

Raster vs. Vector

CG102

Raster Graphics

Overview

- A raster graphic is an image made of hundreds (or thousands or millions) of tiny squares of color information, referred to as either pixels or dots. (*Technically* pixels refer to color blocks viewed on an electronic monitor where as dots refer to the ink dots on a printed piece.)
- The most common type of raster graphic is **photograph**.
- Popular raster file format extensions include: **jpg/jpeg, psd, png, tiff, bmp, and gif.**

Raster Graphics

Pros of Raster Images

- **Rich Detail:** Ever wondered what the term “dpi” stands for? It means “dots per inch,” a measurement of how much detailed color information a raster image contains. Say you’ve got a 1” x 1” square image at 300 dpi—that’s 300 individual squares of color that provide precise shading and detail in your photograph. The more dpi your image contains, the more subtle details will be noticeable.
- **Precise Editing:** All of those individual pixels of color information can also be modified, one by one. So if you’re a true perfectionist, the level of editing and customization available in a raster image is almost limitless.

Raster Graphics

Cons of Raster Images

- **Blurry When Enlarged:** The biggest downfall to raster images is that they become pixelated (aka grainy) when enlarged. Why is this? Well, there are a finite number of pixels in all raster images; when you enlarge a photo, the computer takes its best guess as to what specific colors should fill in the gaps. This interpolation of data causes the image to appear blurry since the computer has no way of knowing the exact shade of colors that should be inserted.
- **Large File Size:** Remember how a 1" x 1" square at 300 dpi will have 300 individual points of color information for the computer to remember? Well let's say you have an 18" x 24" photo— that's 129,600 bits of info for a computer to process which can quickly slow down even the faster machine.

Vector Graphics

Overview

- A vector graphic uses math to draw shapes using points, lines and curves. So whereas a raster image of a 1" x 1" square at 300 dpi will have 300 individual pieces of information, a vector image will only contain four points, one for each corner; the computer will use math to "connect the dots" and fill in all of the missing information.
- The most common types of vector graphics are fonts and logos.
- Popular vector file format extensions include: eps, ai, and pdf.

Vector Graphics

Pros of Vector Images

- **Infinitely Scalable:** Through the wonders of math, vector files can be scaled up or down as much as you want without losing any image quality. Whereas a raster image must guess the colors of missing pixels when sizing up, a vector image simply uses the original mathematic equation to create a consistent shape every time.
- **Smaller File Size:** Using our previous 1" x 1" square example, a vector file needs only four points of data to recreate a square versus 300 individual pixels for a raster image. For simple graphics, like geometric shapes or typography, this means a much smaller file size and faster processing speed.

Vector Graphics

Pros of Vector Images (continue)

- **Edibility:** Unlike popular raster-based formats, such as a jpg or png, vector files are not “flattened.” When you open them back up in a program such as Adobe Illustrator, all of the original shapes exist separately on different layers; this means you can modify individual elements without affecting other objects in the image.

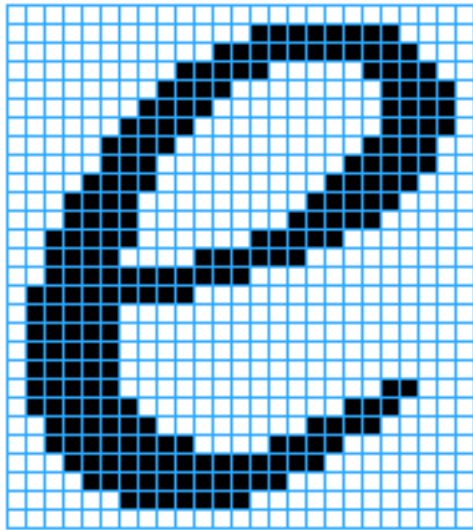
Vector Graphics

Cons of Vector Images

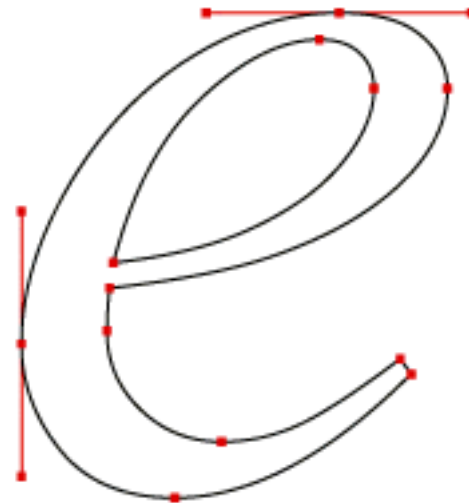
- **Limited Details:** Because of the mathematically way that a vector remembers data, they are not practical for complex images that require exact coloring. Sure, you can create basic color gradients, but you'll never be able to match the color detail available in a raster image where each individual pixel can be its own individual shade.
- **Limited Effects:** By definition, vector graphics are created from simple points and lines. This means they can't handle certain styling effects, like blurring or a drop shadow, that are available with raster images.

Raster vs. Vector

BITMAPMED (RASTER) GRAPHICS



VECTOR GRAPHICS



Raster = photographs = great color detail, but can't enlarge without becoming blurry.

Vector = fonts/logos = ability to enlarge without losing quality, but limited color detail.