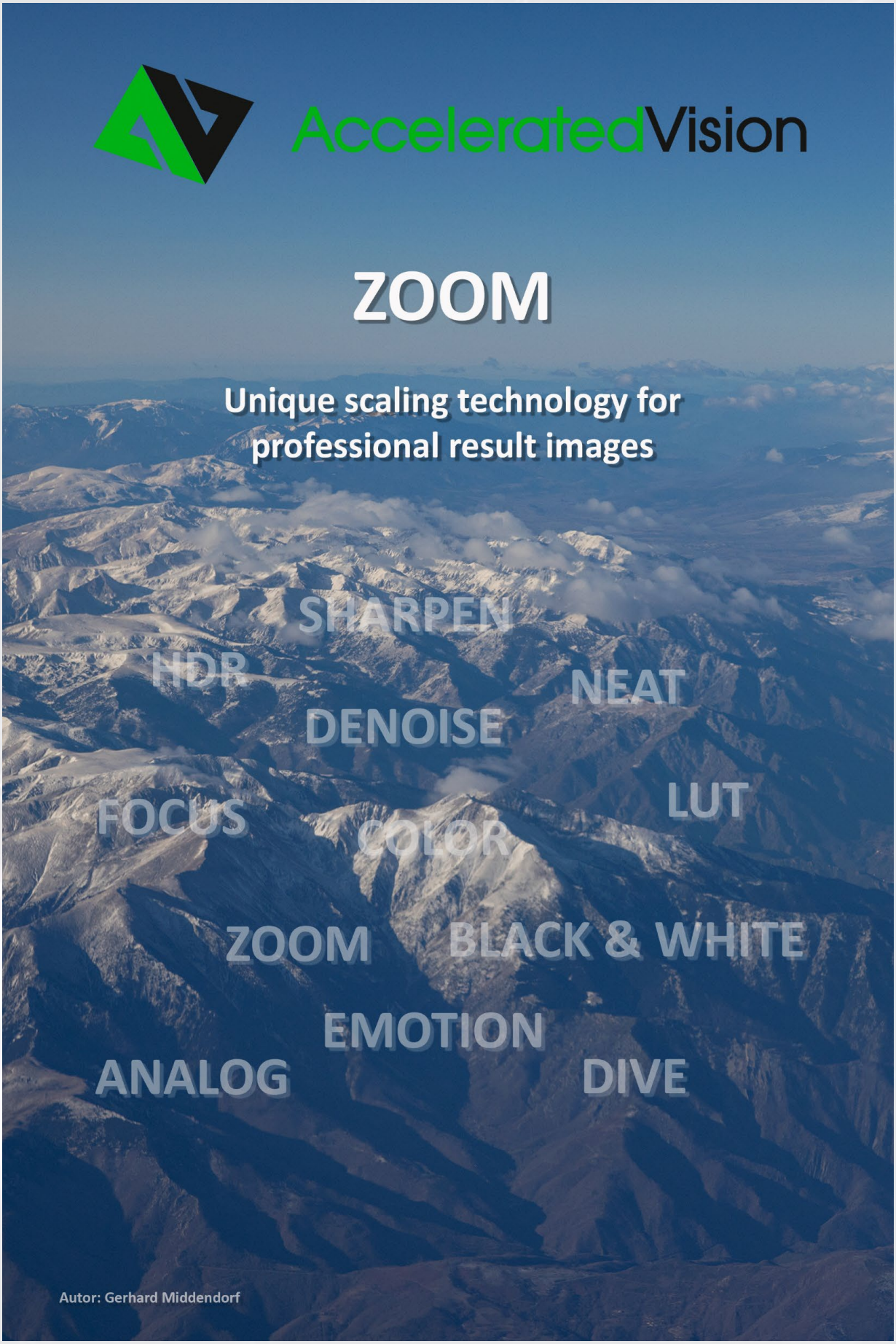

AcceleratedVision
ZOOM
Unique scaling technology for professional result images
SHARPEN
HDR
NEAT
DENOISE
FOCUS
COLOR
LUT
ZOOM
BLACK & WHITE
EMOTION
ANALOG
DIVE
Autor: Gerhard Middendorf

Guide to the special functions of the programmes

ZOOM

ZOOM is a solution for a wide range of applications: Project close-ups onto the wall, enlarge images for exhibitions, optimise the quality of scanned documents or enlarge an image section - **ZOOM** offers the right setting for every scaling task.

With **ZOOM**, you can scale photos in the **Super-Resolution-area**, in which all scaling offers are summarised, to 8 times the image width and height if required using a unique technology and obtain high-quality, professional result images with the integrated blur correction.

Unique means that ZOOM uses non-generative AI methods, but with mathematical processes based on deep learning, neural networks, and that the **learning relates exclusively to the loaded original image and not to other, external comparison images**.

What does this mean? In simple terms, many scaling programmes select image parts of an image file one after the other and then replace them with new image parts. These can be parts of circles, lines, ‘puzzle pieces’ of bodies, animals or any objects/subjects. This ‘creative’ scaling with comparable, ‘learnt’ image parts does not exclude the addition of elements that are not part of the original and results in a “new” original" with corresponding copyright problems because, for example, the rights to the training images remain unclear.

