Convert images and non-vector PDFs

Free Addon integrated into progeCAD for vectorization

ProgeSOFT

CAD Solutions

www.progesoft.com

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Introduction

This document illustrates the features of the WinTopo application, integrated into progeCAD, which allows you to perform image vectorization.

WHAT DO YOU MEAN "VECTORIALISATION"?

The vectorialization programs of images, allow to perform a "tracing" of the desired image going to intercept the profiles, based on the various contrasts. The result obtained is a representation of the image with lines that can be managed later in the CAD, like progeCAD.

This means that it is possible, starting from a scan, to obtain a vector representation in the CAD, for example if you have a planimetry in paper form.

Contacts

For any information, contact us:

- E-mail: support@progecad.com

When is it useful to use the vectorizer?

This vectorization software is used in the following situations:

When you want to convert an existing image into vectors

When an image is available, for example a Map downloaded from the web (in the TIF BMP JPG formats), this is the classic case of use of the vectorization software.

To convert a paper document into CAD file

The paper document must be scanned using a scanner. See also the chapter **"From paper to CAD"** to get the best possible result.

If you receive a non-vector PDF document containing only images

It is common to send technical documentation via PDF file.
These PDFs can be of 2 types:

Vector PDF: Files resulting from a print / conversion in PDF format directly from the drawing program.
In these cases, it is not necessary to use WinTopo, but you can directly use the PDF2CAD command, available in the progeCAD menus "AddOn> Convert PDF to DWG".

- **PDFs containing images:** Often you choose to save from the scanner management program directly in PDF format. In this way a "non-vector" PDF is generated, it does not contain vectors but only an image.
  See section **"How to extract images from a PDF"**

If you have a PDF file containing a vector part and also images

In some documents, like brochures, it is possible to have a PDF file which contains a mix of vector parts, text and images.
In this situation, with the PDF2CAD command of progeCAD, mentioned above, it is possible create a conversion of the whole document into a CAD file.
The vector parts will then be automatically transformed into CAD vectors, while the images will be inserted as such.
The conversion engine of progeCAD's PDF2CAD command, extrapolates the images that are inserted into the drawing as external references, and saves them

in the same folder as the created DWG file. It will be possible to proceed with a vectorialization using the technique described in the **"Perform a Vectorization"** section.

Downloading the cadastral maps distributed in PDF format

Many municipalities, distribute the maps of the cadastral plans in PDF format (it depends on the country where you reside). These files usually contain bitonal TIF images, which will then be extracted from the PDF, to be vectorized.
See section "**How to extract images from a PDF**".

From paper to CAD

When you start working with CAD software, you often have to use or keep old drawings on paper made earlier.
progeCAD has an integrated application, WinTopo, which allows you to transform a raster image in CAD file.

Main precautions for a correct scan in order to realize a vectorialization of the paper document

1. Remove folds from the sheet as much as possible
2. Choose the output format .TIF or .BMP (not recommended .JPG and .PDF)
3. Set the colors of your scanner to BITONAL (Black-White), avoiding to scan in color or grayscale
4. Select a high resolution (minimum recommended: 600 dpi)
5. Once the image has been obtained, proceed to vectorization with WinTopo, see section "Perform a vectorization"

In this way we obtain an image that will give the best possible result in the vectorialization phase.

IMPORTANT: By setting the scanner management program to get the document directly in PDF format, a "non-vector" PDF is generated, containing a low-resolution image.
See section "How to extract images from a PDF"

Understanding scanned images

Scanners and printers work at resolutions indicated in points per unit of space, typically in inches: dpi (dots per inch) and ppi (points / pixels per inch) which are the parameters that indicate the resolution of printers and scanners normally used.
Suppose that you have to scan a print in A4 format with the scanner, then the dimensions of 21 x 29.7 cm or better 8.3 x 11.7 inches (1 inch = 2.54 cm).

Choosing a resolution for the image acquisition of 300 dpi we will have

(8.3x300) x (11.7x300) = 2490x3510 = 8.739.900 pixels (8.7 Mpx)

The overall resolution of the image is not the only element that determines its final quality. To save the file we have to indicate the format.

