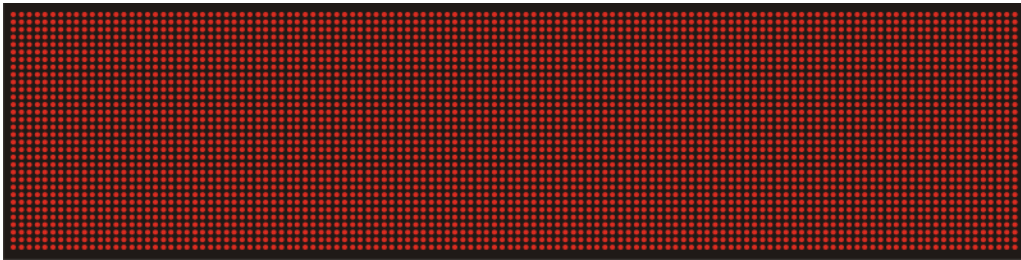


Optimizing Images and Video for an LED Display

LED displays are amazing pieces of technology. They are capable of showing text, images, animations and video visible from far away and under harsh outdoor conditions. Despite this, all LEDs have limits when it comes to the amount of detail they can display.

The reason for this limitation has to do with the number of *pixels*, or points of light, that make up the display. Each pixel is controlled as either on or off – and in some LED displays, each pixel can produce different levels of light output. The difference in light output is what creates a three dimensional image on the display itself. Text messages transmitted directly onto a sign are typically using pixels that are either on or off to make up each character in the message itself.

Pixels are arranged in rows that go across the length of the display, and columns that go up/down the height of the display. This forms the *pixel matrix*, typically written as HEIGHT by WIDTH. For example, a 32x128 pixel display is 32 pixels high and 128 pixels wide, for a total of 4096 pixels.



Example of a 32x128 pixel matrix

Commonly, only display height in pixels is used for comparison purposes. This is because the height is typically smaller than the width, and is therefore more of a deciding factor for display capabilities. LEDs are typically presented longer rather than taller so that the user has the option to include text messages from left to right on the display.

A typical LED display may be 8, 16, 24, 32, 40, 48 or 64 pixels in height. In comparison, standard TV signals are 525 pixels high, HDTV is up to 1080 pixels high, and a 5 mega-pixel image is 1920 pixels high.

Clearly, this amount of detail cannot be replicated on an LED display. So how does someone take their own image or video and make it look good on their sign? The answer is to find an optimal way to change its size to fit the display. When it comes to placing an image or video onto an LED display, there are three ways to make it fit:

- Resizing (shrinking the image or video to fit on the display)
- Cropping (selecting only a portion of the image or video to be displayed)
- A combination of the two

We will be using this example image that is currently 250 pixels high by 400 pixels wide. It is in color, but the following instructions also apply to red or amber displays. They also apply equally to video as well as images.



Resizing

The least desirable way to put an image or video on your display is to simply resize it. In essence, you are combining many pixels into one, resulting in a loss of detail. The larger the original image, the more pixels that need to be combined to fit onto the available LED matrix. Here is our example image (which is 250 pixels high by 400 pixels wide) resized for a 32x128 display matrix:



A closer look at this same image (imagine you are standing closer to the display):



You will notice two differences from the original image. The first is that the image is now *pixilated*, meaning that the individual pixels that make up the image are now visible. Pixilation is unavoidable on an LED display due to the limited number of pixels available. However the *gradation*, or difference in color between adjacent pixels, plays a large part in making the image look good. We will see this in the next example.

The second difference is that the *aspect ratio* of the image has changed, making the image look “stretched”. This is because the height had to be reduced almost twice as much as the width to make the original image fit into 32 by 128 pixels.

Cropping

A more acceptable way of fitting an image to a display is to crop it. This simply means selecting a 32x128 pixel area in our original image and removing the rest. Here is our example image cropped to 32x128:



A closer look:



The negative to this approach is that only a very small area of the original image could be used. However, you will notice that the image still maintains its original aspect ratio (it doesn't look "stretched" or "scrunched"), and that the smooth gradation makes the image look much better. Try viewing the large examples in this document at a distance to see the difference.

Resizing and Cropping

The best approach is to find a middle ground that gives us some of the benefits of both. This is done by resizing the image first (to something larger than the display and without changing the original aspect ratio) and then cropping, or by performing both simultaneously. Here is our example image that has been both resized and cropped:



A closer look:



Here we have resized the image to include more of the subject, but have also cropped to reduce the amount of detail. The result is an image that will look good on the display.

Choosing the Right Image or Video

While these tips can be used for any image or video, starting with the right one can make things much easier. Choose subjects that do not contain a lot of detail and have a smooth gradation of shades or color.



Good original image



Poor original image

Display Type Differences

Finally, the type of display impacts its physical size when comparing displays with the same number of pixels. A 32x96 Standard Definition can show the same amount of detail as a 32x96 Elite, the only difference being their physical dimensions. This is because the physical distance between the centers of the pixels for an Elite is 0.7", a Premier 0.9", and a Standard Definition 1.375".

Daystar Elite .7"

Daystar Premier .9"

Daystar Standard 1.375"



Elite 64 pixels high



Premier 48 pixels high



Standard 32 pixels high



Elite 48 pixels high



Premier 40 pixels high (Color Only)



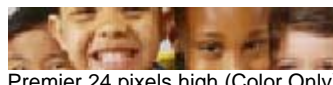
Standard 24 pixels high



Premier 32 pixels high



Elite 32 pixels high



Premier 24 pixels high (Color Only)



Standard 16 pixels high



Elite 16 pixels high



Premier 16 pixels high



Standard 8 pixels high

Again, the same *matrix* sizes of different types can display the same amount of detail. The same (or similar) *physical* sizes of different types can not. If you notice, the Elite 64, Premier 48 and Standard 32 are all roughly the same physical size in height. However, the Elite holds more detail than the Premier, which holds more detail than the Standard.

Also to note is that Standard Definition has four LEDs per pixel for red and amber, and seven for color. This makes the pixels for Standard Definition displays much larger and brighter than Elites and Premiers.

Creating Legible Text on Your LED

CONTRAST

Get the most contrast you can between the letters and the background. Use rich or primary bold colors with high contrast type. Light letters on a dark background usually read better than the opposite. For instance yellow letters on a black or dark blue background or white letters on a deep saturated color like purple, blue, red etc. are all good options. High color contrast is the key to good readability. See the chart below for some high contrast combinations.



TYPEFACE

Choose a typeface that is bold and easily legible from a distance. Typefaces with thin strokes or ornate letters are usually hard to read. Use a stroke around text to add contrast. To draw attention to your message use Appear Mode and Disappear Mode on your Complay display and use the Delay function to hold text messages longer and increase legibility. When it comes to text keep it clean, bold and large.

Hard to Read

Abcdefghijkl

Abcdefghijkl

Abcdefghijkl

Abcdefghijkl

Easy to Read

abcdefghijkl

abcdefghijkl

abcdefghijkl

abcdefghijkl

Text needs to be a minimum of 8 pixels high. If the matrix on your sign is, for example, 32 x 96, 32 is the number of vertical pixels you're working with and you should not use any message that has more than 4 lines of text. (4 lines of 8" high pixel text = 32 pixels) 2 lines of text with the 16 high pixel font on a 32 pixel high matrix will give you a bigger more readable message.