Convert **images** and non-vector **PDFs**

Free Addon integrated into progeCAD for vectorization

ProgeSOFT

CAD Solutions

www.progesoft.com

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Contents

Introduction

This document illustrates the features of WinTopo, an application for image vectorization integrated in the progeCAD software.

WHAT IS "VECTORIZATION"?
Vectorization programs allow to convert images into vector graphics by performing image tracing, the procedure of tracking geometry of the original image based on contrast variations. The output of this procedure is vector representation of the original image, that is lines, arcs and other geometry editable in CAD programs, like progeCAD.

This means that starting from a scan you can obtain a vector representation in the CAD format, for example, of some floor plan which you have in the paper form.

Contacts

For any information, please contact us at
support@progesoft.com

When should the vectorizer be used?

This vectorization software is used in the following situations:

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 a CAD file

The paper document must be scanned using a scanner. See also the chapter **"From paper to CAD"** which gives some practical guidelines in order to achieve the best result.

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

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

> **Vector PDFs:** Output files are received through PDF print/conversion made directly from a vector graphics editing application.
>
> In this case, it is not necessary to use WinTopo, you can directly use the PDF2CAD command, available in the progeCAD menu "AddOn > Convert PDF to DWG".

- **PDFs containing images:** Using scanners you often choose to get a PDF as an output file format. In this way a "non-vector" PDF is generated, it does not contain vectors but only an image.
  See the section **"How to extract images from a PDF"**

If you have a PDF file containing vector and raster data

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, it is possible to convert the whole document into a CAD drawing using the PDF2CAD command in the progeCAD software (the menu AddOn > Convert PDF to DWG).
The vector parts will be automatically transformed into CAD vectors, while the images will be inserted as such.

The conversion engine of progeCAD PDF2CAD command, extracts the images which 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 vectorize them using the technique described in the **"Perform a Vectorization"** section.

Downloading cadastral maps distributed in PDF

Many municipalities distribute maps of cadastral plans in the 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 the 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 paper drawings previously created.
progeCAD has an integrated application, WinTopo, which allows you to transform a raster image in a CAD file.

Main precautions for a correct scan in order to vectorize a paper drawing

1. Remove folds from the paper sheet as much as possible
2. Select .TIF or .BMP as an output format (.JPG and .PDF are not recommended)
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 the section "Perform a vectorization"

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

IMPORTANT: By setting the scanner management program to create documents directly in the PDF format, a "non-vector" PDF is generated, containing a low-resolution image.

See the 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 the A4 format with the scanner, the dimensions are 21 x 29.7 cm or 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 are COMPRESSED, consequently they are not the best choice for this type of operation.

Main image concepts

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 quite variable depending on numerous factors, first of all on the quality of the original raster image.
To "trace" a design, it is first of all necessary that the printed document is of good quality and, in particular, has distinct lines clearly defined against 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 of 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 we'll obtain the overall resolution of the image.