The most used formats are:

JPG (Joint Photographic Experts Group) - **TIFF** (Tagged Image File Format) - **BMP** (Windows Bitmap)

IMPORTANT: The images in JPG format are COMPRESSED, consequently they are not the best choice for this type of operation.

Main concepts on images

A raster image is composed of pixels.

A vector document is composed of geometrical objects such as lines and arcs drawn at points from specified coordinate points. Vector drawings are used by CAD, GIS and general applications that require accuracy of detail in the drawing.

A raster to vector converter translates a raster image into the corresponding vector document.

The result of this operation is very variable and depends on numerous factors, first of all on the quality of the starting raster image.
To "trace" a design, it is first of all necessary that the printed document have a good quality and in particular that the lines are clear and distinct from the background. Better results are obtained with black and white drawings. When

you digitize the drawing, you must indicate the resolution of the file you want to obtain, which is the number of pixels of the raster image obtained from the scan.

What is the RESOLUTION?

A digital image is formed by pixels, very small squares that contain part of the information related to the acquired image.
An image is composed of many small squares, multiplying the number of pixels on the two sides will obtain the overall resolution of the image.

Eg:
2048x1536 = 3.145.728 pixel
3008x2000 = 6.016.000 pixel
3264x2448 = 7.990.272 pixel

How to extract images from a PDF

As previously mentioned, PDF files can contain images without any vector information.
It is possible that one of these situations happens:

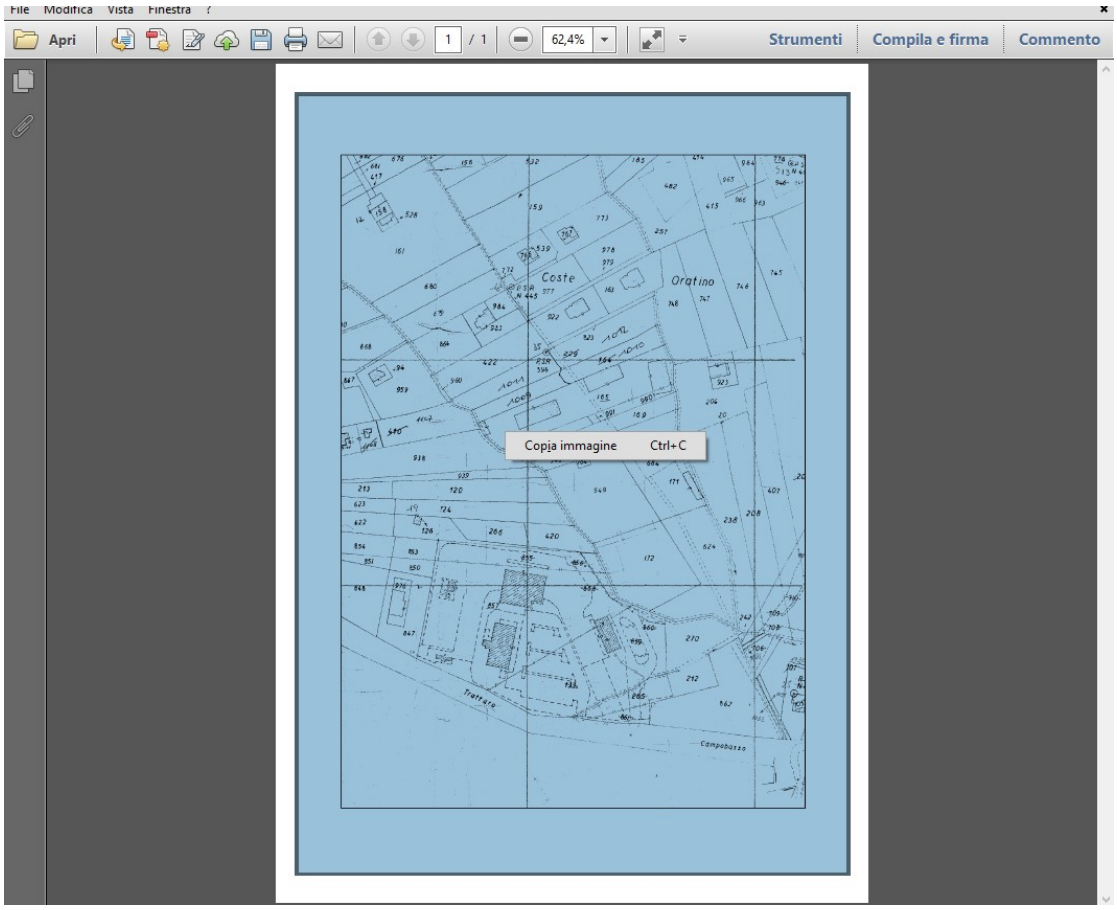
A paper copy was scanned, saving in PDF format

