
Digital Images

Due: Start of class, Tuesday, February 4, 2014

Software check—Do This First

This lab uses Corel PaintShop Pro, which is available for student use on your **WFU-issued ThinkPad laptop**. The Carbon X1 model ThinkPad (distributed to first-years and juniors) should have version “X5” pre-installed, while the T430s model (sophomores and seniors) should have version “X4” pre-installed. Both versions work similarly. Check your ThinkPad for this software as follows:

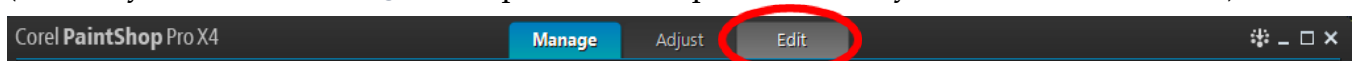
Go to [All Programs](#) on the Start menu and search for [Corel PaintShop Pro](#). If it is there, ensure that the program starts and runs normally. If the software fails to run, or you have any other difficulties, please contact the instructor ASAP. You will not be able to complete the lab without this software.

Part 1: Preparation

1. You must have the [Corel PaintShop Pro](#) software installed and functioning, as described above, before continuing.
2. On your WFU-issued ThinkPad, create a new folder named [lab2](#).
3. From the Lab #2 assignment in Sakai, **save** the lab manual, the lab report, and each of the six image files into your new [lab2](#) folder. Don’t just click on the files to open them; instead right-click on each file and choose [Save Link As...](#) (or [Save Target As...](#))

Part 2: Image resolution

Open PaintShop Pro as described at the beginning of this Lab. At the top-center of the PaintShop window, there are three tabs labeled [Manage](#), [Adjust](#), and [Edit](#). Select the [Edit](#) tab. (You may close the [Learning Center](#) panel if it is open; however you will need this later.)



Within PaintShop, open the file [logo.bmp](#) from your [lab2](#) folder. This image, of a WFU logo, is saved as an uncompressed bitmap file (a [.bmp](#) file), with each pixel represented using the RGB color model. In such a file, three numbers explicitly represent each pixel, one for each of the additive primary colors [red](#), [green](#) and [blue](#). Using PaintShop’s [Image → Image Information...](#) menu item, find various measurements of this image’s dimensions and use that information to answer the following question.

→ Question #1. Write your answers on the Lab Report Document.

Part 3: Image compression

Image compression is the reduction of the size of an image file by either re-arranging or removing some of the information about pixel colors.

With the `logo.bmp` file still open in PaintShop, use the `File → Export → JPEG Optimizer...` menu command. You may want to expand the `JPEG Optimizer` window to a full-screen view and increase the `Zoom` amount to about `300` to be better able to see the changes you are about to make. You may also use the `Pan` button just below the preview images to move around in the images to compare different parts if you want. Don't click on the `OK` button until later... just keep the `JPEG Optimizer` window open for now.

Choose different values of the `Set compression value to:` box to see the effects of JPEG compression on the image. Question 2(a) will ask you to use compression value settings ranging from 1 (the lowest compression, highest quality setting) to 99 (highest compression, lowest quality).

→ Question #2. Write your answers on the Lab Report Document.

Return the compression setting to the highest quality value (not the most compressed!) and click the `OK` button. In the `Save Copy As` window that opens, save this image in your `lab2` folder as `maxqual.jpg`.

Use the `File → Export → JPEG Optimizer...` menu command again on the same logo image, but set the compression setting this time to the lowest quality value (highest compression) and click `OK`. In the `Save Copy As` window, save this image in your `lab2` folder as `maxcomp.jpg`.

In Windows, open your `lab2` folder to see the two new image files you just saved. Click ONCE on each version of the logo image file and observe the file `Size` and `Dimensions` listed at the bottom of the window. Use these values to answer the next question.

→ Question #3. Write your answers on the Lab Report Document.

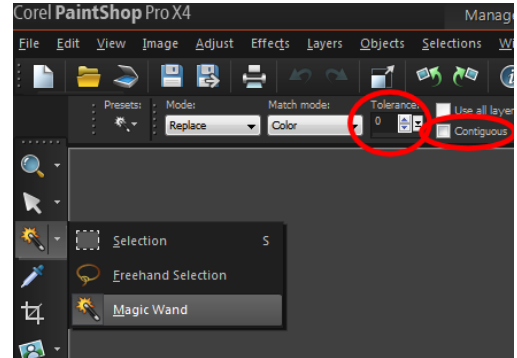
Part 4: PaintShop tools

Open `maxqual.jpg` in PaintShop. At this point, you will have 2 versions of this image open—the original `logo.bmp` bitmap file and this `maxqual.jpg` JPEG file—each in its own tab in PaintShop. Use the `Window → Tile Vertically` menu command to show them both, side-by-side. While the `maxqual.jpg` file is much smaller (in KB) than the original image file, the two look quite similar; even so there are subtle differences between the two that we can find. PaintShop's `Magic Wand` tool can help to find these differences. **When the `Magic Wand` tool has its tolerance set to 0, if**

you click on a pixel, it will select other pixels that are exactly the same color as the original pixel clicked on.

