

Proper Choice of Graphics Formats

Creating your images

Create all graphics using the right tool and the right format. For example:

1. From SciPy, Octave, Matlab, etc., **export plots in vector format.**
2. Create line graphics with **Inkscape**. For LaTeX documents, TikZ may sometimes be a good choice.
3. Process photographs with the GIMP - unless you overlay line graphics, in which case use vector tools like Inkscape or LaTeX graphics.

Never throw away essential information.

1. **Never convert vector to raster data.**
2. **Never use lossy compression on line graphics.**

The proper choice of graphics formats during processing and publishing has a critical impact on the quality and usability of the result. The two principal issues are:

1. Preservation of information (in particular, **resolution independence** and avoidance of **compression artifacts**)
2. Minimization of **file size**

The most important distinction is between vector (resolution independent) and raster (pixel) data. From this follows Rule Number One: *Never convert vector data to raster data.*

Then, file formats require attention because of the technological restrictions imposed by the publishing medium.

Vector Data (possibly combined with raster data)

1. Never convert them to raster format.
2. For **print** publishing: For PDFLaTeX, convert your graphics to (vector-format) PDF.¹⁾
3. For **Web** publishing: Use SVG. For legacy browsers that do not yet support SVG, for maximum portability you may want to offer an alternative raster image (inside an <object> tag, for example), see below.

Raster Data

1. Keep your graphics files reasonably small. Provide the resolution required for high-quality publishing, but do not preserve more than can be reproduced in the published form.
2. If your data are composed of **smooth transitions** (typically, this includes all **photographs** and almost nothing else): Use a **lossy** format enabling a high compression rate at almost no visible

loss of quality (JPEG/JFIF).

- 3. If your data contain **discrete colors, drawings** etc. (this includes most non-photographic data, or photographic data with line graphics overlaid): Use a **lossless** format. PNG is highly recommended as it is open, includes compression, and is widely supported²⁾. For discrete-color drawings, it yields better compression ratios than JPEG, at perfect quality, while JPEG creates approximation artifacts that are particularly obnoxious in print.³⁾

Recommended Graphics Formats

| Format | | Vector | Raster | |
|-------------------------------------|-----------------|--------|----------|-------|
| | | | lossless | lossy |
| Portable Document Format | PDF | • | • | • |
| Scalable Vector Graphics | SVG | • | • | • |
| Portable Network Graphics | PNG | | • | |
| JPEG File Interchange Format | JPG, JPEG, JFIF | | | • |

Conversion

There are open-source tools for essentially all conversions that arise in practice. To convert PDF to SVG I recommend [Inkscape](#).

¹⁾ OpenOffice.org can import PDF, SVG and other vector graphics formats. I'm sure some of its proprietary look-alikes can also be convinced to grok vector graphics.

²⁾ Except for alpha-channel transparency by Microsoft products, but perhaps this information is outdated.

³⁾ There is almost no reason to use GIF anymore, as PNG is much more versatile and often more efficient. Exceptions are alpha-channel transparency for use with Microsoft products (well supported by the open-source community however) and animated raster graphics ([MNG](#) is still not very widely supported).

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Last update: **2018/09/03 14:57**

