

Manual for Zoom Engine



Features:



Zoom Engine is a Photoshop-compatible plugin for enlarging images. Easy to use and with a great versatility, it is able to handle a wide range of images, while offering results higher than common or even specialized tools. With *Zoom Engine* you have access to a set of effective enlargement methods, including an unique and intelligent method, called CZ2, for achieving enlargements that look crisp and detailed, and that even starting from very small images or of poor quality!

Upgrade: *Zoom Engine* is the successor of the plugin *Quick Enlarger*. Major modifications have been brought to this one:

- A better interpolation method: Crispy Zoom Version 2 (CZ2).
- A handier interface. Controls are more responsive (especially preview).
- Customizable bicubic method!
- Performance improvements (sinc, bicubic and CZ1); requires less RAM.

Zoom Engine has the following features:

- Get high quality enlargements with last method CZ2.
- "Windowed sinc" methods (Blackman and Lanczos) with the Kernel radius you wish.
- Customizable bicubic method!
- Can be used for batch processing.
- Support 16bits mode.
- Has preview, so that you can compare results.
- Great ease of use

Compatibility:

This plugin should work with *almost any retouching software* that supports Photoshop plugins and *that allows to increase canvas size of your picture*. However, avoid old versions or old software. A particular note for *Paint Shop Pro* users: do not use a version below 7.

Benefits of registration:

- Remove the thick black diagonal that the plugin draws.
- Remove the message: "Demo!"
- Your financial participation will encourage the author in his efforts to realize other plugins, updates ...



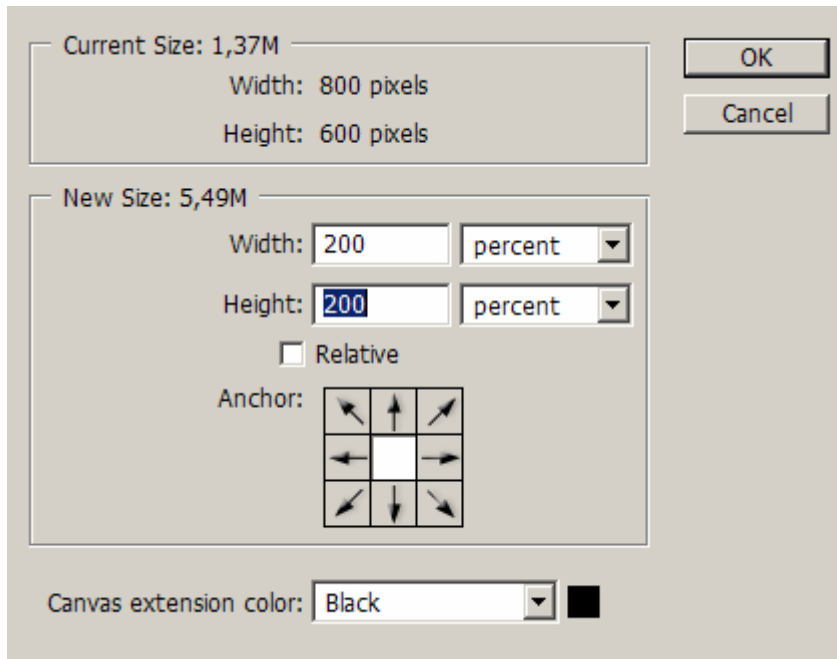
Get rid of the black lines by registering!

How it works:

Before using *Zoom Engine* you have to start your preferred image editing application and open an image or photo. Please note that this plugin supports only **RGB mode, with 8 bit or 16 bit per channel**. For instance, if your image has only 256 colors (case of gif), you must convert it in a mode that this plugin supports.

Usually you proceed in two steps:

First step: increase the canvas of your picture to the new size you wish.



On the left, the dialog box to modify the size of the canvas which appears in Photoshop. This one does not allow locking of the aspect ratio. Also it is easier to work with percentages. Here we modified the width and height of the image in order to double its size.



Remarks:

- All the plugin needs to be able to work is a free area (a zone with a sole colour) which is next or surrounds the part (or selection) you wish to enlarge. The size of this free area zone determines the size of the final image. This works also when the free area is transparent.