In ZOOM the original always remains untouched, the copyright of the resulting image remain exclusively with the user, which the programmer of this and the other programmes from Accelerated Vision, Mr Piepgras, attaches great importance to.

This programme performs a mathematically precise scaling using only image elements that are present in the image, which are virtually ‘disassembled’ and reassembled in an enlarged form, and the respective training image is always the original file with the exception described in the corresponding chapter (**Training images**) that you would like to load further training images yourself in order to improve the result even further. The process that describes this very high-quality and complex scaling with pattern recognition and ‘assembly’ of the puzzle pieces from the image bears the very technical title **Super Symmetric Smart Patches** (SSSP).

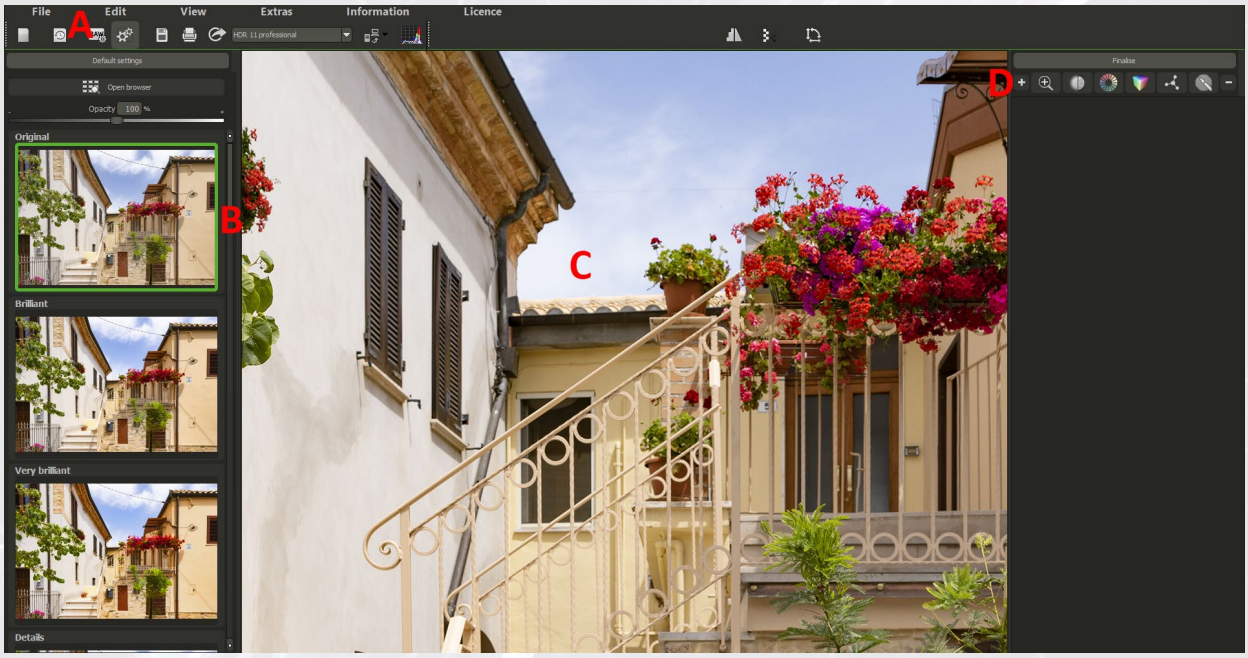
Two additional technologies for contour smoothing, **Super sampling** and **Gamma aliasing**, provide you with further optimisation options.

Note: The cross-programme functions or modules such as the RAW module or all other modules offered, which can be displayed via the toolbar, can be found in the corresponding guides.

Table of contents

1. Workspace with special presets

If you are the owner of another Accelerated-Vision programme, you do not need to change. The arrangement and use of the menus, tools and modules offered in the toolbar or the RAW module is identical, requires no familiarisation and is described in detail in the General functions guide.
Selected special features are described below.

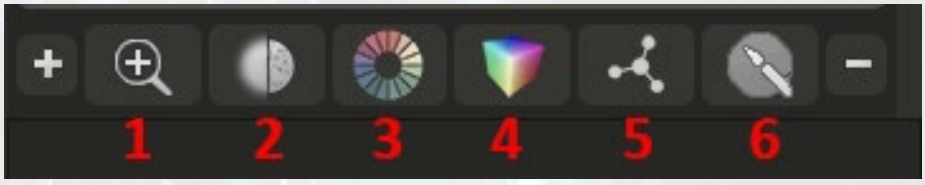


The ZOOM workspace is divided into four main areas:

