Feb 12 2018
Points

Pixel element

Additive (light) vs. Subtractive (paint)

Additive and subtractive color combinations
RGB color model

From Wikipedia, the free encyclopedia

"RGB" redirects here. For other uses, see RGB (disambiguation).

The **RGB color model** is an additive color model in which red, green and blue light are added together in various ways to reproduce a broad array of colors. The name of the model comes from the initials of the three additive primary colors, red, green, and blue.

The main purpose of the RGB color model is for the sensing, representation and display of images in electronic systems, such as televisions and computers, though it has also been used in conventional photography. Before the electronic age, the RGB color model already had a solid theory behind it, based in human perception of colors.

RGB is a *device-dependent* color model: different devices detect or reproduce a given RGB value differently, since the color elements (such as phosphors or dyes) and their response to the individual R, G, and B levels vary from manufacturer to manufacturer, or even in the same device over time. Thus a RGB value does not define the same color across devices without some kind of color management.
Additive colors

To form a color with RGB, three light beams (one red, one green, and one blue) must be superimposed (for example by emission from a black screen or by reflection from a white screen). Each of the three beams is called a component of that color, and each of them can have an arbitrary intensity, from fully off to fully on, in the mixture.

The RGB color model is additive in the sense that the three light beams are added together, and their light spectra add, wavelength for wavelength, to make the final color's spectrum. This is essentially opposite to the subtractive color model that applies to paints, inks, dyes, and other substances whose color depends on reflecting the light under which we see them. Because of properties, these three colours create white, this is in stark contrast to physical colours, such as dyes which create black when mixed.

Zero intensity for each component gives the darkest color (no light, considered the black), and full intensity of each gives a white; the quality of this white depends on the nature of the primary light sources, but if they are properly balanced, the result is a neutral white matching the system's white point. When the intensities for all the components are the same, the result is a shade of gray, darker or lighter depending on the intensity. When the intensities are different, the result is a colorized hue, more or less saturated depending on the difference of the strongest and weakest of the intensities of the primary colors employed.

When one of the components has the strongest intensity, the color is a hue near this primary color (reddish, greenish or bluish), and when two components have the same strongest intensity, then the color is a hue of a secondary color (a shade of cyan, magenta or yellow). A secondary color is formed by the sum of two primary colors of equal intensity: cyan is green+blue, magenta is red+blue, and yellow is red+green. Every secondary color is the complement of one primary color; when a primary and its complementary secondary color are added together, the result is white: cyan complements red, magenta complements green, and yellow complements blue.

The RGB color model itself does not define what is meant by red, green and blue colorimetrically, and so the results of mixing them are not specified as absolute, but relative to the primary colors. When the exact chromaticities of the red, green, and blue primaries are defined, the color model then becomes an absolute color space, such as sRGB or Adobe RGB; see RGB color spaces for more details.
The **CMYK color model** (process color, four color) is a subtractive color model, used in color printing, and is also used to describe the printing process itself. CMYK refers to the four inks used in some color printing: cyan, magenta, yellow, and key (black). Although it varies by print house, press operator, press manufacturer, and press run, ink is typically applied in the order of the abbreviation.[citation needed]

The "K" in CMYK stands for key because in four-color printing, cyan, magenta, and yellow printing plates are carefully keyed, or aligned, with the key of the black key plate. Some sources suggest that the "K" in CMYK comes from the last letter in "black" and was chosen because B already means blue.[1][2] However, some people disagree with this because there is no blue in the primary CMYK colors; it's made with cyan and magenta. Some sources claim this explanation, although useful as a mnemonic, is incorrect, that K comes only from "Key" because black is often used as outline and printed first.[3]

The CMYK model works by partially or entirely masking colors on a lighter, usually white, background. The ink reduces the light that would otherwise be reflected. Such a model is called subtractive because inks "subtract" brightness from white.[citation needed]

In additive color models, such as RGB, white is the "additive" combination of all primary colored lights, while black is the absence of light. In the CMYK model, it is the opposite: white is the natural color of the paper or other background, while black results from a full combination of colored inks. To save cost on ink, and to produce deeper black tones, unsaturated and dark colors are produced by using black ink instead of the combination of cyan, magenta, and yellow.[citation needed]
Bit depth quantifies how many unique colors are available in an image's color palette in terms of the number of 0's and 1's, or "bits," which are used to specify each color. This does not mean that the image necessarily uses all of these colors, but that it can instead specify colors with that level of precision. For a grayscale image, the bit depth quantifies how many unique shades are available. Images with higher bit depths can encode more shades or colors since there are more combinations of 0's and 1's available.

https://www.cambridgeincolour.com/tutorials/bit-depth.htm
What is bit depth?

Bit depth refers to the color information stored in an image. The higher the bit depth of an image, the more colors it can store. The simplest image, a 1 bit image, can only show two colors, black and white. That is because the 1 bit can only store one of two values, 0 (white) and 1 (black). An 8 bit image can store 256 possible colors, while a 24 bit image can display over 16 million colors. As the bit depth increases, the file size of the image also increases because more color information has to be stored for each pixel in the image.

When you save (or export) an image as a GIF or a PNG, you can select the bit depth of the resulting file. With certain types of images that naturally have few colors such as logos or simple designs, you may be able to drastically reduce the size of the image file without degrading the quality of the image. With other images (especially those with gradients) reducing the number of colors in an image will severely degrade the image quality.

http://etc.usf.edu/techease/win/images/what-is-bit-depth/
The following table illustrates different image types in terms of bits (bit depth), total colors available, and common names.

<table>
<thead>
<tr>
<th>Bits Per Pixel</th>
<th>Number of Colors Available</th>
<th>Common Name(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>Monochrome</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>CGA</td>
</tr>
<tr>
<td>4</td>
<td>16</td>
<td>EGA</td>
</tr>
<tr>
<td>8</td>
<td>256</td>
<td>VGA</td>
</tr>
<tr>
<td>16</td>
<td>65536</td>
<td>XGA, High Color</td>
</tr>
<tr>
<td>24</td>
<td>16777216</td>
<td>SVGA, True Color</td>
</tr>
<tr>
<td>32</td>
<td>16777216 + Transparency</td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>281 Trillion</td>
<td></td>
</tr>
</tbody>
</table>
BIT DEPTH VISUALIZATION

By moving your mouse over any of the labels below, the image will be re-displayed using the chosen amount of colors. The difference between 24 bpp and 16 bpp is subtle, but will be clearly visible if you have your display set to true color or higher (24 or 32 bpp).
BIT DEPTH VISUALIZATION

By moving your mouse over any of the labels below, the image will be re-displayed using the chosen amount of colors. The difference between 24 bpp and 16 bpp is subtle, but will be clearly visible if you have your display set to true color or higher (24 or 32 bpp).

24 bpp | 16 bpp | 12 bpp | 10 bpp | 8 bpp

![Color Visualization Image]
Let's start something new.

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Tools

v marching ants

selection

additional tools

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Elliptical Marquee Tool
Single Row Marquee Tool
Single Column Marquee Tool