

Pixels and Megapixels

By Ann Brundige

With so many choices for graphics formats, resolution, display size, and print out size, it can be very confusing! These tips will hopefully make it a little easier to plan for getting the graphics into a project in IntelliPics Studio 3® or My Own Bookshelf®. Many of these considerations would apply to other applications as well.

Pixel Dimensions and Bit Depth

A pixel is one of the little teeny dots that make up a digital picture. Each one has some code attached to it, telling where it is to be displayed on the picture and what color it is. The amount of code per pixel goes up if the number of possible colors is higher, that is, if you are using a mode that allows for subtle color gradations. This is the Bit Depth, and typically digital cameras now are 32 bit depth. Add to that the larger number of pixels in a single photo (megapixels!) and you can see why the file sizes of digital photos are getting larger all the time.

So one way to imagine a digital picture as it comes from your camera is that it's a certain quantity of pixels. You could calculate the actual number of pixels by multiplying the number of pixels wide by the number of pixels high, but typically this is expressed as width times height. The megapixel rating for your camera is the largest total pixels you can have in one picture. However, often you can set the camera for a lower resolution or quality. Why does it call fewer pixels lower quality?

Fewer Pixels=Less Detail=Less Total Information

Essentially, fewer total pixels means less detail. Displayed at a fairly small size, a picture with 3 megapixels total might look much like one with 11 megapixels. But if you enlarge those two photos, very soon the 3 megapixel photo will begin to look grainy. You're beginning to see between the dots. Meanwhile, there are so many dots in the 11 megapixel picture that they cannot all be displayed, so it still looks smooth. No editing tricks can actually put in more information.

However, bigger is not necessarily better if you are using the photos in IPS3 or some other application. After all, you are not enlarging the photo greatly when you use it in a computer activity. Indeed, it is worth investigating how many pixels might actually be displayed in an activity page, because if only part of the total is displayed, you have a hidden bunch of code that is going to contribute to the file size without really adding to the activity.

Displayed Pixels vs. Pixels In The File

First of all, the typical monitor is displaying 72 dots (pixels) per inch. On my monitor, which is about 14 inches across, that means that only 1024 pixels will fit across it. I notice that the default IPS3 page and that for My Own Bookshelf® is only 11 inches across (not counting the border). This means only 800 pixels could be displayed across it. You might have your monitor set at a higher resolution, maybe 96 pixels per inch. In that case, 1344 pixels might fit across it. What happens if I change my resolution to 96 pixels per inch? Everything on the screen looks smaller, because now the pixels are closer together. The IPS3 page looks smaller, only a little over 8 inches across. That's still about 800 pixels across for the page. And that is indeed the default number of pixels across a page, as you can see under Settings.

More Pixels Than Can Be Displayed

What happens if you load in a picture that is much bigger in terms of pixel width? If you put in a background picture that had the pixel dimensions of 1600X1200, it would still just fill the page. IPS3 and MOB must be using some algorithm to show only half of those pixels. However, you will be charged the full price in terms of file size.

Using your Megapixels Wisely

So what do you do with all those pixels? It depends in part on what you intend for the picture within the activity. If you were using it in an IntelliMation where part of the effect was to enlarge the picture, to give the illusion of moving into it, then having the pixel width wider than can be displayed might make sense. Otherwise, when you enlarge the picture it might look grainy. Still, you do not need much more than 1024 pixels across even if you are enlarging the photo dynamically within the activity.

There are several ways to use a camera that takes pictures with wider pixel dimensions. You could in some cases simply set the camera for a lower resolution. Then you could take more pictures before filling up your camera card. You could also leave the setting at higher resolution, and take pictures at a distance, knowing you will be able to crop out the subject area and display that subject close up in the activity. That is, you could crop out an area only, say, an eighth of the total area of a large megapixel picture, and that might still be a full screen wide for an activity. If you have a high megapixel camera, this may allow you to get some good detail on distant or small subjects, such as a bird in a tree. It's a good idea to do this cropping in PhotoShop or the

editing software that came with your camera, and then save a cropped *COPY* to use in IPS3. Remember that **using Make Smaller within IPS3 or the Scale function in MOB does not reduce the file size**, because it is not actually discarding any of those pixels.

One final word about graphic formats...

You have probably heard that JPEG compression is a "lossy" compression. This does not mean JPEGs are bad. It means that you do NOT want to repeatedly open, change, and resave in JPEG format. However, JPEG is a very compact format, especially if you choose the lower quality/smaller file size. This is particularly good for putting pictures onto the web, and that is why you often find that pictures from the web will not enlarge very well. They already are pared down to the minimum number of pixels.

One good strategy is to keep your original, save an edited copy in some other format, and save a JPEG to use where small file size is the main criterion. Formats that do not erode upon repeated saves include .psd (PhotoShop), .bmp (Bit-mapped, common on Windows), .pct (Pict, a Mac format which IPS3 can load) and .tif (TIFF, a good format for something to be printed.)

Keeping File Size Small

I have done a comparison of various formats in IPS3. My results may be out of date after future updates, so you might want to do such a test if you are planning a big project. I tested many formats by first saving the same photo in each format. Then for each format I made a new IPS3 document, put in the photo, and then duplicated the page repeatedly until I had 10 pages. I saved those and compared the file sizes. Oddly, using JPEGs did not give the smallest size. Others came out much smaller. It seemed as if the JPEGs decompressed within the page. Actually, .pct files

turned out to yield the smallest file, while .bmp was also better than JPEG. I have heard that better handling for JPEGs is a goal of the next update, so it may be worth repeating these tests.

In a similar set of experiments with My Own Bookshelf, the smallest file resulted from using .bmp with 16 bit color. JPEGs definitely ballooned in size. Again, this may change in future updates, so you might want to check this after an update.

One other tip: Loading a full page graphic as a background in IPS3 takes a little less file size than inserting that same graphic so that it is floating on the page.