A: **Menu and toolbars.**

B: **Presets and browser, which shows an overview of all presets.**

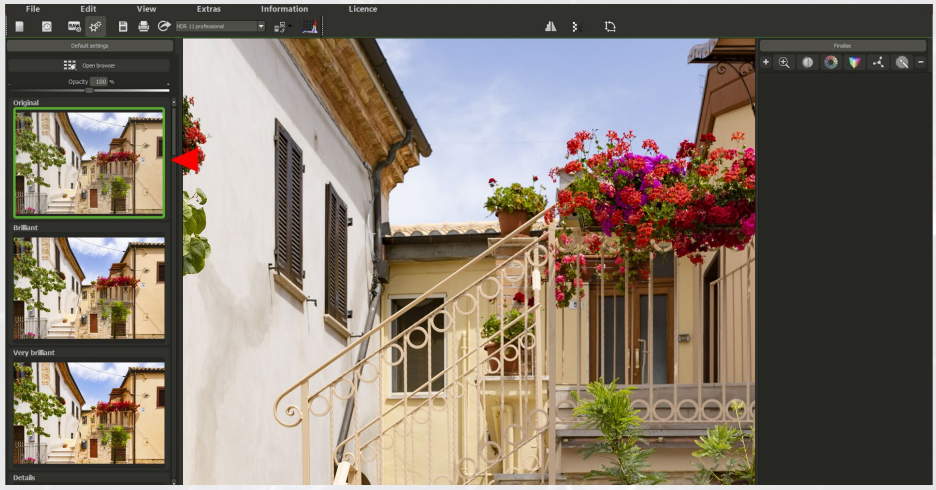
C: **Image area.**



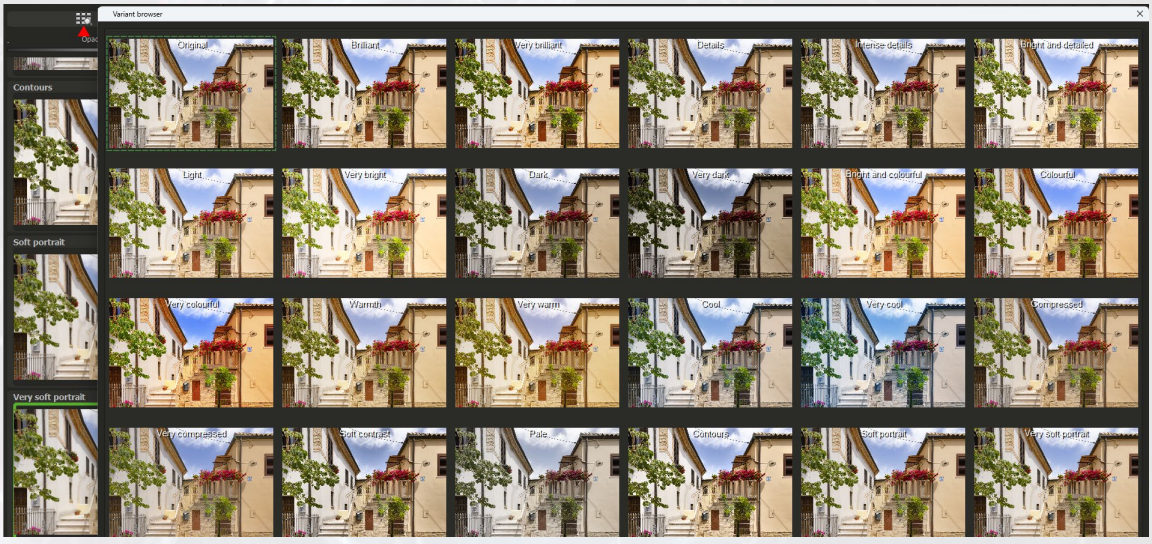
D: **Toolbar in Finalise mode** with the selectable modules
- **Super Resolution Area** (1).
- **Virtual Micro Details** (2).
- **Colour Module** (3).
- **LUT Module** (4).
- **AI Filter Area** (5).
- **Sensor Error Correction** (6).

Note: The user interface is designed for **4K screens**. On these screens, all modules are typically visible in the super-resolution area. On **Full HD screens**, you have to scroll down a little to see all modules and options.

Selected special features :



Presets: The presets are not presets that offer different magnification or ZOOM variations.
If required, you can select image looks that are perhaps better suited to the selected subject before they are scaled.
The unprocessed **original** is preset.



Browser: Click on the browser icon to display all available presets in the **variant browser** and double-click on a thumbnail to call them up directly.

Green save button

The **green save button**, which cannot be overlooked in many programmes, is only displayed in **ZOOM** in the comparison view (graphic on the right) after you have triggered the calculation of a selected zoom size by clicking on **Calculate zoom** (graphic on the left).

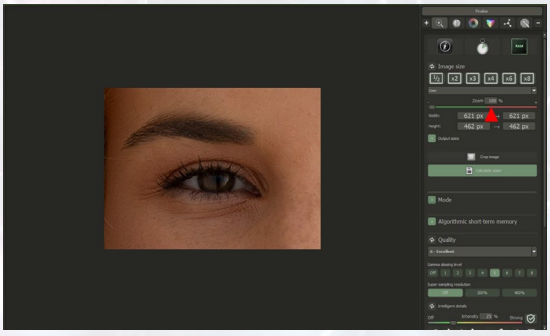
Expert mode: In **ZOOM** there is only the **Finalise mode**.