In this case, the best solution is to repeat the scanning process of the paper document, following the instructions in the section "From paper to CAD".

A non-vector PDF has been downloaded / received

Follow this procedure:

1. Open the PDF file with Adobe Reader (or other equivalent software)
2. Click on the image with the left mouse button, in this way the image will be selected
3. Right-click, and then choose COPY IMAGE



4. Open a program for editing images, such as Windows PAINT
5. Paste the image
6. Save the image in TIF or BMP format
7. Follow the instructions in the section "Perform a vectorization"

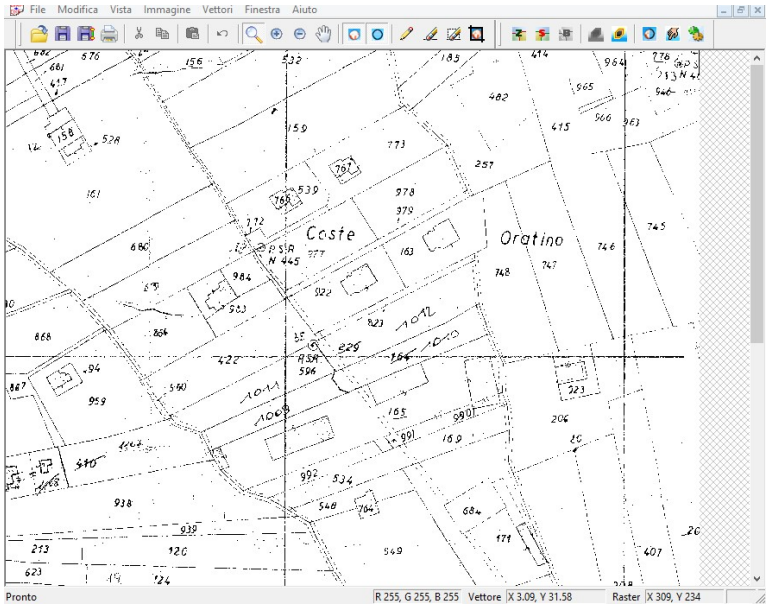
NOTE: If this is not possible, it means that the PDF is protected. The only way to get the image is to convert the PDF using the PDF2CAD command of progeCAD, which still manages to extract the raster images by saving them in the same folder of the PDF.

Perform a Vectorization

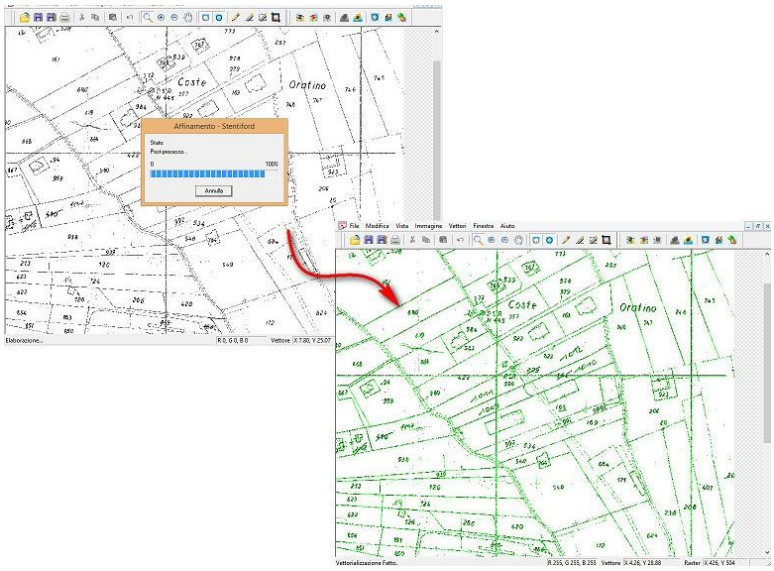
Once the image has been obtained using the indications given in the previous sections, it is possible to proceed with the vectorialization.

