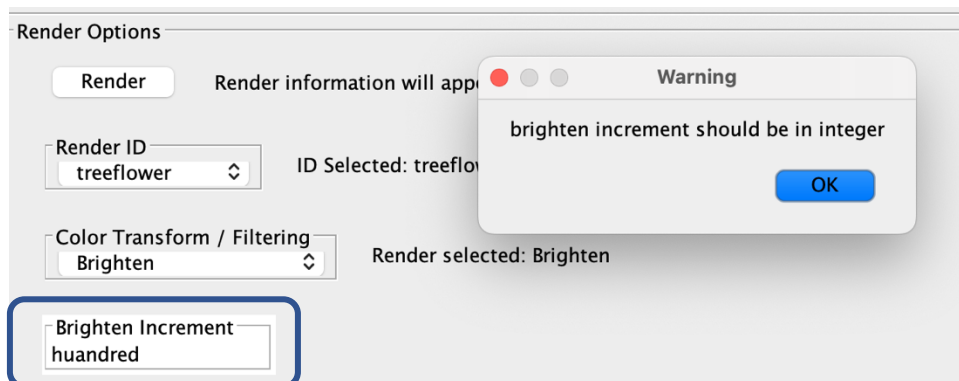**Figure 9. successfully Brightened +100 image**



**Figure 10. Warning message**

- **Plot Histograms**

  1. Click the drop-down list from the Component Setting and Select a greyscale method;
  2. Click Histogram;
  3. Default source image is from Right Image;
  4. Default scalar is 20, which indicates the current graph height is the average frequency value / 20 (Figure 11);
  5. If shown histogram graph is too flat, Click the drop-down list from Histogram Scalar and select a smaller number; (Figure 12)
  6. Click again for graph refresh;
  7. If done with the plot, Click Plot off to hide the graph window.
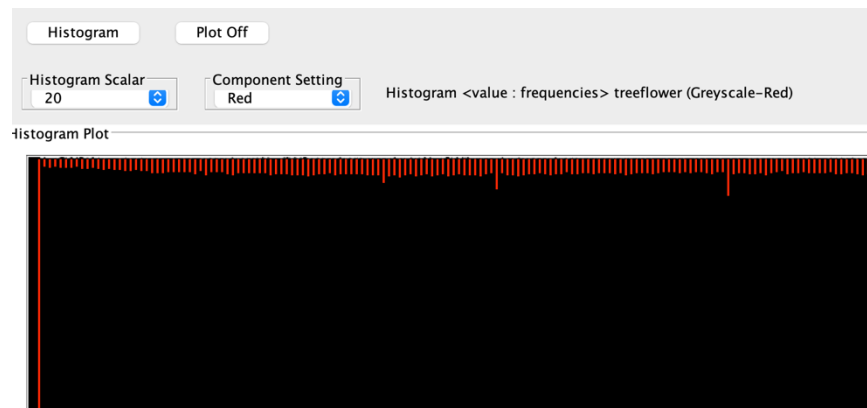


**Figure 11. A Histogram plot of the treeflower(Greyscale-Red) model (Scalar: 20)**
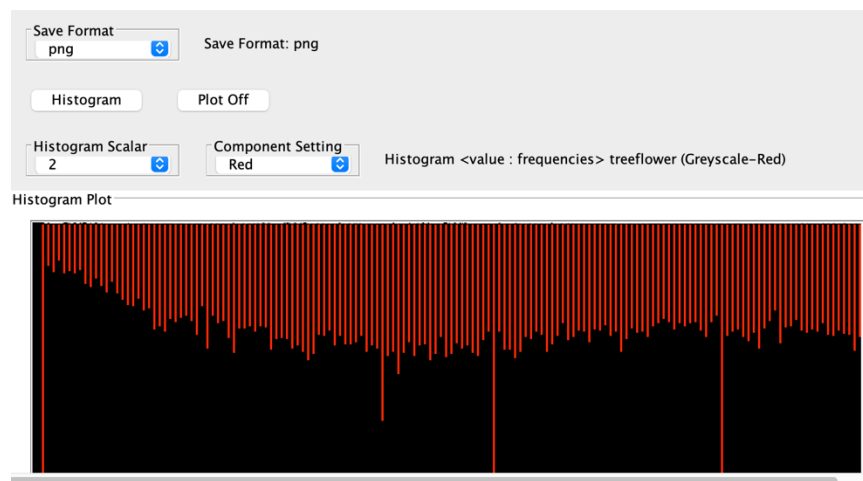


**Figure 12. A Histogram plot of the treeflower(Greyscale-Red) model (Scalar: 2)**

- **Save Image**

  1. Click the drop-down list in Left Image and Select the image ID to save;
  2. Click the drop-down list from Save Format in Dialog boxes;
  3. Select the image format to save;
  4. Click Save button, go the directory and save as input name. (Figure 14)