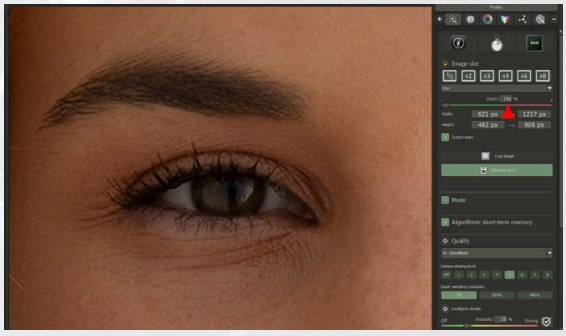
Image view 100%

In contrast to other programmes, after loading an image file you will not see the **entire image** fitted into the view, but always the **100% view**. This usually means an enlarged image section as in the example.

In the **Super Resolution area** that appears (see next chapter), the zoom slider is therefore always set to **100%** at the start.
If you scroll down in the image example with the mouse wheel or **double-click faster into the image**, the entire image would be displayed at **39%**.

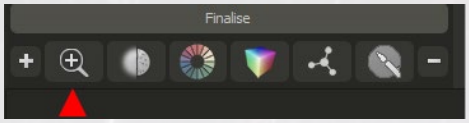
The 100% view and the adjusted full image view naturally depend on the original image size in pixels, in the example 3,543 x 2,362 pixels.
For a RAW file with 5,563 x 8,191 pixels, you would only see the entire adjusted image view at **11%**.





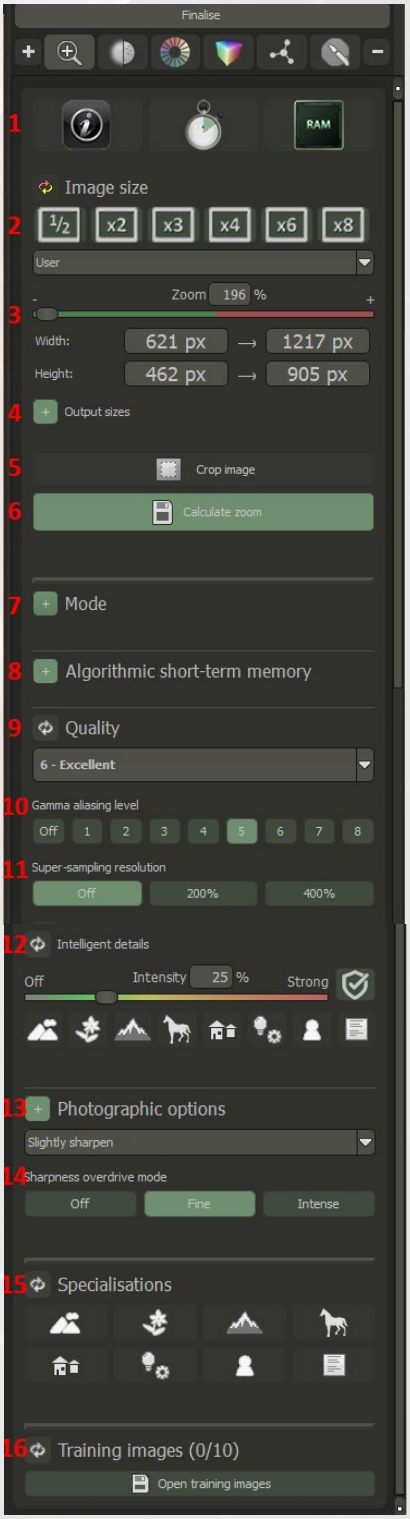
In the case of **small image files**, e.g. image sections as in the example with 621 x 421 pixels or old scanned images, double-clicking on this image section would show the image fully framed at **196% zoom** (graphic on the right).

2. Super Resolution-Bereich – Übersicht



Click on the button with the **magnifying glass** symbol to display the 'heart' of the programme, the extensive **Super Resolution area** with all the modules and options described in the following chapters:

1. **Workflow suggestions, calculation time estimation, monitoring.**
2. **Zoom settings automatic, manual**.
3. **Zoom control, with which a value for the magnification of the resolution is set**.
4. **Output sizes in selectable units, e.g. cm and dpi (resolution indicator).**
5. **Image cropping: Opens the image cropping window**.
6. **Calculate zoom: Starts the calculation of the image with the current values**.
7. **Mode: Shows the options Chrominance (standard) and Spectral**.
8. **Algorithmic short-term memory**.
9. **Quality: choice of different calculation qualities (default Excellent)**.
10. **Gamma aliasing levels (default level 5)**.
11. **Super-sampling resolution (default Off)**.
12. **Intelligent details (default off)**.
13. **Photographic options with selectable presets**.
14. **Sharpness overdrive mode (default Fine),** which is one of the photographic options.
15. **Selectable specialisations such as Portrait or Technology, which can improve the result**.
16. **Inviteable training images which can further optimise the result.**



3. Flash-Workflow

If you want to edit an image beforehand, e.g. remove noise, change the image look, etc., it makes sense to carry out these editing steps before loading so that the scaling has an effect on the resulting image. Due to the integrated sharpening, sharpening in **SHARPEN** is generally unnecessary.

Example: This sign on an old railway carriage with the aspect ratio width = **1021** px, height = **338** px, is to be scaled to 3 times the image width and height.