Quick procedure for vectorization with WinTopo

1. In progeCAD start WinTopo (menu AddOn > Raster to Vector)
2. In WinTopo: File menu > Open Image

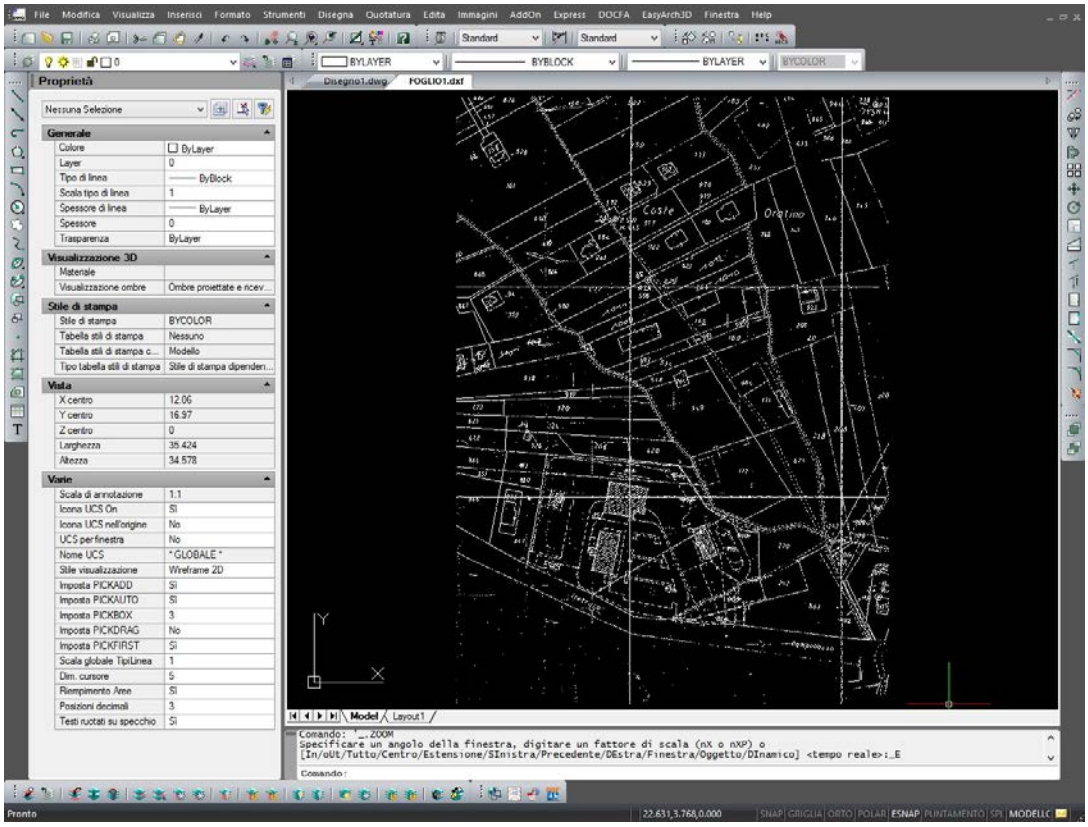


3. Vectors Menu > Quick Vectorization
4. Wait the end of process



5. Menu " File > Save Vectors as ", then save the file in DXF format (format proposed as default)

6. Open the resulting file in progeCAD



NOTE: If the result is not optimal, see directly the internal help of Wintopo, to discover all the advanced functions, which allow to improve the conversion of images into vectors.

Advanced WinTopo manual

See directly the internal help of Wintopo, to discover all the advanced functions, which allow to improve the conversion of images into vectors.