

Georeferencing Images Using Arcviews ImageWarp Extension

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1. Open Arcview
2. From the Extensions menu (under File menu), checkmark the Image Warp Extension and click OK.
3. A new menu should now be added to your list on the top of the screen called ImageWarp, from that menu select ImageWarp session.
4. From the window that appears, chose your image you want to georeference (the image file saved on the hard drive). Then choose a coverage that you will use to aid in your georeferencing (this is a theme that is already projected in geographic space which you will align your image with (use a DRG 7.5 minute quad if possible, this will give you the most information and data points to aid in georeferencing your image).
5. Select the projection your image will eventually be in, if in decimal degrees then just skip this step, if it is in UTM (if you are using the USGS DRG 7.5 minute quads do this) change the projection to UTM, NAD27, Zone 12N.
6. Create a new Ground Control Point (GCP) Table for your georeferencing session, and save it in the same folder as your image is.
7. You should now have three windows tiled together on your screen, the upper left window is the image you want to georeference (not yet in geographic space), the lower left window is your template for which will aid in the georeferencing process (a projected, georeferenced theme), and the larger window which will show you where you GCPs are located on the projected theme.
8. The toolbar window (rectangle) has the tools you will use to georeference. To begin:
 - a. First find locations that are similar in both the image and the theme, good ones to use are road intersections, road curves, animal water tanks, buildings, or any other visual data points that are easily readable on both the image and the projected theme.
 - b. You can now begin adding shared control points between the two windows, to add the first GCP, select the “push-pin” looking tool on the tool window (this is your add GCP tool). Now on window labeled TO (showing your projected theme) select a GCP by clicking once in the desired location (i.e., road intersection), this will be a reference point. Now on the window labeled FROM (with your non-georeferenced image in it), find the same location and click that point. If you click wrong during the placing of either of these points you can either delete them (using the black arrow select it and press the keyboards delete button) or you can move the point (using the black arrow select the point and then switch tool to the empty, clear arrow, this tool allows you to click in the location where you want the point moved to). You should have one GCP point (located in the same locations) on both the TO and FROM windows.
 - c. You can now add a second GCP, once again place one on the TO window, then click the shared GCP in the FROM window. Continue to do this until you have four in each. After having four GCPs, any more GCPs you add, you can correct for error (which is very important in georeferencing, you should have more than four GCPs during this process).
 - d. On your 5th GCP, select a point in the TO window, then click the tool located on the upper left hand corner of the tool box (this tool will allow Arcview to calculate where it thinks the control point should be placed on the image). You will probably see that the control point Arcview placed on the top window is not located in the exact place you need it to be, this is because of curveture in the photograph or odd size of the image. This is where the real georeferencing takes place, you will need to correct and move the point on the top window so it is placed in the correct location, this will eventually lead to the warping of the photo to obtain a correctly georeferenced image. To correct the location of the point (i.e., move it to its proper location, as shown in your lower window view) you will need to first select it with the black arrow and then select the clear arrow (above the black arrow), using this tool you will need to make a single click where the point should be located, you do not need to drag the point, just click once in the spot where the point should be located, by doing this it will correct the image and manipulate it so that part of the image is aligned with that spot in geographic space.
 - e. Continue to select more points on the lower window, click the tool that allows Arcview to calculate and plot the point, and move it to its correct location, and so forth, remember that the more control points you have the better georeferencing you will get. When you feel you have enough control points you can begin to have Arcview process the new image. To do this you must first calculate your Root Mean Square (RMS) error. Click on the small button that looks like a calculator on your floating toolbar. It will prompt you to select your polynomial order for calculating the error (use the highest value it will allow you to use,

to do this: first select 2, then 3, 4, 5 and so forth until It prompts you that you need more points). The final error will tell you how accurate the georeferencing will ultimately be, ideally your RMS error for both X and Y will be fairly low (<30??), this means you probably have ample enough control points.

- f. You can now run the processing steps needed to georeference the image, do this by clicking on the green light (looks like a street light) located on your floating toolbar.
- g. Just run through the questions it will ask you, tell Arcview where you want you final image to be located, select 0 for the cell size (default), create a JPG image, etc....
- h. The processing step will probably take around 5-10 minutes, it needs to create three grids, then convert those grids back to an image.
- i. After the process is complete you can view your image by opening a new view in Arcview and adding the image theme. Your image theme should be located in the folder you designated during the step g. from above, there should be two files there: one being the actual image and one being a world file that gives the image georeferencing information.
- j. You might want to place the image in a view with some other known geographic data to see how well they are aligned, you might have to add a few more points to your session and process the image again for better accuracy.
- k. When you are all done and your image looks good, you can close your session by closing Arcview. To begin a new session open Arcview and start with step 1.