

# Zooming digital images explained

*This article explains briefly how the Inzomia technology works and provides information about how to optimize your images for best result.*

## Getting started

So you already have a site optimized for the web. You have already used Zoom Studio (available for download at <http://www.inzomia.com/download>) to create a new gallery with your original images and everything is neat... except when you take one of your images to fullscreen mode or zoom the images, the image quality is really lousy. What can you do? This article gives a few tips of things to think about when going from static sized images to zoomable images.

## Perceiving scaled images

When an image is displayed at its original size, 100%, every pixel in the image file is shown as a pixel on the screen. What happens when we zoom the image in and or out?

As an example, imagine a single pixel line and a two pixels high image, where one line is black and the other is white.



When we zoom out on the image, some of the pixels in the original image will not end up on the screen. Therefore, the zoom software has to decide how to squeeze in the pixels. If the program, like Inzomia, filters the image, new pixels are calculated from the original image.

When we zoom the image to 50% of its original size we have to decide how to display it. If we take the simple way out and skip one of the pixels we get either a black line or a white line, probably not what we want. A better way is to calculate the new pixels based on the pixels in the original image and display, in our case, a gray pixel instead.



When we zoom into the image we have the opposite problem. If we zoom the image to 150% of its original size we need to display our two-pixel line image over three screen scan lines. If we simply duplicate one of the image lines we get either, two black lines and one white line or two white lines and one black line. A better solution is to add new pixels based on the original pixels. We add, in our case, a gray line between the black and white lines and as a result we get a smooth transition from black to white. When you look at an image with Inzomia the above calculations are done on the whole image in real-time.



## Scaled images

The images on your web page are probably optimized for web display and look good on your old pages, but once you zoom, the image artifacts become apparent. Typically you will be able to scale images to about twice their original size and they will look okay, but as you zoom more almost every image will start looking bad. Imagine a 100 by 100 pixel image that is displayed in a typical desktop Fullscreen mode (1024x760). Your image is scaled more than 7 times to fit the display. What we want is to have the images zoomed out from the start. What you need to do from the beginning is to determine how much you want to be able to zoom in your image and create your images based on this. Say you want to be able to zoom an image to 4 times its original size and you want it displayed in a 100 by 100 pixel window. To get the original pixels when the image is at max zoom you need an image with the size 400x400 pixels and set the start zoom to 25% (actually Inzomia will calculate the start zoom automatically to fit the image inside the window so it is really nothing you have to think about). If the image is okay when scaled two times its original size we only need an original image at 200x200 pixels. A good rule of thumb is that the larger window you display your images in, the higher resolution you need for your original images.

## Recompression

When you recompress your images you should always do it from the original uncompressed images. A far too common mistake is to take large web images, scale them in Photoshop and then compress them as high quality jpegs. First of all if you use compressed jpeg images as source images you will ALWAYS lose quality. Every time a jpeg image is compressed it loses quality that can never be restored. If you compress a jpeg image two times you lose quality two times.

Another common mistake is to scale directly or indirectly to get a higher resolution image. When an image is scaled, for example in Photoshop, the program has to do the same thing as Inzomia does and the only thing you gain is a larger image file in kb. Note that changing the DPI of the image is the same as scaling it indirectly, more on DPI and images later on.

## Digital cameras

Most modern digital cameras can output images in jpeg format. When working with digital camera images the best thing is to have the camera store the images in an uncompressed format. If uncompressed mode isn't possible or practical with your camera, always use the highest quality jpeg settings. When taking high quality Jpeg photos with modern cameras there is practically no quality loss, although jpeg compression can never be done without a loss of quality. Another 'feature' you should avoid in digital cameras is the digital zoom. A digital zoom does the same thing as the scale function in a paint program. If you want to scale an image it is much better to do it after the image has been shot. If you are looking to buy a digital camera, look for one with optical zoom.

## Alternative representation

Inzomia supports the use of an alternative representation for people without the Inzomia plug-in. If you already have web prepared images, use them for the alternative representation

## DPI

There seems to be much confusion about DPI (Dots Per Inch) and digital images. The simple truth is that DPI has nothing to do with images when they are displayed on screen. DPI is only a relevant measurement when you output your images to print. Images displayed on the monitor are said to be in 72 DPI, but if you really think about it you realize it is not true. Compare the same image displayed at 640x480 on a 14" monitor and a 21" monitor. Obviously the 14" monitor has to output more pixels per area than the 21" monitor, still, they display the same image that is 72 DPI. When you work with Photoshop to create web images, never change the DPI settings, the only thing it does is to scale your images. The one thing relevant is the width and height of the image in pixels.

## Setting the max and min zoom

Inzomia has a default maximum zoom of 1000% and a minimum zoom of 0.1%. Depending on your images you probably want to change this.

In Zoom Studio 2 open the preferences dialog and select the Inzomia tab and change the zoom limits. If you don't have very large images you probably want to increase the min zoom, there is no point in zooming out the image to one pixel. Depending on the quality of your images you should also set the max zoom, as a rule of thumb 300% is a good value.

## LuraWave

LuraWave images are perfectly suited for zooming. If they are stored in embedded mode, Inzomia will stream the image. With LuraWave embedded compressed images, it becomes practical to serve high-resolution images even to modem users.

Wavelet compression doesn't exhibit the usual jpeg compression artifacts. If your original image is a compressed jpeg image you will get the artifacts of both the jpeg compression and the wavelet compression. Before a jpeg image is compressed by Smart Compress, it will be decompressed and you will gain nothing from the original jpeg compression. Smart Compress is capable of compressing images better than jpeg, but always feed it high quality images.

Lurawave images can be compressed as either loss-less or lossy images. Compare the lossy mode with the jpeg compression and the loss-less mode with gif images. I recommend you use the lossy compression and output images of above 100 kb in size. Experiment to get the best result for your images.

## Conclusion

Adding zoomable images to a web site can really enhance the user experience but take the time needed to prepare your images to get the best possible result. Zoom Studio 2 is available for download from [www.inzomia.com/download](http://www.inzomia.com/download), the installation also includes Smart Compress 3.

Fredrik Lönn – Inzomia AB