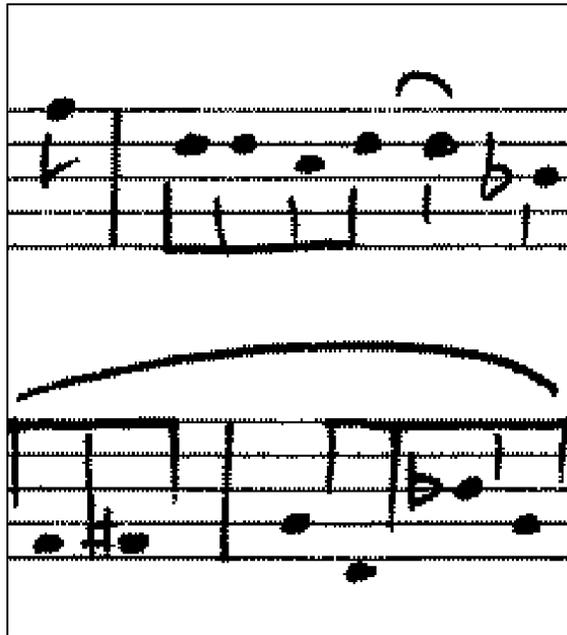


Cleaning up a part automatically using Photoshop.

Lance Hoffman

Often when working with a scanned chart, we are dealing with bitmap (i.e. black and white) images of music pages. If the initial scan was not done at a reasonably high resolution, the straight lines can take on a fuzzy, “comb” appearance, as in the picture.



This tutorial shows you some simple steps you can take to clean this up using Adobe Photoshop (PS). Not only is PS great at cleaning up what is essentially a line drawing, it can easily be automated, so that if you perform the same 4 or 5 steps on each part in a chart, you only need to do it once, and tell the program to do the rest.

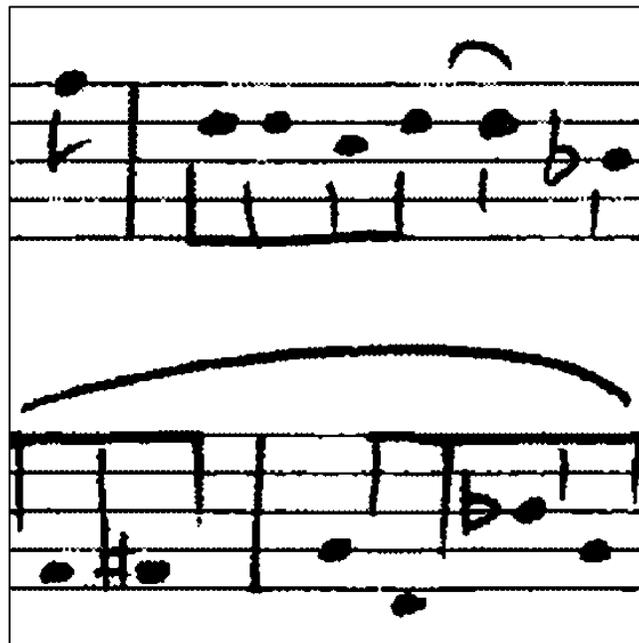
Another program that could be just as useful is GIMP, an open-source “imitator” of PS. The large advantage to GIMP is that it is free, with an interface similar to older versions of PS. Each of the processes outlined in this tutorial can be done using GIMP, but perhaps not in the same way. For our purposes, I will be explaining how to do the cleanup using PS.

1. Convert to Grayscale.

My first step in cleaning up a chart is to convert each page into a TIF image (there are numerous free programs available to do that; PS can do it, but it is slow). This picture above is zoomed in on one of these untouched TIFs. We are starting with a bitmap image, so the first step is to convert it to grayscale: Image > Mode > Grayscale, and use 1 for the scale factor. Not only does this give PS more bits per pixel to work with, but allows the use of layers, which will be useful later.

