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# Software Review: MapAnalyst 1.2.1

(Bernhard Jenny and Adrian Weber, Institute of Cartography,  
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## Background and Software Overview

Recent interest in the use of historical cartographic images for time-series mapping and comparative cartography can be attributed to the availability of historical-map imagery and to research interests in analysing the accuracy of early mapping. Much of the technical wherewithal for such analyses has existed under the GIS umbrella for some time now and has given researchers the ability to work with either vector or raster renditions of antiquarian maps. Examples of the derived products include the portrayal and measure of the evolution in human settlement patterns, the historical development of transportation infrastructure, locational applications in archaeology research, analysis of historical battle plans, or simply the comparison of two or more maps of the same geographic area.

Most GIS suites inherently have the ability to carry out these functions, but, for those specifically interested in accuracy analysis, one product that falls in the “must-have” category is MapAnalyst. This is a free utility designed specifically to compare the accuracies of two map images. The basic procedure is to rectify one image file to another (image-to-image georeferencing), and the software subsequently provides the user with a quantitative analysis of the distortion between them.

According to the MapAnalyst Web page (<http://mapanalyst.cartography.ch>),

MapAnalyst is software for the accuracy analysis of old maps. Its main purpose is to compute distortion grids and other

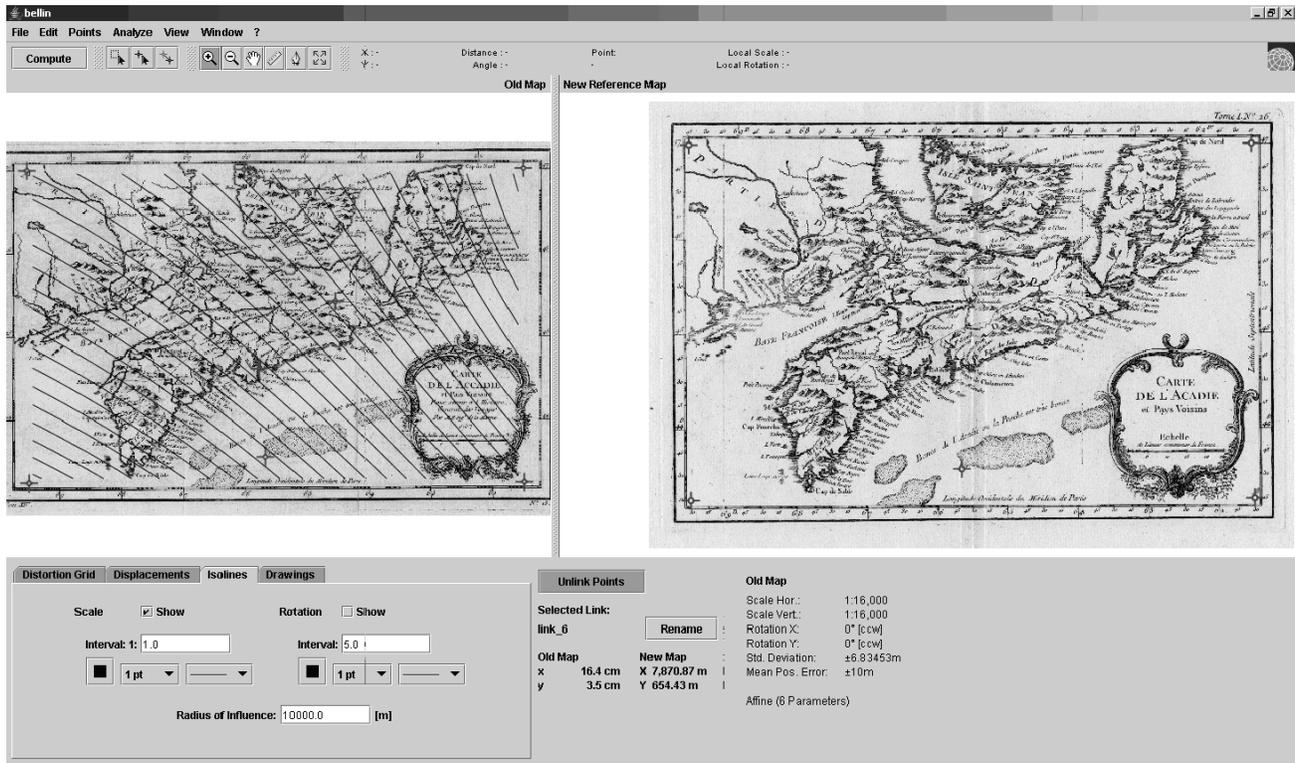
types of visualizations that illustrate the geometrical accuracy and distortion of old maps.

