

## Image File Formats

In computer graphics, images are composed of colored dots known as pixels. Each pixel value can be specified as a combination of three colors  $\langle R, G, B \rangle$  where R is red, G is green, and B is blue. Each of these elements is an integer ranging from 0 to some maximum color value (in ppm/pgm files, the maximum color value is often 255). For example, the color red is represented by  $\langle 255, 0, 0 \rangle$ , white is  $\langle 255, 255, 255 \rangle$ , and black is  $\langle 0, 0, 0 \rangle$ .

While there are many graphics file formats (e.g., jpeg, gif, tiff, targa, etc.), we will focus on ppm/pgm since it is the simplest graphics file format. A ppm/pgm file has a particular format that consists of a header section with general information about the image, and a data section with the actual RGB values for each pixel. The header information is always written as ASCII text, but the data section can be ASCII or binary.

The ppm/pgm file format is as follows:

```
Pn                - P3 = RGB ASCII pixel data (ppm)
                  - P5 = greyscale binary pixel data (pgm)
                  - P6 = RGB binary pixel data (ppm)
# comment         - optional comment line(s)
www hhh          - width, height
# comment         - optional comment line(s)
nnn              - maximum color value
data             - as described below

RRR GGG BBB      - ASCII pixel data (for each pixel)
rr gg bb         - binary pixel data (for each pixel)
```

Note that the first line of the file indicates the type of pixel data present in the data section. Comments can be multiple lines as long as each line begins with #. The pixel data format will be either of the last two lines above, depending on the file type.