Step 1: Load image file (see **General files guide**).
Step 2: Selecting the scaling:

- Clicking the **x3** button immediately scales up the image,
- the zoom slider jumps to **300%**,
- the new aspect ratio in pixels is displayed to the right of the original size: 3063 px x 1014 px.

Note: The aspect ratio always remains constant.

Step 3: Display the output size in metric units (not mandatory, but informative and helpful if the image is to be transferred to a medium, e.g. **print on paper or T-shirt**).
Note: Above the output sizes, you **will always see the size specifications pixel by pixel because digital images only consist of pixels**.

- Click on the **Output sizes** button to display the converted values in **cm**, **mm**, **inches** and **picas**.
  The example shows **25.93 x 8.59 cm at 300 dpi**,
- The **dpi value** displayed below, the **print resolution of the loaded image**, is automatically determined from the image data and displayed, in the example **300 dpi**. If this information is missing, the dpi value is automatically set to **72 dpi**.
  You can change this value as required.
- The image view changes according to the selected zoom size and shows the correspondingly enlarged image section.

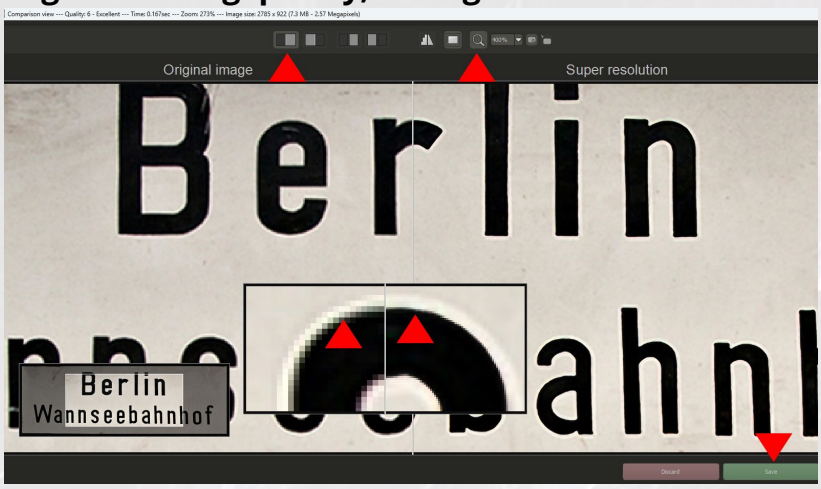
Step 4: Start the calculation with the current settings:

Click on the **Calculate zoom** button to start the calculation with the **default settings**.
These standard settings, which can be recognised by the green buttons or the displayed values, ensure impressive results even without individual intervention.
The default settings are

- **Mode** is set to **Chrominance**.
- **Algorithmic short-term memory** is **active**.
- **Calculation quality** is set to **Excellent**.
- **Gamma aliasing** is set to **level 5**
- **Super sampling resolution** is deactivated (**Off)**.
- **Intelligent details**: The **intensity** of the inclusion of intelligent details is set to **25%**.
- **Photographic options** are preset to **Slightly sharpen**.
- **Sharpness overdrive mode** is set to **Fine**.

Depending on the image size, the **comparison view-window** with the save option is displayed after the scaling calculation has been completed (in the example, 0.170 sec. is displayed in the header for the calculation time).

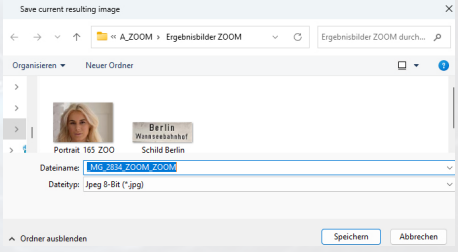
Step 5: Checking the scaling quality, saving

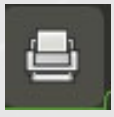


The comparison view shows the original with the zoomed image section on the left and the resulting image on the right.
The 'floating' view is set by default: The original on the left, the 'advanced' calculated view on the right.
Check quality with the magnifying glass: The comparison view offers a good comparison between the original and the calculated zoomed version.
If you want to assess details more closely, click on the **magnifying glass symbol**, which is set to **400%** by default, and select a point in the image where the before/after comparison is more clearly visible. In the example, this is an 'e' from the "Wannseebahnhof" and impressively shows the difference in quality: the artefacts have practically disappeared, the contours are clearly separated from the background, and a look at the 'large' comparison view confirms the impression: the sign appears clear and sharp even at 3x magnification, but also with homogeneous transitions at the edges.

Identical view left and right: By clicking on the 3rd button from the left, you will see the same image section on the left (original) and right (result), which in many cases enables an even better and faster comparison edges.