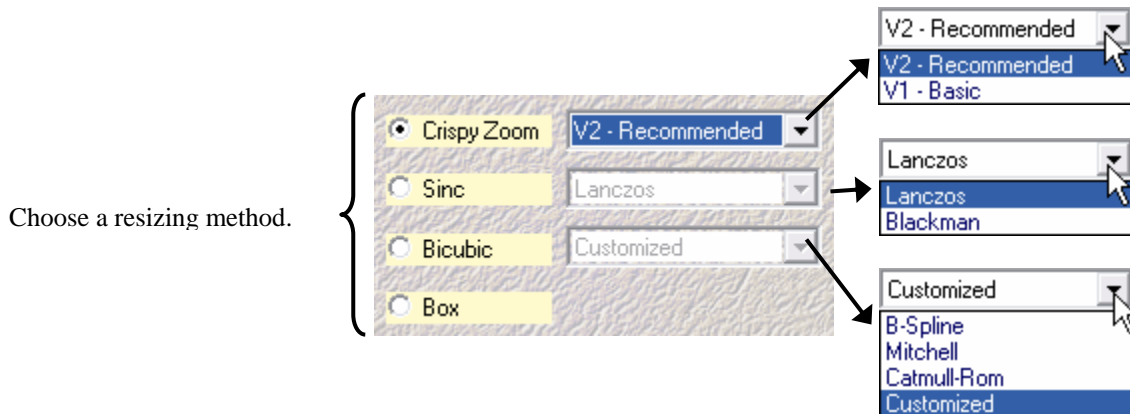


- The plugin works also with nonrectangular selections; but you must take precautions. See for that: section "Detection speed of selection".



Warning! If you convert your picture in a new mode (for instance: cmyk → rgb), do it before increasing the canvas. A problem arises if you do it afterwards: Photoshop carries out dithering of colors (just like for gifs, but imperceptible) and thus your "free area" will be in fact made up of several colors. Consequence: the plugin will be probably unable to detect the selection.

Second step: open the menu that leads to the plugin filters and choose *Zoom Engine* from the "Mehdi 2" sub menu. Wait a short time before the followings option appears:



Choose a resizing method. Other contextual option appears below.

➔ **Crispy Zoom 1 and 2:** (CZ1 et CZ2) Crispy Zoom methods analyze images and preserve sharpness of edges even for big scaling factors. However method CZ2 is more advantageous, because its more sophisticated algorithm ensures much better results.



Image Test

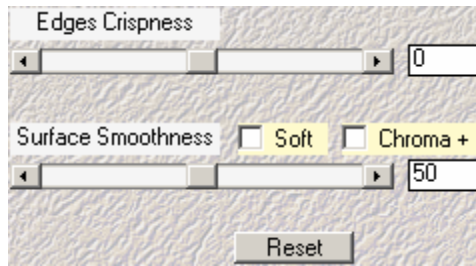


Agrandis 4x avec la méthode CZ1



Agrandis 4x avec la méthode CZ2

Here's the contextual menu related to CZ methods:

