Homework #1: Try out some Computational Photography Apps

Assigned: Tuesday, September 6
Due: Thursday, September 15

For this assignment you'll use existing software for several computational photography tasks. No programming is required. Put all the files requested below into a single folder called `<NetID username>-HW1` For example, if your NetID username is `jdoe`, put all files into a folder called `jdoe-HW1` Then compress this folder to create `<NetID username>-HW1.zip` and copy this one file into the Moodle dropbox called "`HW #1 Hand-In`"

1. Build a **3D model** of an object from a set of photographs. Do this using Microsoft `Photosynth` (http://photosynth.net) as follows: (1) run `Photosynth`, which is installed on the instructional Windows machines (or you can install it on your own Windows machine), (2) login in with email address "`cs534-fall16@hotmail.com`" and password "`UW-Madison`", (3) name your synth with the name of the object you photographed *and your name*, (4) enter a description, (5) click "Add Photos" and add *ALL* your photos, and (6) click "Synth." After processing is completed, click "View" to see the result on the Photosynth web site. View the results in various forms using the icon at the bottom to select "3D view," "overhead," "2D view" and "point cloud." All synths that are created by the class are shown under "My Synths." You should take at least 50 photos for this problem (more is better). Tips for how to take your photos are given at http://cdn1.ps1.photosynth.net/docs/Photosynth%20Guide%20v8.pdf Create a text file called `P1-readme.txt` that contains the name of your synth on the Microsoft website, and then copy this file into `<NetID username>-HW1`

2. Take 5-10 photographs that have overlapping fields of view and taken from approximately the same position and put them all in a folder called "P2". Create a **panoramic image** from them using Microsoft `Image Composite Editor (ICE)`, which is installed on the CS instructional Windows machines (or you can download it from http://research.microsoft.com/en-us/um/redmond/projects/ice/ and install it on your own Windows machine). To use `ICE`, select "New Panorama" and open all of your images. Then go through the stitch and crop stages where you can adjust the panorama. Finally, in the export stage, select "Export to disk" to save the panorama. Rename your output image `P2-panorama.jpg` For more information, see https://social.microsoft.com/Forums/en-US/home?forum=ice Copy your output image to `<NetID username>-HW1` You do *not* need to hand in your input images.

3. Use the provided two sets of three images given in HDR.zip, each taken using different shutter speeds, to create high dynamic range (**HDR**) images using HDRsoft `Photomatix`, which is installed on the CS instructional Windows machines in room 1350. See below for instructions on using `Photomatix`. Experiment with the manual controls. Name your HDR output images `P3-Kyoto.jpg` and `P3-UnionSouth.jpg` and copy them to `<NetID username>-HW1`

4. Take a photograph of a scene that contains something you would like to remove (e.g., a fire hydrant, parked car, or a photobomb). Use the "**Content-Aware Fill**" feature in `Photoshop`, installed on the instructional Windows machines, to remove the unwanted area and fill it with new pixel values. Copy your input and output images, named `P4-in.jpg` and `P4-out.jpg` into `<NetID username>-HW1`

5. OPTIONAL: Take your own video and install and use Microsoft `Hyperlapse` on your Android or Windows phone (available at http://research.microsoft.com/en-us/um/redmond/projects/hyperlapseapps/) to create a stabilized, time-lapse video.

Problem 3 Information: How to use HDRsoft's Photomatix

1. Given 3 or more photos, taken with different shutter speeds, of a scene that contains parts that are very bright and other areas that are very dark, `Photomatix` is used to combine them into a single, high dynamic range image. For this assignment we have provided the images for you. Optionally, you can take your own set of images if you have a camera that allows manual control of the aperture and shutter speed. Learn how to take a set of appropriate photos at http://www.hdrsoft.com/resources/tut_win A user manual for `Photomatix` is at http://www.multimediaphoto.com/pm/PhotomatixProManual.pdf
2. Open `Photomatix` from the "Start → All Programs → Photomatix Pro 5.1" menu on an instructional Windows machine in the ***Enterprise Lab in room 1350***.
3. Click "Load Bracketed Photos" button on the *Workflow Shortcuts* panel.
4. Click "Browse" in the pop-up window and add all your images. You can add multiple photos at the same time.
5. After you add all the source photos, click "OK".
6. There will be a pop-up window called "Preprocessing Options." Note that if you did not use a tripod when taking your source photos, you should select the "Align source images" check box and select "Hand-held" preset. For all the other check boxes, you can either use the default values or choose what you like.
7. Click "Align & Merge to HDR".
8. After you click "Align & Merge to HDR" in step 7, there will be a new pop-up window. This window will show you a preview of the final HDR image that will be created using your source photos. Note that this might not be the final HDR image but just an approximation of the final HDR image.
9. Adjust different parameters on the for Tone Mapping/Exposure Fusion, such as the color saturation, luminosity, and so on as you like using the *Adjustments* panel (on the left side of the screen).
10. Once you are satisfied click "Apply" button at the bottom of the *Adjustments* panel.
11. Go to "Save Final Image" on the Workflow Shortcut panel to save your HDR image.

Note: We will talk more about HDR imaging later in the course. If you want to know more about HDR now, you can find more information at many websites including Wikipedia at http://en.wikipedia.org/wiki/High_dynamic_range_imaging

Problem 4 Information: How to use Photoshop's Content-Aware Fill

1. Make a copy of your original image.
2. Open `Photoshop` from the "Start → All Programs → Adobe Photoshop CC" menu on an instructional Windows machine.
3. Open the copy of your image from the "File → Open" menu.
4. Choose the Lasso Tool on the left-hand side of the screen. (Right clicking the Lasso Tool and choosing the "Polygonal Lasso Tool" tends to work best.)
5. Use the Lasso Tool to enclose the object you want to remove. Try not to leave much space

between the tool and the edges of the object you are removing.

6. Right click on the image, choose the “Fill...” option. Make sure the “Use” drop-down menu is set to “Content Aware”. Feel free to experiment with the blending options to try and improve your results. When you are ready hit OK.
7. Repeat steps 4-6 until you are satisfied.
8. Go to “File → Save as” to save your image.

For a more detailed tutorial, see http://www.photoshopessentials.com/photo-editing/content-aware-fill-cs5/