Choose the **Magic Wand** tool. In PaintShop Pro the **Magic Wand** shares the same space (the third icon down on the toolbar) with the **Selection** tool. If you see the rectangular **Selection** tool instead of what looks like the **Magic Wand** tool, click on the small down-arrow just to the right of the **Selection** tool and select the **Magic Wand** option. Set the **Tolerance** value to **0** and un-check the **Contiguous** option. The image at right should help you with these choices.

On the original bitmap **logo.bmp** (uncompressed) image, click the **Magic Wand** once on the Deacon's chin in the image and mentally note how much of that area is selected.



Using the **Magic Wand** again, click the same spot in the **maxqual.jpg** (compressed) version of the image. Compare between the amounts selected in each image (you may wish to increase the zoom to see more clearly) and use your observations to answer the following question.

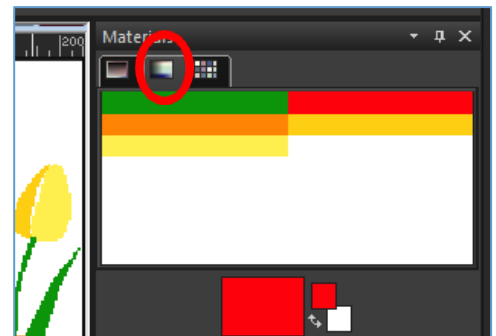
→ **Question #4. Write your answers on the Lab Report Document.**

Part 5: Indexed color

In PaintShop Pro, close all images that are currently open. From your **lab2** folder open the file **tulips.psd**. Visually note that this solid-color graphic image contains only six colors.

Choose the menu option **Image → Decrease Color Depth → 16 Color palette**. Ensure that the **Palette** option is set to **Optimized Median Cut** and that the **Reduction method** is set to **Nearest color**, and then click **OK**.

Using these options, you can see exactly which six colors comprise this image in the **Materials** panel in the upper-right corner of the window. (If you don't see the six colors as shown at right, click the middle tab on the materials panel.)

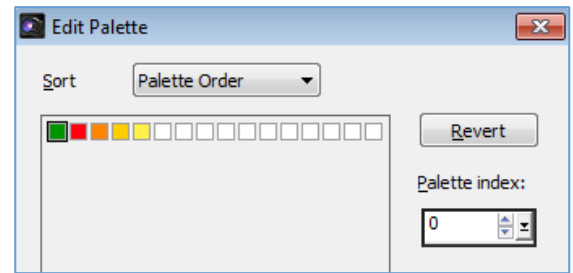


To find more information about each of the colors, first select the **Dropper Tool** from the toolbox at left (it's the tool directly underneath the **Magic Wand Tool**). Then use your mouse to move the dropper tool over the various parts of the image. As you hover the mouse over the different colors, you will notice a pop-up window that shows the **R**(ed), **G**(reen) and **B**(lue) values for each color as well as the color's index number (labeled **I:**). Record these numbers for each color on your answer sheet as you answer the following question.

→ **Question #5. Write your answers on the Lab Report Document.**

Select **Image → Palette → Edit Palette...** to examine the image's palette of indexed colors. The index numbers should match those that you just observed!

Find green in the color palette and double-click on it. Choose a new color (different from green) in the "color picker" that appears, and then click **OK**. You should notice an immediate change in the image.



→ Question #6. Write your answers on the Lab Report Document.

Let's look at a different color palette on the same image, without changing index numbers. Choose the menu option **Image → Palette → Load Palette...** Ensure that the **Safety Palette** is selected, click on the **Maintain indexes** button, and then click **Load**.

→ Questions #7, 8 and 9. Write your answers on the Lab Report Document.

You may now close the **tulips.psd** file. There is no need to save the changes you have made.

Manipulating Digital Images

Purpose

This section will allow you to experience first-hand the use of **Corel PaintShop Pro** for manipulating digital images, reinforcing the digital image concepts seen in class.

Note

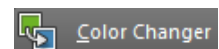
There are three main tasks in this section: a color replacement, a selective partial image replacement, and an image touch-up to remove unwanted distractions. You should attempt to at least begin all three tasks while in the lab room so that you can get any necessary assistance with the editing tools. You can then complete any remaining work to perfect your images outside of class to turn in by the due date shown above.

Part 6: Color replacement within an image



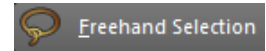
Image editing software such as PaintShop includes a number of powerful image editing tools that are used extensively in the world of commercial art. Consider, for example, the two magazine covers shown at left. They both use the same photo of Cameron Diaz and her 'sexy hair,' but her clothing color was changed on the second cover to better coordinate with the magazine's logo. In this part of the lab you will experiment with PaintShop's **Replace Color** tool to perform a similar kind of realistic-looking color change on an image of a spool of thread.

For this experiment, you should be able to work out the solution on your own. You will make use of PaintShop's **Color Changer** tool (this is *not* the same as the



Color Replacer tool, which does something different). To use the **Color Changer** tool, first select a replacement color from the **Materials** panel, and then choose a color to replace in the image by clicking on the image. Be sure to try clicking on different colors and using different values of the **Tolerance** setting, undoing between each try. Remember that the **Undo** command is your best friend.