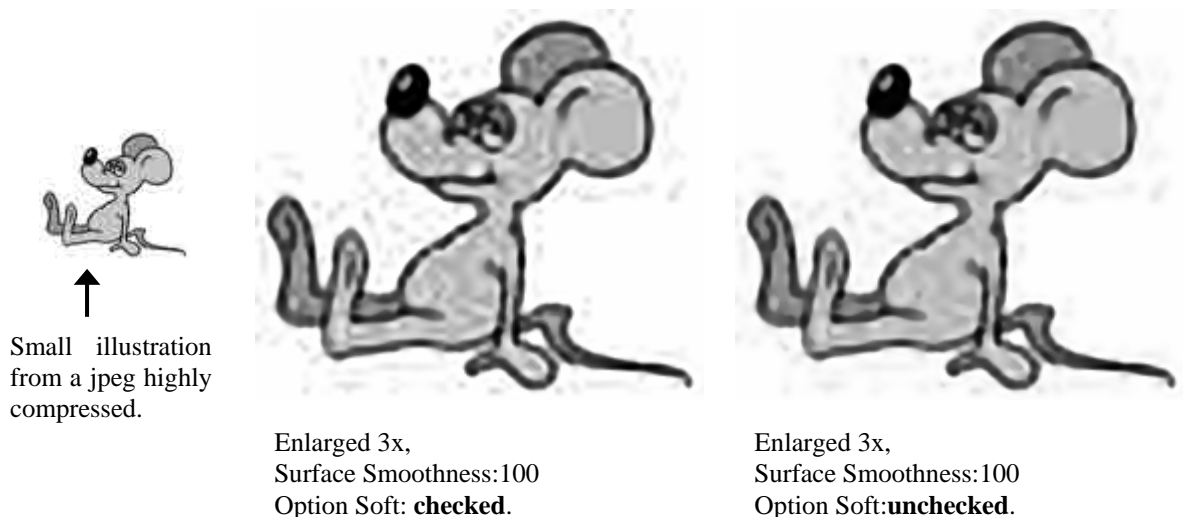


Now, here's the description of main controls:

- **Edges Crispness:** The more you increase this parameter and the clearer are the limits defined by contours. Exaggerating this parameter leads to an unwanted aliasing effect. Sometimes, edges are too sharp, and this gives the feeling that the result is not natural; you can decrease the parameter in this case.
- **Surface Smoothness:** Unlike edges, surfaces present smooth transitions. In order to preserve the smoothness of these transitions, and thus to reach a more natural result, you should give a minimal value to this parameter. You may need to decrease this parameter for images presenting a weak contrast.
- **Reset:** restore default values of controls. These values give a satisfactory result for the majority of images.

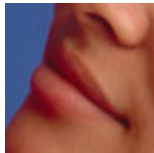
CZ2 method presents also two particular options, both influencing the parameter “Surface Smoothness”:

- **Soft:** Tends to slightly blur surfaces. This can help to eliminate noise or Jpeg compression artifacts. This option should be systematically checked for illustrations, or cartoon-like pictures... However, for photos, this option should be checked only for images of poor quality, because it tends to eliminate least pronounced details.



- **Chroma+:** For edges weakly pronounced, and when the "surface smoothness" setting is sufficiently low, you may observe a small improvement of the result when this option is checked. This option affects only the chrominance, and most of the time your eyes will be unable to notice a difference. **Because this option can increase significantly the computing time, it is advised to uncheck it.**

Here's an example where we can observe a "small" improvement:



Test Image



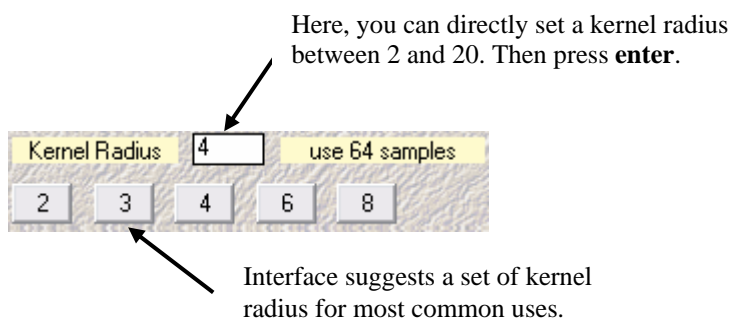
Enlarged 3x,
Surface Smoothness: 30
Option Chroma+: **unchecked.**



Enlarged 3x,
Surface Smoothness: 30
Option Chroma+: **checked.**

➔ **"Windowed sinc" methods:** According to the Fourier theory, the sinc function is ideal for the reconstruction of a signal from several of its samples. Numerous interpolation methods derive from this function, according to the "window" applied to this one. You can set size of this window or kernel. But interpolation speed decrease proportionally to the kernel radius.

Here's the contextual menu related to "windowed sinc" methods:



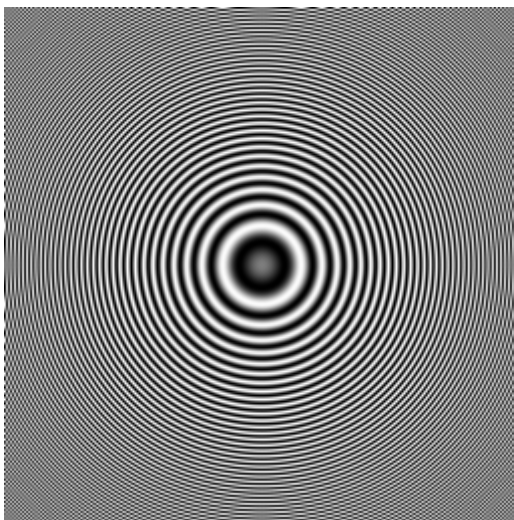
Two type of “window” are proposed:

- 1- **Lanczos**: The most popular method. Best for the reconstruction of fine details. However an annoying ringing effect may sometimes appears.
- 2- **Blackman**: It has a less pronounced ringing effect than Lanczos.



