

The digital image

Bytes and bits

One bit is the smallest possible size of data on a computer and is either a 0 or a 1. Eight bits equals one byte. Often we speak of megabytes (Mb) or gigabytes (Gb) which is one million bytes or one billion bytes. Now what can we do with one byte? Well, we then have eight places that can either be 0 or 1. That makes 2^8 different combinations which is 256 different variants.

What is a digital image?

The most common type of digital image is called bitmap image. A digital bitmap image is built up by pixels. Each pixel is described by a certain amount of data.

A black and white image takes up the least amount of data per pixel as there are only two possible ways to describe a pixel - it's either black or white. (Beware that an image that look like a black and white image or grey scale image could actually be a color image but more of that later.)

And as each pixel only demands two ways to describe each pixel takes up only 1 bit.

Grey scale image

A grey scale image describes every pixel as one of 256 different shades of grey - so it has a bit depth of 8 bits (which is also equal to 1 byte). So each pixel takes 8 bits of data.

Color image

Now things starts to get tricky. As we often have two different ways to describe a color image. One is called RGB and the other is CMYK. Let's take a closer look on these two as they are diametrically different from each other.

RGB

This is the computers way to describe the colors you can see on a computer screen. This could be described as the colors of light much as the rays of the sun or the light from a bulb. RGB is short for red, green and blue and is described by these three colors.

Normally each pixel is described with 256 shades of each color. 256 shades of red etc.

When describing a RGB color each color has a number from 0 to 255. If you have 0 in all three colors you have black. If you have 255 in all colors you get white.

Every RGB pixel takes 3 bytes of data (or 3 times 8 bits which is 24 bits).

Examples:

Yellow: R=255, G=255, B=0

White: R=255, G=255, B=255

Black: R=0, G=0, B=0

CMYK

The problem with RGB is that you simply cannot take the red, green, and blue and put them onto a paper as the result would turn out wrong. The colors must be translated into CMYK which stands for Cyan, Magenta, Yellow and Black (the black color, K, is sometimes called the Key color). Cyan is a light blue green color, magenta is a bleak red color. Using and mixing the CMYK colors is very much like when you paint with water colors on a paper, mixing yellow and cyan for example will get you a green color.

When describing a pixel with CMYK colors every color has a percent number between 0% and 100%. This is to represent the amount of color you put on a paper (0% is nothing of that color and 100% is as much as possible of the color. If you have 0% of every color you get white and if you use 100% of every color you get an extremely deep black (this amount of color will usually get very bad printing result).

A pixel with CMYK takes 4 bytes of data.

Examples:

White: C=0%, M=0%, Y=0%, K=0%

Green: C=100%, M=0%, Y=100%, K=0%

Red: C=0%, M=100%, Y=100%, K=0%