To cause the color change to apply only to certain parts of the image, you may select just a part of the image by using the **Freehand Selection** ('lasso') tool. Try various approaches to discover how these tools work. If you cannot determine how to accomplish the task below, please ask for assistance.



In PaintShop, open the file **thread.psd** (from your **lab2** folder). Use the **Color Changer** tool and the **Freehand Selection** tool to change the color of the front spool of thread from orange to a realistic-looking purple or pink color as shown below. For full credit, ensure that your change affects the orange spool in front, but not the more-distant orange items in the lower-right corner of the image. More importantly, ensure that the orange 'reflection' on the yellow-green spool at the top is also changed to a realistic-looking purple/pink reflection. (Leaving an orange reflection from a purple object would be an obvious 'Photoshop fail'.)



Figure 1. *thread.psd* before modification



Figure 2. Same picture modified

When you have finished to your satisfaction, use **Save As...** to save the file in **JPEG** format in your **lab2** folder with the new name **thread-mod.jpg**.

→ **Question #10. Write your answers on the Lab Report Document.**

Part 7: Selectively replacing image content

In the previous exercise, you used PaintShop to selectively change part of an image. In this exercise, you will use PaintShop to combine two images into a new, merged image. This is the same method that was used for the shark-and-divers example image shown here.



Open the files [devils-tower.jpg](#) and [sky.psd](#) in PaintShop. Use the normal [Selection](#) tool to select most of the sky image, leaving out the dark patch in the lower left, as shown here:

Then choose the [Edit](#) → [Copy](#) command.

Return to the Devil's Tower† image and experiment with PaintShop's [Magic Wand](#) tool to find the best settings to select *all* of the blue sky and *only* the blue sky. Some hints: Use [Perceptual](#) as the [Match mode](#). Make sure that [Contiguous](#) is checked ON. Experiment with different values of the [Tolerance](#) setting—you might find numbers such as 35 or higher will work best. Select the sky by clicking in a medium blue sky area; if you don't like your selection you can de-select it by right-clicking (or by pressing Ctrl-D). *Do not attempt to hand-trace an outline of the sky!*

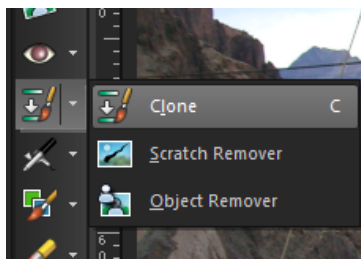
With the sky still selected, choose [Paste Into Selection](#) (on the [Edit](#) menu) to replace the blue sky in the image with the more-dramatic cloudy sky.

Compare your result to the sample image at right. For full credit, your image should appear realistic, showing no traces of the original blue sky yet retaining intact all of the trees and the rock tower. If you are not satisfied, you can [Undo](#) your changes and re-try with different settings.

When you are satisfied, use [Save As...](#) to save the file in [JPEG](#) format in your [lab2](#) folder with the new name [tower-mod.jpg](#).



Part 8: Cleaning up an image



In this exercise, you'll experiment with PaintShop's [Clone](#), [Scratch Remover](#) and [Object Remover](#) tools to remove unwanted elements from an image. You have been provided with [dam.jpg](#), a picture looking downstream from the top of [Hoover Dam](#) on the Colorado

† For those unfamiliar, [Devil's Tower](#) is a 1267-foot tall natural volcanic outcropping in [northeastern Wyoming](#).

River‡. Various elements distract from the view, and you want to remove those items from the image.

Experiment with the [Clone](#), [Scratch Remover](#) and [Object Remover](#) tools to remove the various distractions from the image. You should turn on the [View → Palettes → Learning Center](#) panel to get some interactive suggestions from the program on how to use the tools. This is an excellent resource.

For full credit, you must remove at least the four cables (power lines) that cross the image, the power-line equipment in the extreme upper-right corner, AND the thin line of floating buoys that crosses the river downstream of the dam. Make your changes as neat and clean as possible so that your modifications are not obvious and look convincingly natural. If you get ‘flares’ and smudges, such as at the edges of the mountains, then you are using the wrong tool for that location or you need to try to use it differently.

As you experiment, remember that the [Undo](#) command is your best friend.

When you have finished to your satisfaction, use [Save As...](#) to save the file in **JPEG** format to your [lab2](#) folder with the new name [dam-mod.jpg](#) (when asked, choose [Maximum](#) quality).

Part 9: Submit your files into the [assignment, Lab #2, on Sakai](#) (not the dropbox).

Upload your lab report and the three modified JPEG files that you created:

- [thread-mod.jpg](#)
- [tower-mod.jpg](#)
- [dam-mod.jpg](#)

Upload these files to Sakai by the lab submission deadline.

Double-check that all files are uploaded correctly to Sakai and that you can successfully open the uploaded files.

Ensure that the image files are not showing as “0 KB” in size and that they are saved in “.jpg” format.

Files that are empty, missing, or not in .jpg format cannot be graded.

‡ This photo was taken before the building of the new [US-93 bridge](#), which opened in 2010.