

## Image File Formats

**Image file formats:** bitmap, jpeg, tiff, gif, mpeg, pgm, ppm

Image files have two parts:

- header
  - file type info, magic number
  - image dimensions
  - color palette,...
- raster data — image pixels

## Manipulating Images

Existing software for file format conversions:

- Matlab
- pbmplus (Unix, Linux)
- xv (Unix, Linux)
- ImageMagick (Unix, Linux, Windows, Mac)
- Vision SDK (Windows)

## Portable Gray Map: PGM

The portable graymap format is a lowest common denominator grayscale file format. The definition is as follows:

- A “magic number” for identifying the file type. A pgm file’s magic number is the two characters “P2”.
- Whitespace (blanks, TABs, CRs, LFs).
- A width, formatted as ASCII characters in decimal.
- Whitespace.
- A height, again in ASCII decimal.
- Whitespace.
- The maximum gray value, again in ASCII decimal.
- Whitespace.

- Width \* height gray values, each in ASCII decimal, between 0 and the specified maximum value, separated by whitespace, starting at the top-left corner of the graymap, proceeding in normal English reading order. A value of 0 means black, and the maximum value means white.
- Characters from a “#” to the next end-of-line are ignored (comments).
- No line should be longer than 70 characters.

Here is an example of a small graymap in this format:

```
P2
# feep.pgm
24 7
15
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 3 3 3 3 0 0 7 7 7 7 0 0 11 11 11 11 0 0 15 15 15 15 0
0 3 0 0 0 0 0 7 0 0 0 0 0 11 0 0 0 0 0 15 0 0 15 0
0 3 3 3 0 0 0 7 7 7 0 0 0 11 11 11 0 0 0 15 15 15 15 0
0 3 0 0 0 0 0 7 0 0 0 0 0 11 0 0 0 0 0 15 0 0 0 0
0 3 0 0 0 0 0 7 7 7 7 0 0 11 11 11 11 0 0 15 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

### **Rawbit Variant**

This variant is different in the following ways:

- The “magic number” is “P5” instead of “P2”.
- The gray values are stored as plain bytes, instead of ASCII decimal.
- No whitespace is allowed in the grays section, and only a single character of whitespace (typically a newline) is allowed after the maxval.
- The files are smaller and many times faster to read and write.

Note that this raw format can only be used for maxvals less than or equal to 255.

## Color Images: PPM

Pixels are represented by their *red*, *green*, and *blue* values.

ASCII data: Magic number "P3"

RAWBIT data: Magic number "P6"