Schritt 6: Speichern



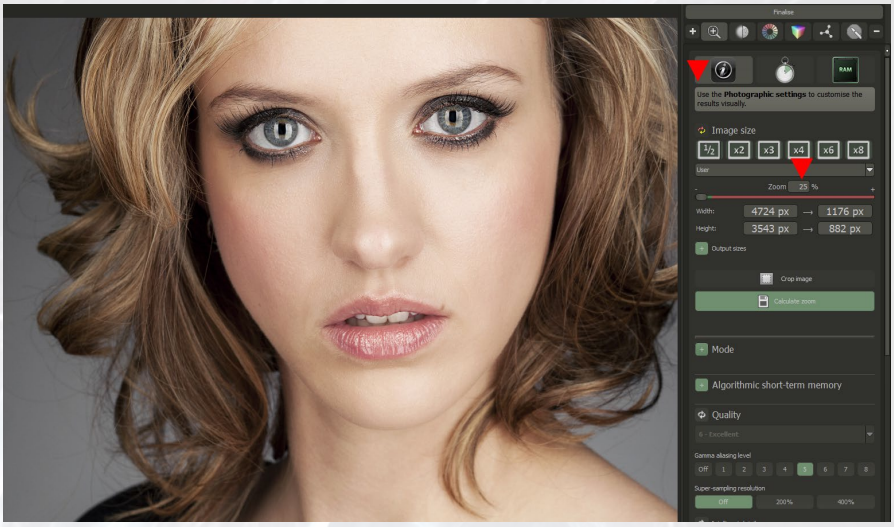


As in all programs, clicking on the **green Save button** opens the window with the save dialogue in which you can save the resulting image and **print** it out if required (button on the right).

4. 3 assistants with workflow suggestions

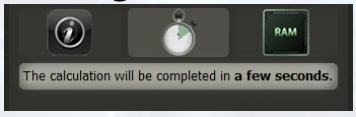
ZOOM offers **3 assistants** that provide important or helpful information when required:

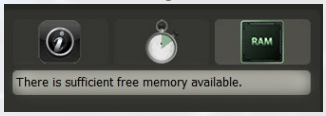
1. Click to display **workflow suggestions**.
2. Click to display the **calculation time estimate** based on the currently selected settings.
3. Displays the **memory monitoring** for the current settings.



Information or workflow wizard
Depending on the subject and the selected ZOOM level, the workflow suggests processing steps that you can follow in full or in part in order to obtain a result image that is even better tailored to your requirements if necessary.
The two wizards to the right “accompany” your current settings with information on the e**stimated calculation time, which depends on the scaling and the selected settings**, and possible warnings about **insufficient memory available**.

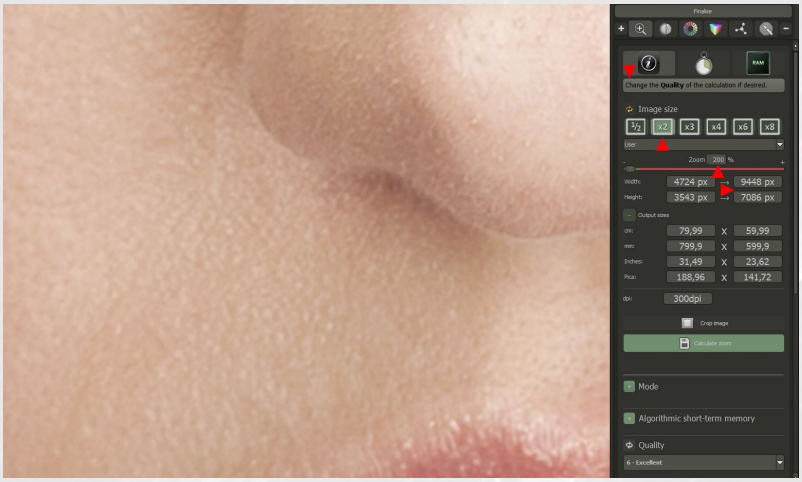
Example: The image of a model is to be scaled to **200%** for a poster in the shop window. The graphic shows the full view zoomed out by double-clicking into the image at **25%**, **i.e. a reduction in size**, to which the displayed information refers. Click on the button with the information symbol to display the suggestion: **Use the photographic settings to customise the visually.**





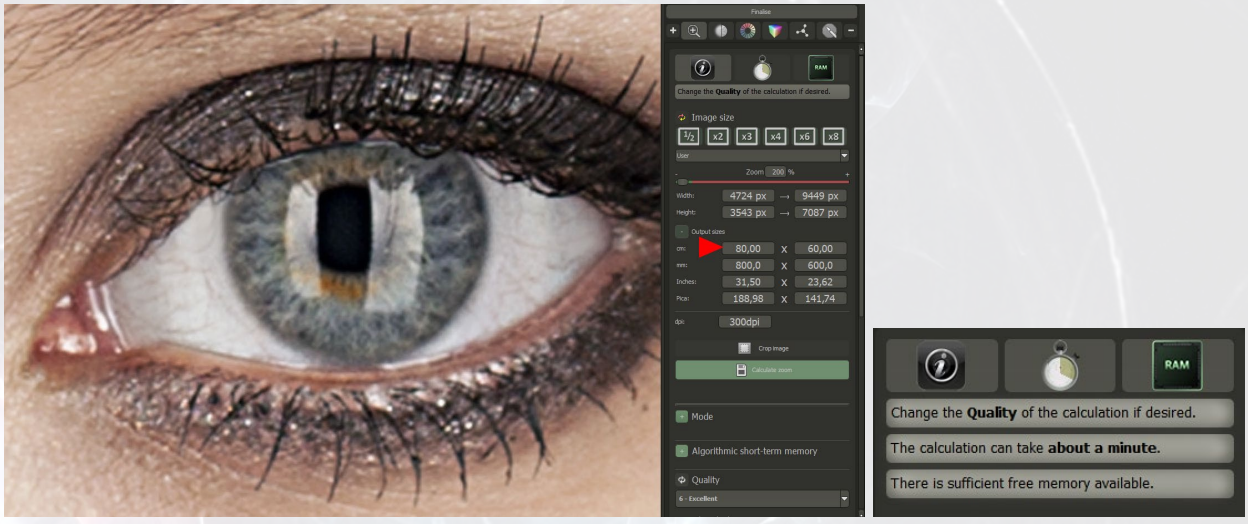
Estimated calculation time/memory space: Click on the buttons to the right to display the information: **The calculation will be completed in a few seconds** and there **is sufficient free memory available** when the reduction (25%) is calculated.

