

Using Digger® to Digitize Hand Drawn Contour Maps

Have you ever wanted to digitize a hand drawn contour map in Digger and re-create this map using Surfer's gridding functions? This is an often asked question from our Digger users and one that we would like to address in this article. Since gridding in Surfer involves interpolation between data points a problem arises because the data defining contour lines in Digger are usually very closely spaced along each contour line compared with the distance between each contour line. Surfer will include many more data points in its search radius with the same value and the contour map that is generated from that grid will not duplicate the original contour map. To solve the problem with closely spaced data along the contour line, we have outlined two procedures to implement during the digitizing process.

Digitizing the contour lines

The first method involves estimating the average distance between the contour lines on your map in map units. Using our example "Demogrid", we selected a value of 0.25. Set the vertex tolerance (Tools | Tolerance Settings) to this value in Digger and digitize the contour lines in "stream" mode. This method of specifying the vertex tolerance during digitizing will not allow any two vertices (data points that define the contour line) to be recorded closer than that distance. This will effectively eliminate overly defined contour lines and help the gridding process to look at data not only along the digitized contour line, but at adjacent contour lines.

The second method involves digitizing points instead of lines. During digitizing, space the points at approximately the same distance as the distances between the contour lines. The Z value of the contour will have to be entered as the primary ID, but digitizing all the points along one contour line at a time will be easiest. In the Digitize Points dialog box, simply enter the Z value in the Primary ID box, check the "create several objects" check box, and digitize the entire contour as points at regularly spaced intervals.

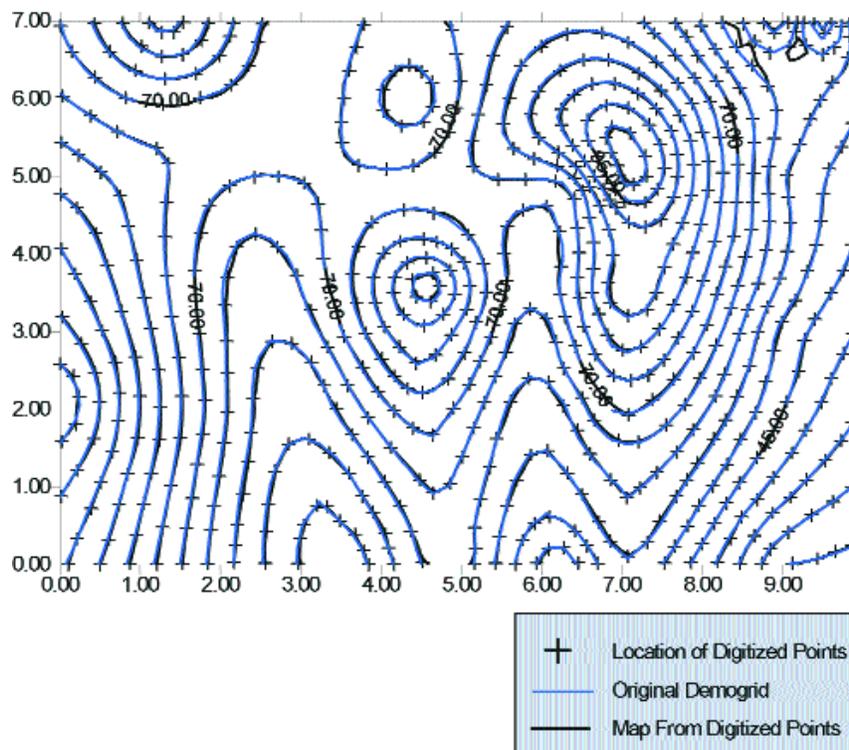


Fig. 1. Overlay showing the original contour map with the newly created map from digitized points in Digger.

Gridding the digitized data

When digitizing has been completed, export the data in Digger as a data (.dat) file. Select the newly created data file using Surfer's Grid | Data command. Specify Kriging as the gridding method and modify the grid line spacing to a value that it is approximately $\frac{1}{4}$ of the distance between the data points. After creating a grid file, generate a contour map to compare to your original map. Figure 1 shows the location of the points that were digitized in point mode from a printout of a contour map in Surfer (demogrid). These points were gridded in Surfer using the Kriging method. The number of grid lines was doubled from the default values. The original map was overlaid with the map created from the points digitized in Digger. This method accurately reproduces the original map. Figure 2 shows the result of simply digitizing the map in stream mode without increasing the vertex tolerance and gridding in Surfer.

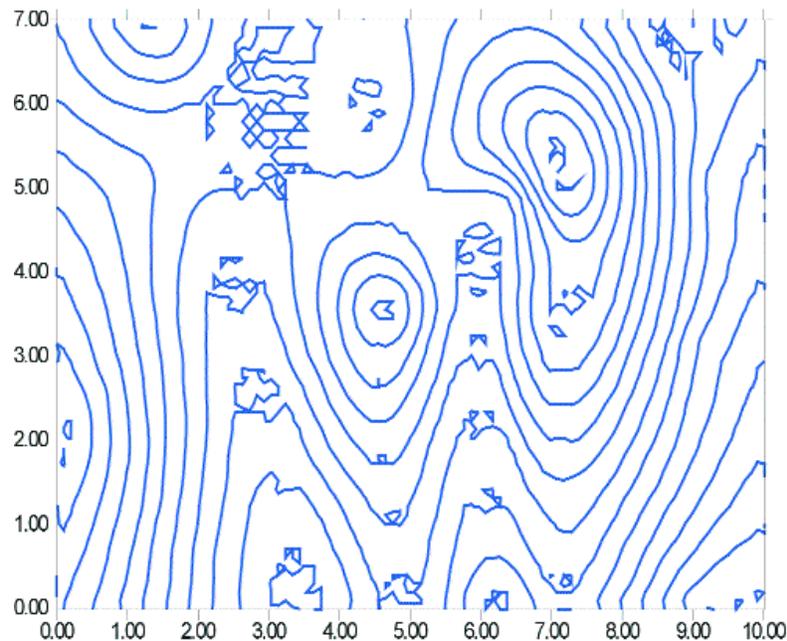


Fig. 2. Demogrid digitized as polylines with minimum vertex tolerance. There is a similarity between this map and the original, however, computation of volumes would not be accurate. For more complex maps, distortion of the image likely would be greater.

Final Comments

For contour maps with widely varying topography, you may need to add some additional data in areas where the contours are more widely spaced, so that the data spacing is even throughout the map. Sometimes you will need to digitize additional contours between each contour you wish to represent in order to get enough data from which Surfer can interpolate. Especially prone to problems when gridding are areas where contours follow a "C" pattern, where contours are more widely spaced, or where there are closed contours. These points can be added in Surfer using the Map | Digitize command. Save the data with new Z values, and then merge the new data with the original data file and re-grid. We suggest that modifying the grid line spacing, gridding method, and search radius options can yield more appropriate results. Experimenting with the various gridding methods and options will often be required to achieve the final map product.