The software uses pairs of control points on an old map and on a new reference map. The control points are used to construct distortion grids, vectors of displacement, accuracy circles, and isolines of local scale and rotation. As a by-product, MapAnalyst also computes the old map’s scale, rotation and statistical indicators.

Any two images can be used in the analysis; however, the “new” image or modern map must include a world file. These ASCII files are automatically generated when an image is georeferenced using a GIS, but it is possible to create your own in a text editor if you are familiar with the structure.

In the comparative example chosen here, the images are both from the work of J.N. Bellin, one from the 1764 *Le Petit Atlas Maritime* and the other from the 1757 Prevost’s *Histoire Générale des Voyages*. This is essentially the same map, from two different engravings, and the intent here was simply to find accuracy variations between them. The *Petit Atlas* image was used as a “georeferenced” image (Figure 1, right); the Prevost example was entered as the unreferenced image shown at left in Figure 1.

At least five points need to be entered and linked to perform a transformation, and a very nice option in MapAnalyst is that the user can select from a number of transformation choices, including Helmert and Affine. A “comparison of transformations” table can also be generated to help the user decide which is best based on the error values.



**Figure 1.** Comparative example depicting two maps of Nova Scotia by J.N. Bellin, 1757 (left) and 1764 (right). See text for full details.

Once an adequate number of points has been entered, the user has three primary options for displaying the results: a distortion grid, displacement vectors, or isolines of scale and/or rotation may be added.

To export the old image with the analysis, a simple export function is provided; however, it does require that you enter the width of the output image in pixels.

### Features, Functions, and Observations

#### INTERFACE

The interface is intuitive and easy to navigate, but hot key shortcuts are not included in this release. This would be useful, at least for the “Compute” and “Zoom” buttons, which get a good workout during a session. Scroll bars in both left and right viewing panes would be an added navigational improvement over the existing pan tool. An auto-link option would be useful for linking points that are entered in a particular order (e.g., old map to new map); the current method requires the user to select and associate the link points manually.

#### FORMATS

JPG, GIF, or PNG formats are supported for adding source images. The file-selection step could be improved if the “add image” dialogue could filter out the

unsupported image types; this is not critical, however, and the user is informed if an unsupported format is accidentally chosen.

#### SELECTION OF GEOREFERENCED IMAGE

If the user selects a “new” map image that has not been georeferenced, a dialogue box appears, indicating the need to first georeference the image in a GIS to generate a world file, then to reload the image. It would be useful for users who do not have access to a GIS to know that it is possible to create these files with any ASCII text editor. Any image that includes a rectangular grid (i.e., UTM) can be georeferenced by cropping and rotating the image in an editor such as PhotoShop, then assigning appropriate ground coordinates in a world file. Numerous Web resources discuss the contents of world files, and this would seem to be a relatively simple procedure to include in a Help file.

#### Overall Assessment

When the user repositions link points, there is a bit of a delay in the animation of point-dragging while relocating the pointer; this may be nothing more than a memory issue. Users will generally be impressed with the speed at which the software loads large files, as each

test file was approximately 20MB and they displayed easily within seconds.

Finally, an overlay function would also be useful to check the accuracy – this would require that both images be displayed in a single window, in which one or both images could be assigned a degree of transparency. Generally, however, this is a great piece of software for analysing old maps, and one would expect MapAnalyst to be a

welcome addition to the desktops of map researchers everywhere.

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