Remarks:

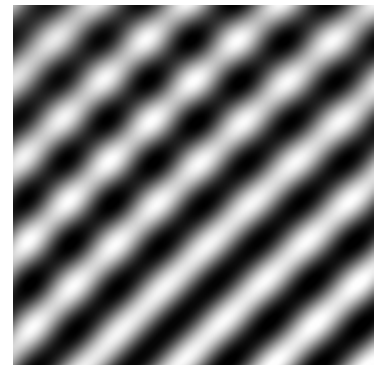
- If you compare "windowed sinc" methods, with bicubic methods, you will observe the most interesting differences when starting from a radius of 3.
- Increasing kernel radius allows to "reconstruct" finer details.
- The image “zoneplate.png” (provided with the plugin), is interesting because it covers all representable frequencies: the more you move away from the center and finer are details.



Test Image: "zone plate"



Enlarged 20x,
Kernel Radius: 4



Enlarged 20x,
Kernel Radius:8



Warning! Thinking that increasing the size of the kernel is enough to get the best results is just an error! Indeed, the more you increase the kernel radius, and the more the ringing effect *is likely* to be pronounced. See the example below:



Original Image

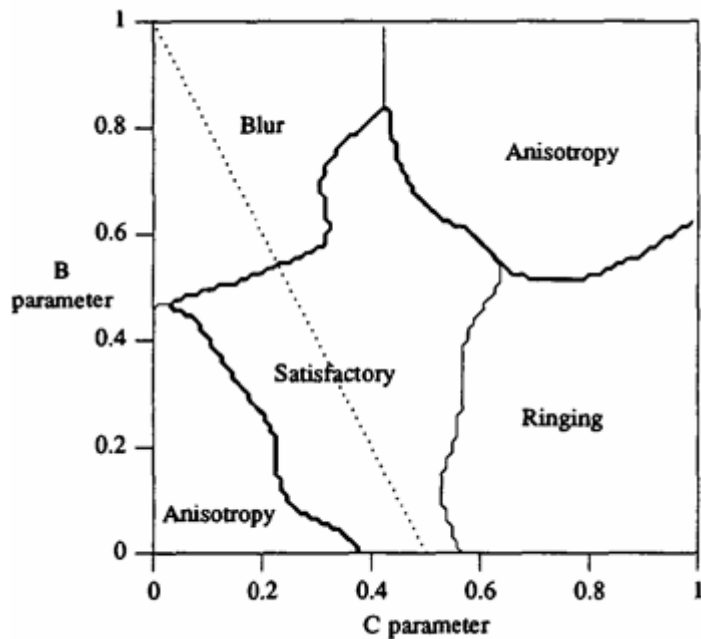


Image enlarged with Lanczos,
kernel radius: 3



Image enlarged with Lanczos,
kernel radius: 50
Did you notice the ringing
effect surrounding the flower?

➔ **Bicubic methods:** The piecewise bicubic interpolation can be controlled with two parameters B and C. According to a famous publication (*Reconstruction Filters in Computer Graphics* by Don P. Mitchell and Arun N. Netravali), a subjective test carried out by 9 experts and more than 500 samples has led to the following graph:



From a numerical point of view, reconstruction of a signal from its samples reaches a maximal precision on the dotted line.

Zoom Engine lets you interact with this graph and customize the bicubic method:

You can set directly values of B and C. Press each times enter.

Click on the graph to customize bicubic method. Option "Customized" is then automatically selected.

You can also choose "standard" presets for bicubic method.