2. Use Dust & Scratches Filter.

From here, use the Dust and Scratches filter: Filter > Noise > Dust & Scratches. This is useful any time you are cleaning a chart. The pixel size determines the size of the dust you're trying to clean. Be careful, you do not want to set this too high, it will round the intersections of what should be straight lines, such as bar lines in the staff. I get good results using just 2 pixels. The threshold is irrelevant, since we are dealing with a grayscale image that contains only black and white; set it somewhere in the middle. Here is the music after applying the filter:



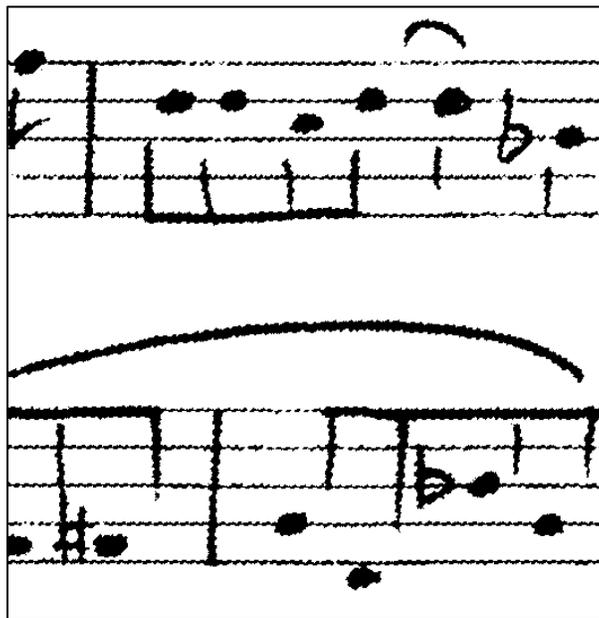
3. Create a new white layer.

It's already better, and you could stop here if you wanted, but it could be made better still. Create a new layer and fill it with white. You can do this most easily by clicking the New Layer button at the bottom of the Layer window, selecting all (Ctrl+A, or Select > All), then fill with white:

Edit > Fill > Use:White. Everything disappears; you need to make the new white layer invisible by clicking the eye next to it in the Layers window: . Select the original layer, "Background," by clicking it to make it active again.

4. Select the music and smooth it out.

Next we want to select only the black parts of the image: Select > Color Range. It will probably automatically select the black for you. If not, use the eyedropper tool (it is already selected for you) and click on any black part, like a notehead. Make sure Inverse is *not* selected, and that Fuzziness is set to 0. Click "OK" to set the selection.



You should see selection "ants" marching around the black parts of the page. We are going to expand the selection a little bit: Select > Modify > Expand. Don't expand too much or you might lose some detail. I have found that 2 pixels is enough for most purposes, sometimes 3. Once you have expanded the selection, shrink it right back down: Select > Modify > Contract. Be sure to contract the selection the same amount you expanded it. What we have done is essentially taken an average over the boundary of the selection. At the same time, the expansion can squeeze the

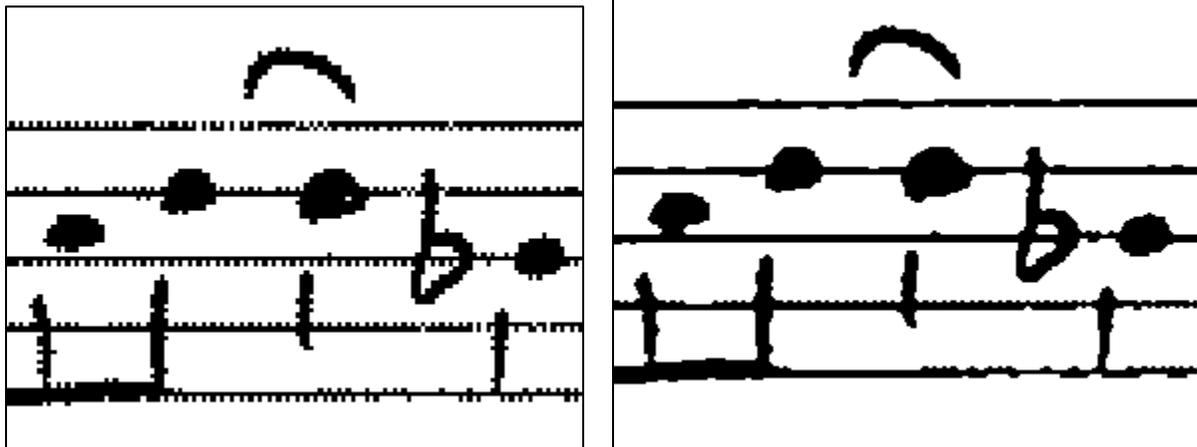
white out of any splotchy noteheads. When the selection is contracted, there is no longer any border within the notehead to contract from. This is particularly useful for light pencil scans.