Select scaling



If you now select the desired scaling by clicking on the **x2** button, the first suggestion has changed: **Change the quality of the calculation, if desired.** It is advisable to make 2 adjustments before you enter this suggestion:

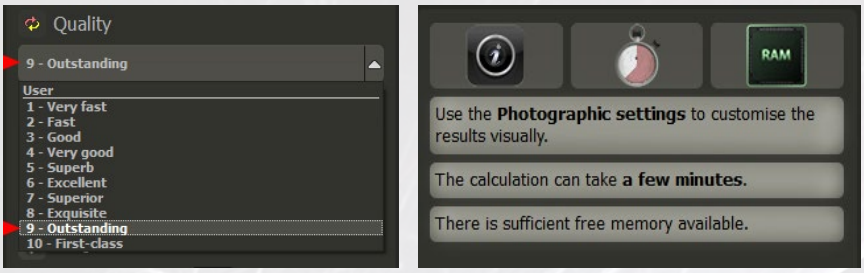
Adjust output size in cm: The automatically calculated output size is set to 79.99 x 59.99 cm.
By clicking in the output width field, you can enter the desired value of **80**. The length is automatically adjusted proportionally to **60 cm**.



The current **calculation time** with this scaling is estimated at around **1 minute**, provided there is sufficient free working memory available.

Adjust image section: The image section in the graphic above is not particularly informative. Hold down the mouse button and move the image section to a desired position, e.g. the eye.
Note: Exactly this image section will also be shown in the comparison window once the zoom calculation has been triggered. This is why the selected image section at the specified zoom level is more important than in other programmes: ‘What you see is what you get’.

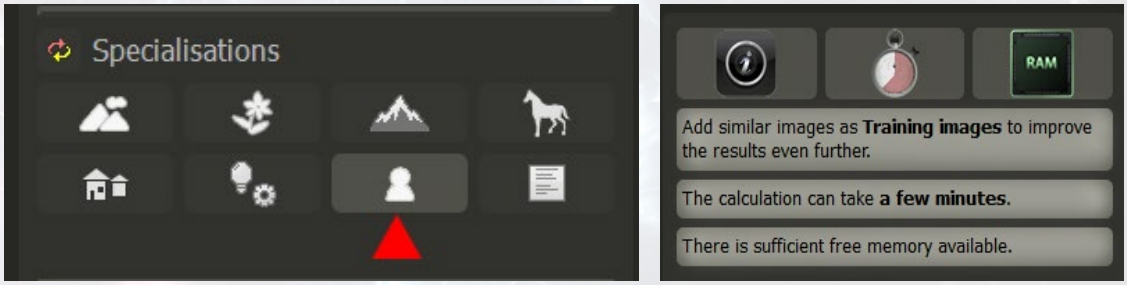
Change quality



The calculation quality is set to **6 - Excellent** by default.
If you change this calculation to the penultimate **level 9 - Outstanding**, for example, and then switch back to the 3 information windows, the workflow suggestion for the next step has changed:
Use the photographic settings to customise the results visually.
The estimated calculation time has increased to a **few minutes**.

Photographic options

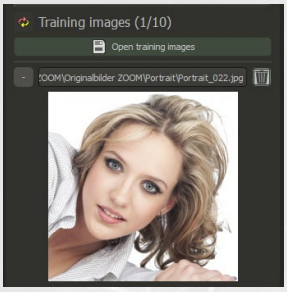
The photographic options are set to **Slightly sharpen** by default.
If you select **Portrait** for this subject, for example, and switch back to the 3 information windows, the workflow wizard will suggest the next step:
Activate one or more Specialisations that would be suitable for your image to improve the results of the image enlargement.
The other two pieces of information have not changed.



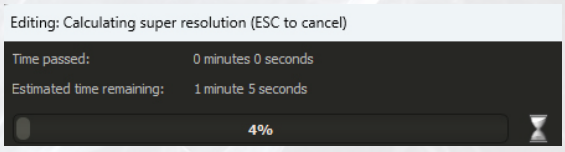
Specialisations

This module is inactive by default. For example, if you select a **Portrait** specialization that matches the subject, the program will be informed that the image is a portrait and that it should access the corresponding training images internally.
If you then switch back to the 3 information windows, the workflow assistant suggests the next step: **Add similar images as training images to further improve the result**.