Three variations (or presets) of the bicubic interpolation are proposed:

- 1- **B-Spline**: tends to blur slightly the result. This interpolation is however interesting because it removes efficiently aliasing (jaggies). Thus edges stay perfectly smooth, even when you perform a very big enlargement. Moreover this interpolation is completely without any "ringing effect".
- 2- **Catmull-Rom**: gives sharp results. However experts' eyes may notice some ringing.
- 3- **Mitchell**: previous methods (B-Spline and Catmull-Rom) have both quality and defects. The Mitchell interpolation is commonly presented like the best compromise between these two interpolations.



Original Image

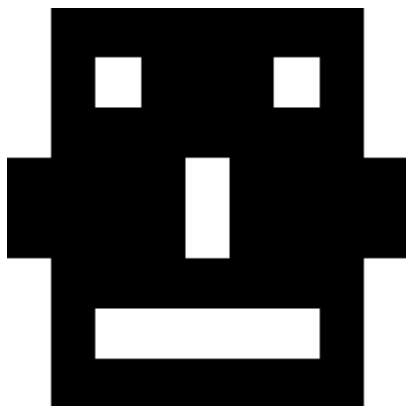


B-Spline interpolation
Contours of the petals remain smooth but many details are lost.



Catmull-Rom. interpolation
Image is sharp, but we observe jaggies on the petals.

➔ **Box method**: Means no interpolation. This one was added to the plugin in order to easily carry out a comparison. There is a particular case where this method proves to be useful; it is when we have a figure made of blocks and that we want to preserve this aspect after enlarging. See example below:



Enlarged **without** interpolation.



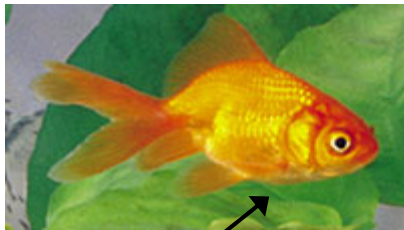
Enlarged **with** interpolation.

Detection speed of selection:

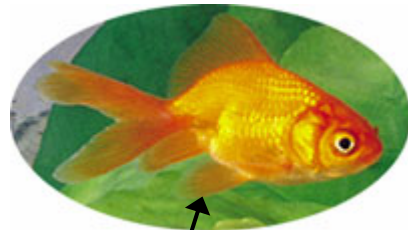
Before performing an enlargement, the plugin *Zoom Engine* must be able to detect the boundaries of your selection. If size of the canvas is big (more than 4000x4000), this detection may take a while. Fortunately *Zoom Engine* offers a hidden parameter to increase the speed of this detection.

Obviously some constraints must be respected, when using this parameter. Two cases arise:

- **shape of the selection is rectangular** (normal case): then the value of the speed parameter should not, nor exceed the height or the width (in pixel) of the selection. A value of 30 should be appropriate for a general use (any selection bigger than 30x30 pixels)
- **shape of the selection is not rectangular** (particular case): only one possible value for the speed parameter, the lowest i.e. 1 (If not the result is likely to be truncated)

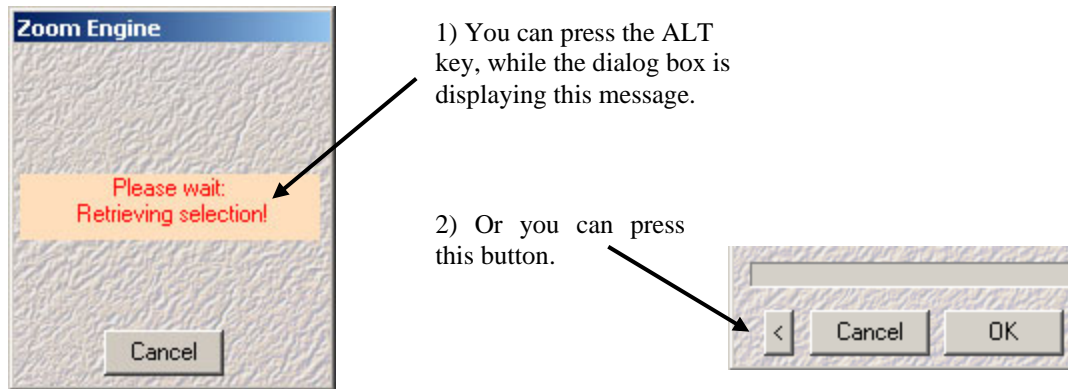


Size of the selection is 200x113.
So the *highest* speed that could be used
to detect this selection is 113.

