Pmnorm User Manual

pnmnorm

Updated: 6 January 2006
Table Of Contents

NAME

pnmnorm - normalize the contrast in a Netbpm image

SYNOPSIS

pnmnorm [**-bpercent=***N* | **-bvalue=***N*] [**-wpercent=***N* | **-wvalue=***N*] [**-maxexpand** [**-keephues**] [**-luminosity** | **-colorvalue** | **-saturation**] [*ppmfile*]

All options can be abbreviated to their shortest unique prefix. You may use two hyphens instead of one to designate an option. You may use either white space or an equals sign between an option name and its value.

DESCRIPTION

This program is part of Netpbm.

pnmnorm reads a PNM image (PBM, PGM, or PPM). It normalizes the contrast by forcing the brightest pixels to white, the darkest pixels to black, and linearly rescaling the ones in between; and produces the same kind of file as output. This is pretty useless for a PBM image.

The program first determines a mapping of old brightness to new brightness. For each possible brightness of a pixel, the program determines a corresponding brightness for the output image.

Then for each pixel in the image, the program computes a color which has the desired output brightness and puts that in the output. With a color image, it is not always possible to compute such a color and retain any semblance of the original hue, so the brightest and dimmest pixels may only approximate the desired brightness.

For a PPM image, you have a choice of three different ways to define brightness:

1 luminosity

2 color value

3 saturation

In the case of saturation, "brightness" is pretty much a misnomer, but you can use the brightness analogy to see what it does. In the analogy, bright means saturated and dark means unsaturated.

Note that all of these are different from separately normalizing the individual color components.

An alternative way to spread out the brightnesses in an image is **pnmhisteq**. **pnmhisteq** stretches the brightest pixels to white and the darkest pixels to black, but rather than linearly adjusting the ones in between, it adjusts them so that there are an equal number of pixels of each brightness throughout the range. This gives you more contrast than **pnmnorm** does, but can considerably change the picture in exchange.

OPTIONS

By default, the darkest 2 percent of all pixels are mapped to black, and the brightest 1 percent are mapped to white. You can override these percentages by using the **-bpercent** and **-wpercent** options, or you can specify the exact pixel values to be mapped by using the **-bvalue** and **-wvalue** options. You can get appropriate numbers for the options from **ppmhist**. If you just want to enhance the contrast, then choose values at elbows in the histogram; e.g. if value 29 represents 3% of the image but value 30 represents 20%, choose 30 for *bvalue*. If you want to brighten the image, then set *bvalue* to 0 and just fiddle with *wvalue*; similarly, to darken the image, set *wvalue* to maxval and play with *bvalue*.

If you specify both **-bvalue** and **-bpercent**, **pnmnorm** uses the one that produces the least change. The same goes for **-wvalue** and **-wpercent**.

If you want to maximize the change instead of minimizing it, just cascade two runs of **pnmnorm**, specifying values for the first and percentages for the second.

This is further constrained by the **-maxexpand** option. Sometimes, too much contrast is a bad thing. If your intensities are all concentrated in the middle, **-bpercent=2** and **-wpercent=1** might mean that an intensity of 60 gets stretched up to 100 and and intensity of 40 gets stretched down to zero, for a range expansion of 150% (from a range of 40 to a range of 100). That much stretching means two adjacent pixels that used to differ in intensity by 4 units now differ by 10, and that might be unsightly.

So that you can put a limit on the amount of expansion without having to examine the image first, there is the **-maxexpand** option. It specifies the maximum expansion you will tolerate, as an additional per centage. In the example above, you could say **-maxexpand=50** to say you want the range to expand by at most 50%, regardless of your other options. **pnmnorm** figures out what intensity to stretch to full intensity and what intensity to stretch to zero intensity as described above, and then raises the former and lowers the latter as needed to limit the expansion to the amount you specified.

When **pnmnorm** limits the expansion due to **-maxexpand**, it tells you about it with a message like this:

```
limiting expansion of 150% to 50%
```

In any case, **pnmnorm** tells you exactly what expansion it's doing, like this:

```
remapping 25..75 to 0..100
```

Before Netpbm 10.26 (December 2004), it was not valid to specify both **-bvalue** and **-bpercent** or **-wvalue** and **-wpercent**.

-maxexpand was new in Netpbm 10.32 (February 2006).

The **-keephues** option says to keep each pixel the same hue as it is in the input; just adjust its brightness. You normally want this; the only reason it is not the default behavior is backward compatibility with a design mistake.

By default, **pnmnorm** normalizes contrast in each component independently (except that the meaning of the **-wpercent** and **-bpercent** options are based on the overall brightnesses of the colors, not each component taken separately). So if you have a color which is intensely red but dimly green, **pnmnorm** would make the red more intense and the green less intense, so you end up with a different hue than you started with.

If you specify **-keephues**, **pnmnorm** would likely leave this pixel alone, since its overall brightness is medium.

-keephues can cause clipping, because a certain color may be below a target intensity while one of its components is saturated. Where that's the case, **pnmnorm** uses the maximum representable intensity for the saturated component and the pixel ends up with less overall intensity, and a different hue, than it is supposed to have.

This option is meaningless on grayscale images.

When you don't specify **-keephues**, the **-luminosity**, **-colorvalue**, and **-saturation** options affect the transfer function (which is the same for all three RGB components), but are meaningless when it comes to applying the transfer function (since it is applied to each individual RGB component).

Before Netpbm 9.25 (March 2002), there was no **-keephues** option.

-luminosity, **-colorvalue**, and **-saturation** determine what property of the pixels **pnmnorm** normalizes. I.e., what kind of brightness. You cannot specify more than one of these.

The **-luminosity** option says to use the luminosity (i.e. the "Y" in the YUV or YCbCr color space) as the pixel's brightness. The luminosity is a measure of how bright a human eye would find the color, taking into account the fact that the human eye is more sensitive to some RGB components than others.

This option is default.

This option is meaningless on grayscale images.

Before Netpbm 10.28 (August 2005), there was no **-luminosity** option, but its meaning was still the default.

Before Netpbm 10.28 (August 2005), there was no **-colorvalue** option.

The **-colorvalue** option says to use the color value (i.e. the "V" in the HSV color space) as the pixel's brightness. The color value is the gamma-adjusted intensity of the most intense RGB component.

This option is meaningless on grayscale images.

Before Netpbm 10.28 (August 2005), there was no **-colorvalue** option.

The **-saturation** option says to use the saturation (i.e. the "S" in the HSV color space) as the pixel's brightness. The saturation is the ratio of the intensity of the most intense RGB component to the difference between the intensities of the most and least intense RGB component (all intensities gamma-adjusted).

In this case, "brightness" is more of a metaphor than anything. "bright" means saturated and "dark" means unsaturated.

This option is meaningless on grayscale images.

Before Netpbm 10.28 (August 2005), there was no **-colorvalue** option.

SEE ALSO

pnmhisteq, **ppmhist**, **pgmhist**, **pnmgamma**, **ppmbrighten**, **ppmdim**, **pnm**

Table Of Contents

SYNOPSIS
DESCRIPTION
OPTIONS
SEE ALSO