5. Fill in the smoothed music.

Now that we have the smooth selection, select the white layer by clicking it in Layers (it is probably called “Layer 1”), and be sure to re-click the eye icon so you can see it. Once the layer is active, fill the selection with black: Edit > Fill > Use:Black. You’ve now created a replica of the original layer, with the lines all smoothed out.

6. Finish up.

All that’s left is some housekeeping. Flatten the image (meaning, merge all the layers into one): Layer > Flatten Image. Then convert back to bitmap: Image > Mode > Bitmap. Keep the resolution the same, and the 50% threshold is fine...everything is black and white anyway. You should now have a TIF the same size as the original. If you want to compare the final result to the original, go to the History window. You can click between the various steps you have just taken, but be sure your last click is the last step, or you’ll lose your work when you save. Here is a comparison for the file I was working on:



The clean version here is after just one pass of this process. While it’s not perfect, the printed results are already much better. Another pass through these steps will give better results and probably get rid of those bumps on the second line. The next section describes how to make this simple.

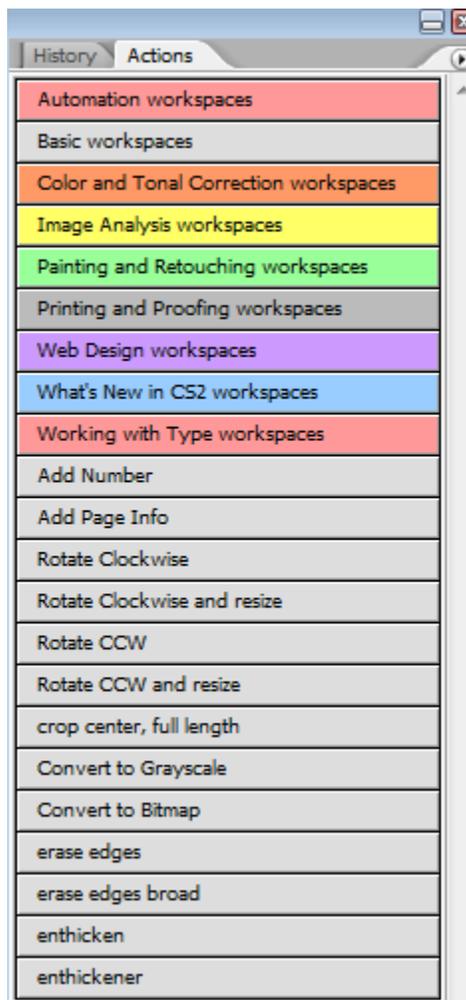
7. Automating it.

It would be a drag to have to do all these steps for every part you want to clean up. Fortunately, PS lets you record macros. In PS they are called “Actions.” In the Action window, click the new action button at the bottom of the window, give it a good name (I call this one “enthickener”), and go through each step. Be sure to stop recording once you’re finished. Once you have recorded it, simply select it and press play, and PS steps through the process.

Actions can be even easier to use in Button mode. In the upper right of the window is a tiny menu button



(with an arrow on it): . You can select Button Mode here, which turns the window into clickable buttons for all your actions. I have many actions that I frequently use when working on charts set up as buttons, and it makes the work so much faster:



The real power of actions is through batching: File > Automate > Batch. Say you have a folder of page images you need to rotate clockwise, “enthicken,” and crop to 9x12. If you record a new action, you can perform any action *or play any other action as part of it*, so in our case we would record “Play ‘Rotate Clockwise’; Play ‘enthickener’; Crop.” This new action then can be automated to act on the whole folder.

Summary

Leaving out the steps that automate the process, here is a summary of the steps we took to clean the chart:

1. Convert to grayscale: *Image > Mode > Grayscale*
2. Use the Dust & Scratches filter: *Filter > Noise > Dust & Scratches*
3. Create a new layer and fill it with white:
 - *Layer > New, or New Layer button*
 - *Select > All, or Ctrl+A*
 - *Edit > Fill > Use:White*
4. Select the music and smooth it out:
 - *Select > Color Range*
 - *Select > Modify > Expand*
 - *Select > Modify > Contract*
5. Fill the selection in the white layer:
 - *Select the layer*
 - *Edit > Fill > Use:Black*
6. Finish up
 - *Layer > Flatten Image*
 - *Image > Mode > Bitmap*