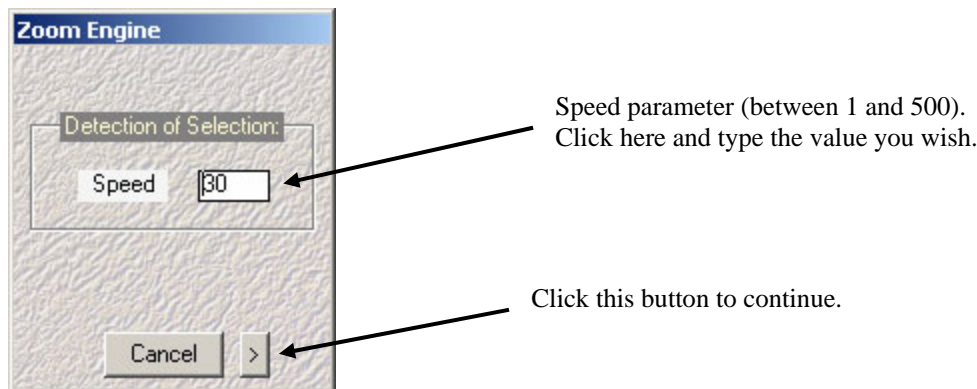


Selection is not rectangular. So only one
possible value for the speed parameter: 1

To reach this parameter there is two ways:



Then you get this menu:



Working with Cloak Mode:

Two reasons can push you to work without dialog (i.e. cloak mode):

- You are particularly satisfied by the current parameters and you just wish to forget the dialog box.
- You wish to enlarge many pictures and to perform batch processing.

➔ **Activating Cloak Mode:** To activate Cloak Mode please hold down the CTRL key and click on the Cancel button.


➔ **Restoring dialog box:** To do that hold down the Shift key when selecting *Zoom Engine* from the filter menu in your image application. Keep the Shift button pressed until you see the dialog box again.

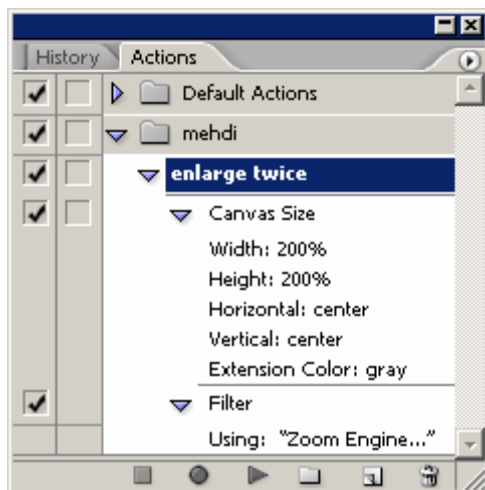


Remark: all the parameters of the plugin are automatically saved (including the cloak mode) and will be restored next time you launch your host application.

➔ **Batch Processing with Cloak Mode:** you must first record an action, which contains the two necessary steps to use this plugin: 1) increasing the canvas size and 2) launching the plugin.

Batch processing is a feature supported by Photoshop and Paint Shop Pro 8 or higher. For further details on this feature, please consult the online help of your retouching software.

 **Warning!** Behavior of the action will not be the same whether canvas size is increased with percentages (example: 200% for the height and the width) or that you define a precise size (example: 800x600 pixels).




At the left, the action palette of Photoshop. Here an action to enlarge two times your images.

Memory usage:

Memory requirements depends essentially on the size of you selection because this one is saved in memory. However you can increase your selection to practically any size.

If your selection is particularly large (at least 3000x3000 pixels), it might be necessary to release some memory for *Zoom Engine*. For this, here are some advices:

- If possible, open only one image at the same time.
- Limit the number of layers.
- Use the **Edit / Purge** command under Photoshop.

 **Warning!** The plugin doesn't work the same way when you use the CTRL+F command under Photoshop (to reapply a filter). Indeed, if you use this command, the plugin will **require much more memory**.

Comparisons:

Now we'll perform some comparisons using the following test image:



➔ **Enlarged 8x with Photoshop (bicubic normal)**



→ Enlarged 8x with CZ2 method



For more exhaustive comparisons with well-known software
take a look at my website:

www.mehdiplugins.com