Stitch Panorama

History

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Introduction

Stitch Panorama is a GIMP plug-in which takes two digital images and overlays one atop the other to make a panorama. With multiple applications of *stitch panorama*, any number of images can be combined into a large panorama. This documentation assumes that you are already familiar with GIMP. Some things you will need to know to run *Stitch Panorama* are how to load and save images, how to zoom and pan around an image, how to make a selection in an image, how to crop an image, and how to flatten an image.

Installation

Requirements:

- GIMP version 2.2 compiled to include python support. The plug-in was developed using GIMP version 2.2.4 on a Fedora Core 3 Linux system. The plug-in may work with other versions of GIMP or other operating systems, but this has not been tested.

Installation Procedure:

Note: In the distribution, the plug-in code name includes the version number. I drop the version number below for clarity and call the program *stitch.py*, though in the distribution it will be called s*titch_0.9.3.py* (or whatever the latest version is).

Linux: Remove any old versions of stitch.py from your plug-in directory. Copy stitch.py to your gimp plug-in directory, e.g. ~/.gimp-2.2/plug-ins, then restart gimp and stitch panorama should appear in the Xtns/Utils menu. Make sure stitch.py is executable (chmod +x stitch.py).

Windows: Likely something similar to Linux, but I don't know for sure since I don't run windows. You will probably have to edit the very first line of stitch.py to point to python on your system.

Making a Panorama

Step 1: Run Stitch Panorama

If stitch.py was installed correctly, and if your GIMP has python support compiled in, then *Stitch Panorama* should appear in the GIMP Xtns/Utils menu. Select *Stitch Panorama* to run the plug-in.

Step 2: Select Images

After selecting *stitch panorama* in the Xtns/Utils menu, a dialog will open asking you to select or load the two images to be stitched together into a panorama. You can load images from a file, or you can use any image that is already open in GIMP.

The two images are designated the *reference image* and the *transformed image*. When the panorama is created, the reference image is left alone and the transformed image is warped onto the reference image. In most cases it will not matter which image is selected as the reference image. However, if one image is cleaner or straighter or otherwise better, it should be selected as the reference image.

If you wish to make a panorama out of more than two images, you will run stitch panorama multiple times. In this case, the panorama should be set as the reference image rather than the transformed image.

Step 3: Set Control Points

Once you have set the reference and transformed images, the main control panel will open. Your first task is to set multiple *control points*. A control point is actually two points, one in each image, pointing to the same image feature.

To add control points, click on *Set/Edit/View Control Points*. The control point editor will open. To set each control point, make a selection in each image surrounding the same image feature, and press *Add*. The program will do a correlation between the two selected regions to precisely set the control point. Hence, your selections need not be very precise, just make sure that the selections cover the same image feature. The simplest thing to do is to use the rectangle select tool to select the feature in each image, though any method of selection will work.

Use the zoom tool to zoom in on the region containing the image feature before making the selections. If you don't zoom in first, you are likely to select a region that is too large. The larger the selection region, the longer it will take to do the correlation, so the selected regions should be as small as possible while still covering some feature.

You can turn off the correlation by unchecking *correlate control points* in the main control window, but this is not recommended. It is faster, but the final panorama is quite sensitive to the control points and is not likely to be acceptable without the correlation. If the correlation is not used, the control point is set to the center of the selection in each image.

When selecting a control point, do not use any image feature which might change with time. If it has changed between the two exposures, the resulting panorama will not be satisfactory. Examples of changing features would be people, clouds, leaves, water, etc.

Continue adding control points. The more control points you add, the better the

panorama will be. If you think you might need to refer to the control points again in a future GIMP session, you can save them in a file with the *Save* button. Be sure to note which images (reference and transformed) the file corresponds to. If you *Restore* a control point file for the wrong images, or if you swap the reference and transformed images, the panorama will be completely wrong.

You can check the quality of the control points using the *Corr* and *Error* columns in the control point table. The correlation (*Corr*) should be close to one. If it is less than 0.85 or so, the control point is suspect and you should consider deleting and redoing it. To delete a control point, select it with the button next to it in the control point list and press *Delete*.

The *Error* column is always 0.0 until you have set at least four control points. The error column shows how far off each control point is from the warping computed using all the control points. If the quality of the control points is good, the error comes from distortion in the images, or a change in perspective between the images, and should be smaller than 10 or 20 pixels for most decent camera lenses. If you erroneously set a control point using features in the two images which are not the same, the errors will be much larger.

