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Software Review of UN-SCAN-IT: Graph Digitizing Software

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UN-SCAN-IT: Graph Digitizing Software. Silk Scientific, Inc., P.O. Box 533, Orem, UT 84059. www.silkscientific. com. See Web site for pricing information.

UN-SCAN-IT 6.0 is the latest release of a graph digitization software package developed by Silk Scientific, Inc. This program converts TIFF, JPG, BMP, PCX, and PICT image files into tabular data using a variety of algorithms to automate the process. UN-SCAN-IT 6.0 is available in both Windows and Macintosh versions. The Windows version, reviewed here, requires Windows 95, 98, NT, 2000, Me, XP, or Vista, a minimum of 64 MB of RAM, and 25 MB of hard disk space. The program was evaluated on a 2.4 GHz Intel Core 2 Duo with 2GB of RAM running Windows XP. Installation was straightforward, requiring serial and registration numbers but no online activation. Introduction to the program is done through a series of tutorial images. These examples show the user how and where icons should be placed on various types of images. After taking half an hour to go through these examples, we found the subtleties of using the program to be well elucidated. For those preferring a paper manual, the one provided is well organized and easy to read.

The software package is divided into three sections, accessible through a central menu system, dealing with image acquisition, conversion, and data manipulation. In general, the user interface, although not flashy, is perfectly serviceable and does not get in the way of the extraction or analysis of data. The included scanner module is basic but functional, allowing for the adjustment of scan parameters, such as the brightness and color depth. However, other scanner software can be used, and files can be easily imported. Many journals are now available in digital formats such as PDF, and images were easily extracted and analyzed from PDF documents. Although the number of data points extracted from the image cannot exceed the resolution of the image, the ability to interpolate between data points is supported. Once the image is acquired from the scanner module, it can be loaded using the digitization menu, and one of several graph scan modes can be selected. These modes approach the conversion in different ways depending on the type of plot and options, such as follow lines, dashed lines, cyclic data, bar graphs, and raster scans. Manual point selection is also available to facilitate digitizing graphs. Converting the image data into tabular data is effected by placing icons on the image to define various regions, such as the maxima and minima on the x- and y-axes, color of data, etc. A convenient zoom window is provided for the more precise placement of icons. Additionally, the icons can be moved with the mouse or the arrow keys on the keyboard. However, the amount of zoom cannot be adjusted, and on lower-resolution images, e.g., 800 × 600, the zoom is no bigger than the image itself.

To evaluate the capabilities of the program, a series of 600 dpi uncompressed TIFF images of line, symbol, and mixed graphs with and without color were generated using Origin 7.0 and converted with UN-SCAN-IT 6.0. Colored-line graphs were the easiest to convert as they could be done in one step, even in dense overlapping regions. Interestingly, the program could not acquire a line thickness for blue- or royal-colored lines, even though it had no problem with the same lines in a variety of other colors. Hopefully this bug will be fixed in future versions. The ability to specify the pixel widths of lines in the options menu would also be a welcome addition. The monochrome line graph digitization function would also sometimes malfunction and jump between intersecting or closely spaced lines. This problem was remedied by analyzing the line in sections and erasing erroneous points with the data eraser tool. The same axis settings are maintained when switching between the line and manual modes, making this type of data extraction quick. Additionally, the axis settings can be saved for later use. For the scatter plots, the raster scan tool was generally able to identify the center mass of individual points; however, at times the overlapping points caused the analysis to be aborted in especially dense regions. Although the algorithm distinguishes between different data series based on color, no shape recognition is included, unfortunately, so monochrome graphs with multiple series need to be separated in postprocessing. The addition of dashed lines between the symbols renders the raster scan analysis almost useless, as the individual dashes are measured as points; again, the addition of shape recognition would alleviate this problem. For these graphs, the manual mode proved to be an effective method of analysis: for example, digitizing 26 data points took ~3 min with an average error in x and y of ~2%.

UN-SCAN-IT 6.0 is an easy and intuitive solution to the problem of digitizing graphs and analyzing data presented in image formats for which the tabular data are not available. The program is dependable and results in great time savings for anyone needing to extract data from a plot.

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