Notes on PPM format

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1 Introduction

These are my notes on the PPM image file format after reading the wikipedia page and the netpbm's specification on PPM. PPM stands for Portable Pixel Map (there also exists PBM – Portable Bit Map as well).

2 Header

The header of a PPM file is always in ASCII. It is described as follows in form of a list:

1. Px where $x \in X = \{3, 6\}$.
2. Whitespace.[1]
3. Width (in base 10 or decimal).
4. Whitespace.[1]
5. Height (in base 10 or decimal).
6. Whitespace.[1]
7. Maximum Color Value (mcv) where $0 < mcv < 65536$.
8. Whitespace.[1]

Afterwards raster data is followed, which we will describe now.

3 Raster Data

Each pixel of a P3 or P6 image is defined as a triplet of red, green, blue values. A P3 type PPM image is known as a Plain PPM file because all of its pixel data is in ASCII as well, in contrast to P6 PPM which is known as Binary PPM where the header in ASCII but the raster data is in binary form.

Note that, line following `#` is a comment, don't use this in binary mode as it may skew the images to the right.

3.1 Binary PPM (P6)

In binary form, each of these values is represented in 1 or 2 bytes. If the mcv is less than 256, then each value is of 1 byte, otherwise 2 bytes.

The Raster data following the $(8)^{th}$ whitespace character is in Height rows. The rows are ordered from top to bottom and each row is Width pixels wide , the pixels have been defined as specified above where Pixels in a row are from left-to-right ordering.
A row of an image is horizontal and the columns are vertical. There is no actual separation required between each pixel in a row unike the "Plain" PPM file described ahead.

3.2 Plain PPM (P3)

The Plain PPM format is fairly simple, instead of having binary data it contains plain ascii data where each pixel is a decimal value as ASCII. The following part highlights key differences between the two:

- There is exactly one image in one file.
- Magic number is P3 instead of P6.
- Each pixel sample/value is represented as ASCII in decimal/base10 of arbitrary size.
- Each pixel sample/value has a whitespace[1] before and after it. There must atleast be one character of whitespace[1] but there is no maximum. There is not exact separation between pixel — just the required separation between blue sample from one pixel and the red sample from the next pixel.
- No line should be longer than 70 characters.

3.3 P3 Example

Here is an example of a p3 type ppm image

```
P3
# feep.ppm
4 4
15
0  0  0    0  0  0    0  0  0   15  0 15
0  0  0    0 15  7    0  0  0    0  0  0
0  0  0    0  0  0    0 15  7    0  0  0
15  0 15    0  0  0    0  0  0    0  0  0
```

Figure 1: Nicely formatted P3 PPM

It does not matter whether you write your data in actual rows of 4x4 but that each pixel's individual sample and the pixels are spearated by a whitespace[1]. You can even write one pixel per line.

An Example would be as follows:

```
P3
# feep.ppm
4 4
15
0   0   0
0   0   0
0   0   0
15   0  15
0   0   0
0  15   7
0   0   0
0   0   0
0   0   0
0   0   0
0  15   7
0   0   0
15   0  15
0   0   0
0   0   0
0   0   0
```

Figure 2: Another P3 PPM but formatted in a different manner

[1] Note that, a whitespace is any of the following characters:

- Newline ($\backslash n$, also known as a LF).
- Tabs (vertical $\backslash v$ and horizontal $\backslash t$).
- Carriage Return ($\backslash r$).
- Form Freed ($\backslash f$).
- Space

All characters except the Line Feed character are a "white space" Together, all of these are known as "whitespace" characters.