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

How to extract images from a PDF

As previously mentioned, PDF files can contain images without any vector information.
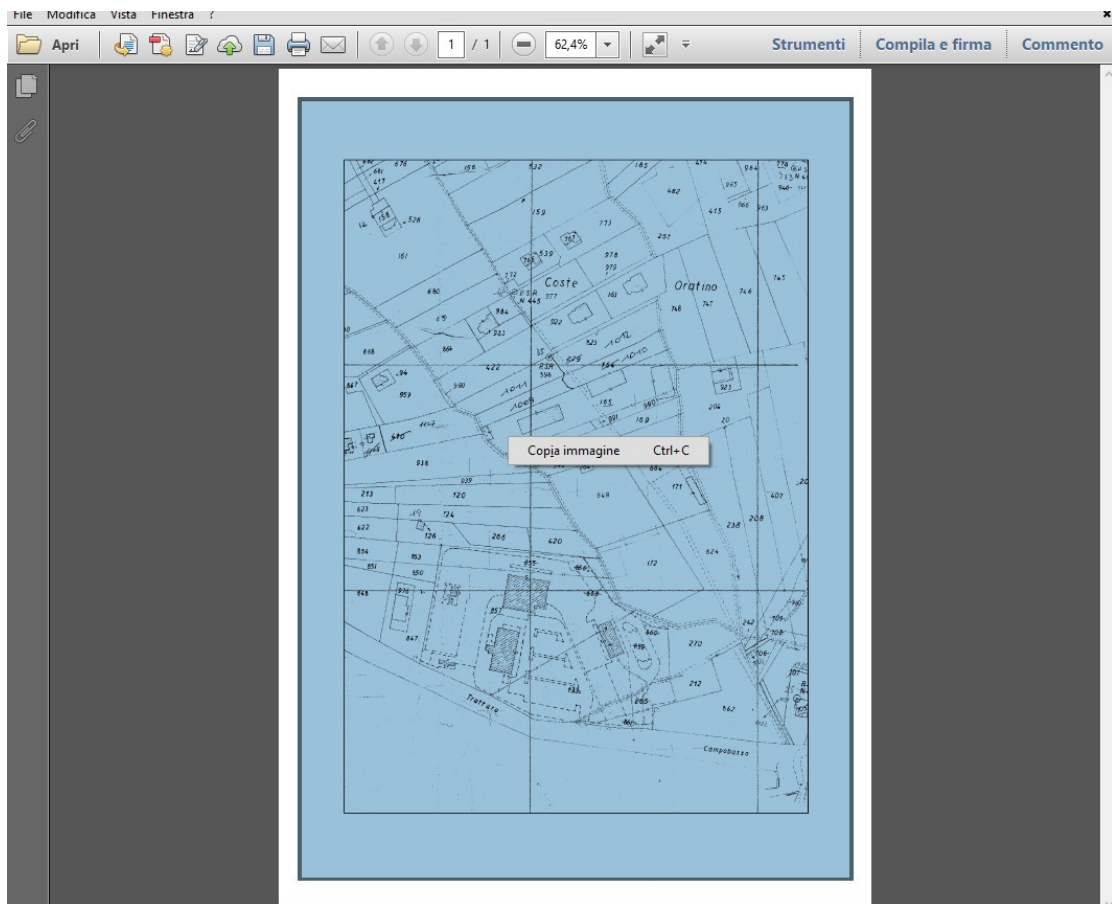One of these situations may happen:

A paper document scanned and saved in PDF

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
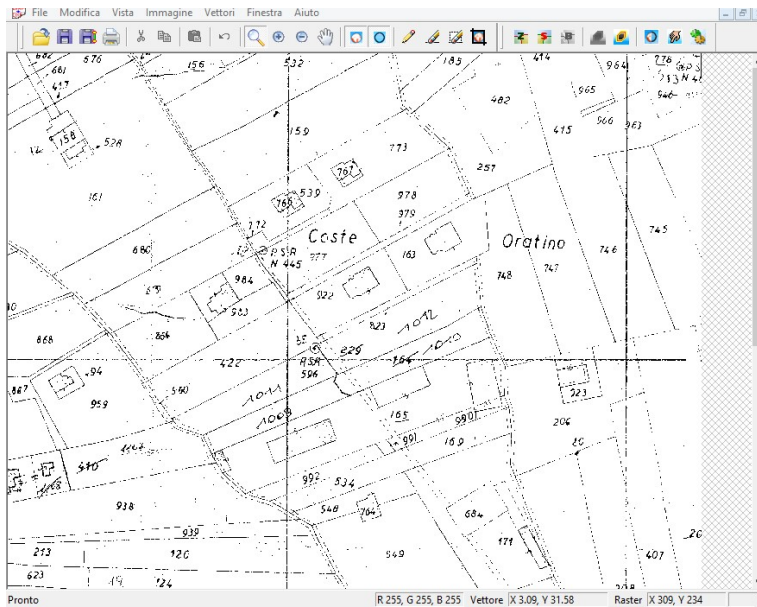7. Follow the instructions in the section "Perform a vectorization"