The last column, labeled *color*, includes a checkbox for each control point. The checkbox indicates whether or not that control point will be used in color balancing. If it is checked, the color at that control point will be used to match colors between the reference and transformed images. If it is not checked, it will not be used for color matching, but will still be used in overlaying the transformed image onto the reference image. There is a limit of 15 control points that can be checked for use in the color balance. If a checkbox is labeled <*edge*>, that control point is close to the edge of one of the images, and using that control point in the color balance is not recommended.

When you are satisfied with the control points, press *Accept* to close the control point editor.

Step 4: Stitch the Panorama

With control points set, you are ready to stitch together your panorama. Click on the *Stitch Panorama* button. Depending on the size of your images, the speed of your computer, and how much free memory your computer has, it can take a while to complete the panorama. If it takes more than, say, five minutes, lack of memory is the likely culprit (panoramas are *big* images!).

There are a number of options available:

- **Interpolation Method.** Leave this set to *cubic*. *Linear* or *None* are faster, but you will not be happy with the result.
- **Blend Size.** If you plan to blend the image edges (below), this sets the size, as a fraction of the image overlap, of the blended region.
- **Color Radius.** When balancing color between the images, the colors at the control points are used. The color radius sets the size of the region around the control points which is averaged to derive the colors used in the color matching.
- **Supersample.** This should almost always be set. It gives the warping of the transformed image onto the reference image a better quality.
- **Color balance.** If set, the colors at the control points will be matched so that the colors of the two images are corrected for any discrepancies (such as

exposure differences). If the colors are overcorrected, it may help to redo the panorama with a larger value of the color radius.

- **Blend images**. If set, the two images in the panorama will be smoothly blended together using layer masks. If this is not set, there can be harsh edges in the panorama.
- **Remove distortion**. If set, remove the distortion in the images. This can be very time consuming. If you are in a hurry, uncheck this option. However, the resulting panorama may not be acceptable if the distortion errors in the control points are substantial.

Step 5: Check the Panorama and rerun if necessary

Once the panorama has be computed, it will be displayed as a new image. It contains two layers, one for the reference image and one for the transformed image. If you are satisfied, you can close the original reference and transformed images and thenflatten and save the panorama. Use the zoom tool to check the panorama carefully before closing the reference and transformed images.

If you are not satisfied, close the panorama, but *do not close the original reference and transformed images*. So long as the original two images are left open, you can rerun *Stitch Panorama*, and the control points will not need to be reentered. You can add control points in regions where the panorama was not acceptable, and redo the panorama. So long as you keep the original reference and transformed images open, you can rerun the panorama as many times as you need to until you get the desired result.

If you are satisfied with the panorama and plan to add another image to the panorama, you must flatten the panorama before using the panorama as the reference image. You should also crop the panorama to eliminate any blank areas.

Frequently Asked Questions

1. **How many control points are required?** You must set at least one, however, the more you set, the better the panorama will be. 10 to 15 control points, well spread out over the overlapping region of the images, is normally enough. If your panorama has some areas that are not matching well, add a control point in those areas and redo the panorama.
2. **When setting control points, how large should the selections be?** It is important that enough of the image feature be covered to permit a good correlation. However, the larger the selection, the more time it will take to compute the optimum control point location. A selection that is at least 10 pixels by 10 pixels or so should be fine. Note that a 20 by 20 pixel region may take up to *four* times longer to compute than a 10 pixel by 10 pixel region.
3. **What makes a good image feature to use as a control point?** There should be a lot of structure in the image feature to get a good correlation. A blank blue sky, for example, will not work. The feature should be relatively small to avoid a lengthy calculation of the control point. Never use a person, or a cloud, or anything else that changes or moves with time. A fixed feature like a part of a building or a rock works best.
4. **How much overlap should there be between the reference and transformed images?** The more the better, but if at least1/3 of the images are overlapping, you should get a decent result. When taking multiple pictures for a panorama, be sure that all the pictures are taken from the same location to avoid differences in perspective.

Support

Sorry, there is none. You are on your own. Hopefully, by playing around with a few panoramas, you will quickly get the hang of the plug-in.

If you find this plug-in useful, you may use PayPal to contribute to future development efforts (send to helicity314-stitch@yahoo.com). This is neither required nor expected, but would be appreciated. Sorry, but you will get nothing for your money other than the knowledge that you are supporting the development of free software. You are still on your own :-).