  Warning: If any drop-list is not selected or invalid extension is encountered in the input name, a warning message will display. (Figure 13)
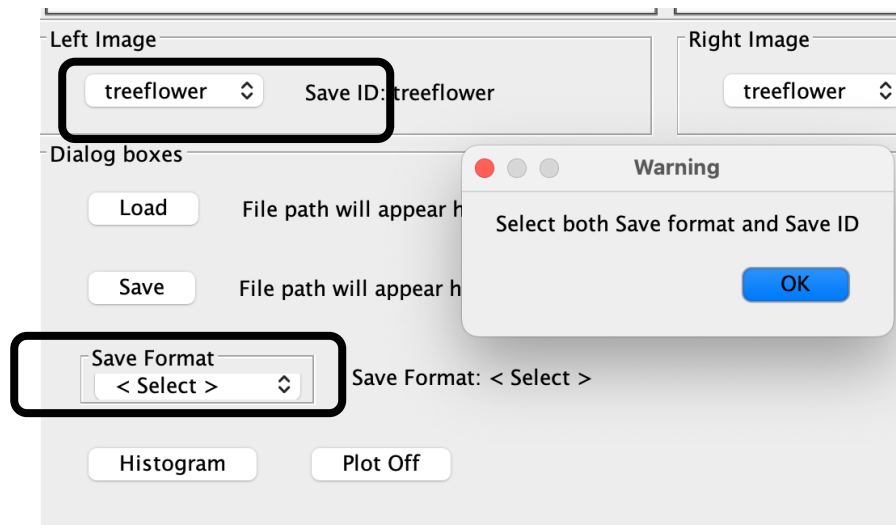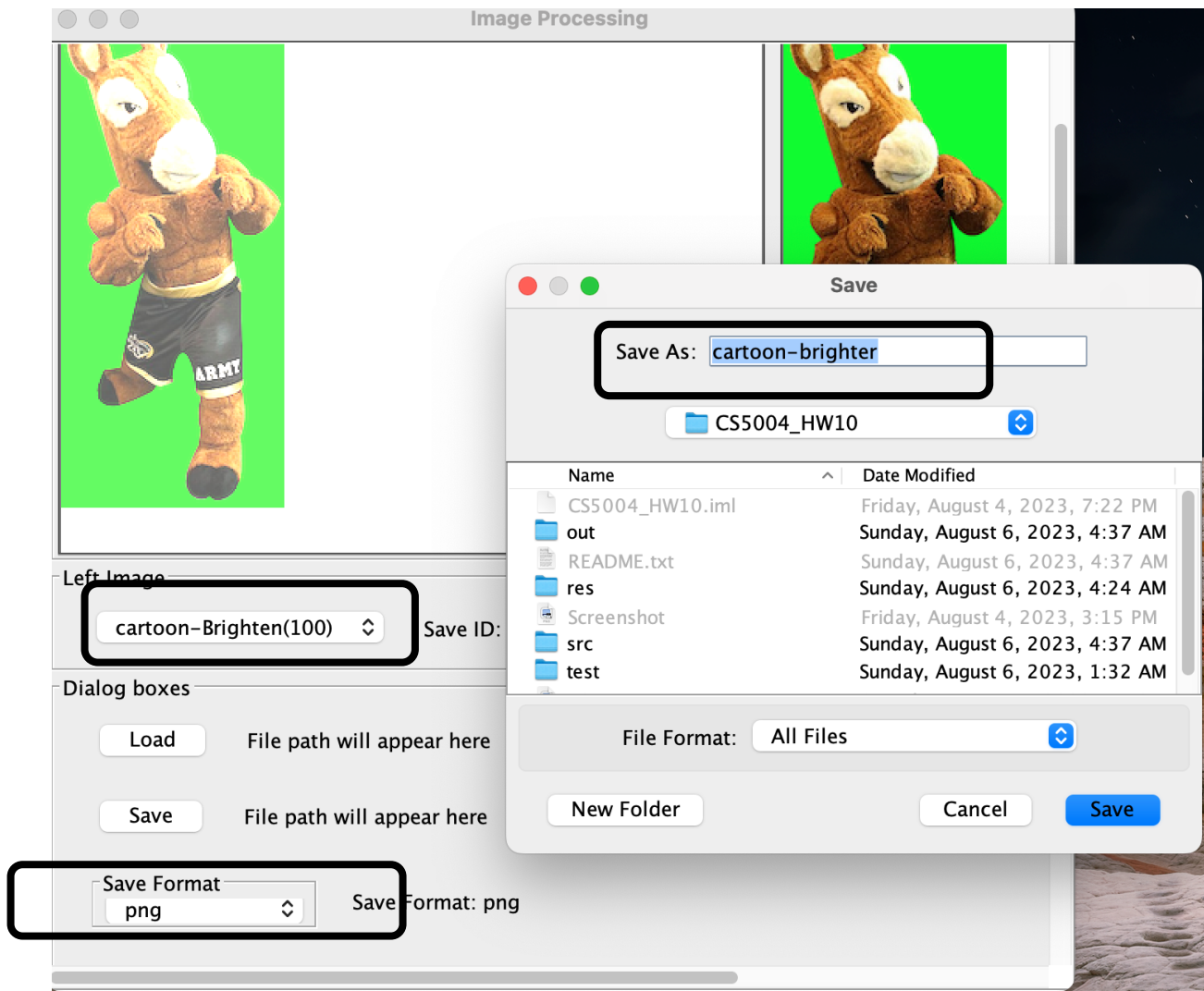


**Figure 13. warning message**

**Figure 14. successfully saved image ID "cartoon-Brighten (100)"
as "cartoon-brighter.png" in path "CS5004_HW10/"**

- **Exit**

  1. Click on GUI heading. (Figure 15)



**Figure 15.  GUI heading**