NOTE: If this is not possible, it means that the PDF is protected. The only way to extract the image is to convert the PDF using the PDF2CAD command of progeCAD, which also can extract raster images and save them in the same folder with the PDF.
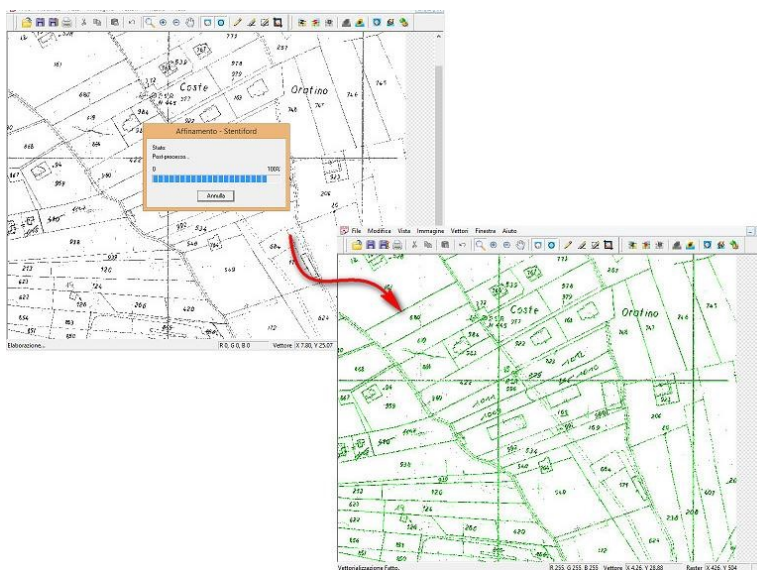
Perform a Vectorization

Once the image has been obtained following the guidelines of the previous sections, it is possible to proceed to the vectorization.

The quick procedure for vectorization with WinTopo

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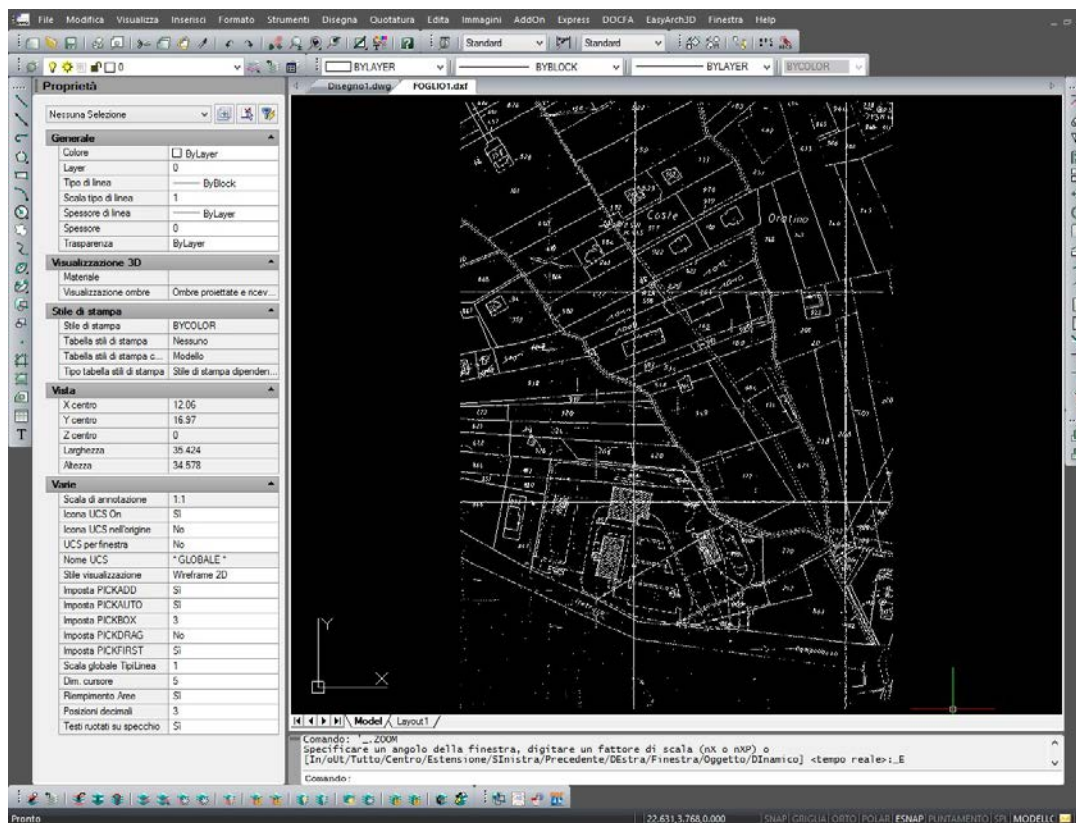2. In WinTopo: File menu > Open Image

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

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

6. Open the output 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.

The 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.