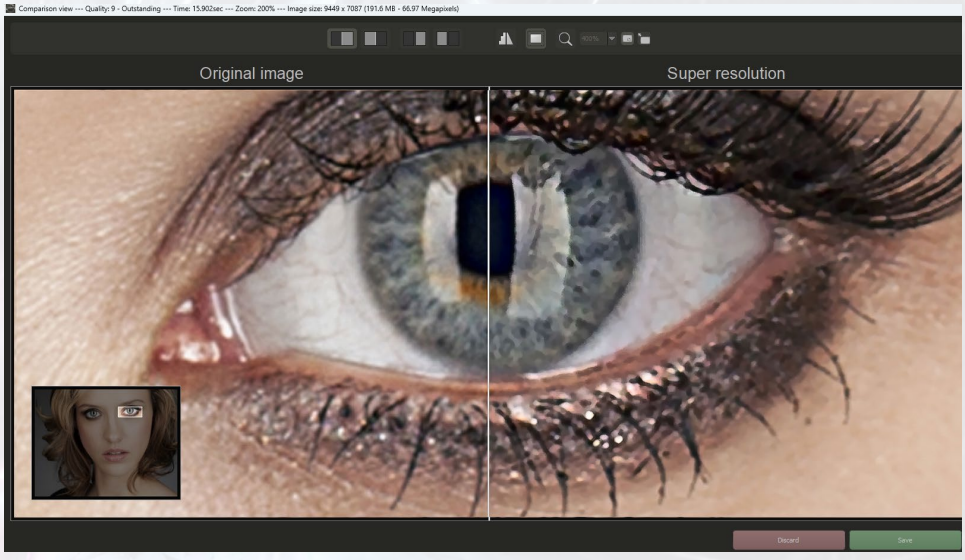
Training images



Click on the **Open training images** button to select a similar image from a folder of your choice. If required, you can load up to 10 training images.
If you then switch back to the 3 information windows, the workflow assistant will suggest the next (final) step: **Do you want to further alter the source image? The RAW module can help you to do so**.
In this module you can, for example, straighten images, denoise the image or manipulate brightness and colours as desired.



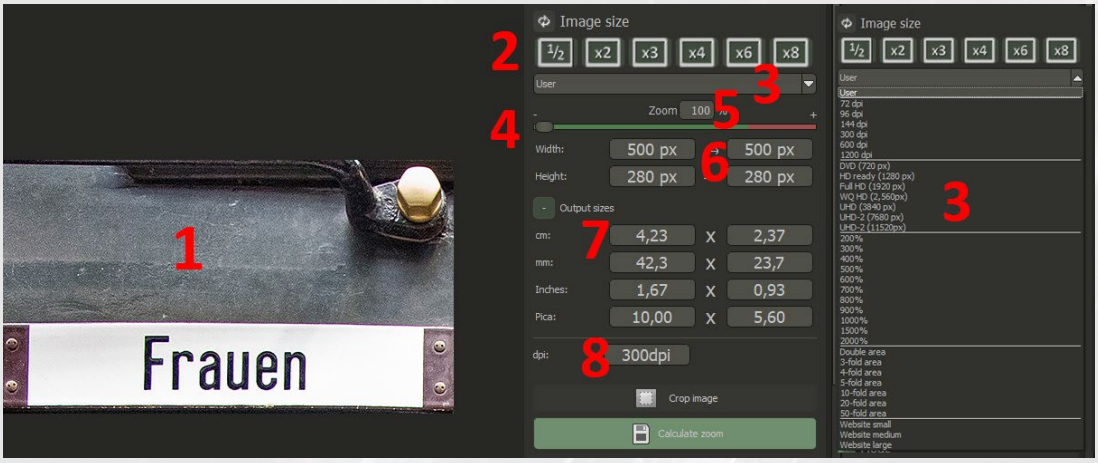
Trigger new calculation: If you are satisfied with your decisions and decide against this last suggestion, click on the **Calculate zoom** button to initiate the scaling with the currently changed settings.
The information window that appears shows the elapsed and estimated remaining time of the calculation.
Cancel calculation: If the calculation time is too long, the process can be cancelled with the **ESC button**.



Finished result image: This result image after the 'guided' workflow leaves nothing to be desired, neither in the 200x enlarged detail view nor in the print.

Note: All workflow options carried out are described in detail in the corresponding chapters.

5. Set zoom sizes and output sizes



As described in the first chapter **Workspace**, the **zoom slider** is always set to **100%** after loading an image file. With small image files, such as the section of a historic railway carriage in the example, the image is not fitted into the programme window; with large image files, you will see an enlarged image section that could be fitted into the programme window by double-clicking on the image with the corresponding scaling in % displayed in the zoom slider.

ZOOM offers various equivalent options for setting the desired image size or suitable scaling.
Regardless of the method selected, you will always see:

- The **zoom slider** shows the value for **enlarging the resolution in %.**
- The **target size** (width and height) in pixels.
- For expanded **output sizes**: The **metric output sizes** depending on the **dpi** number.

You select the procedure that makes sense for you:

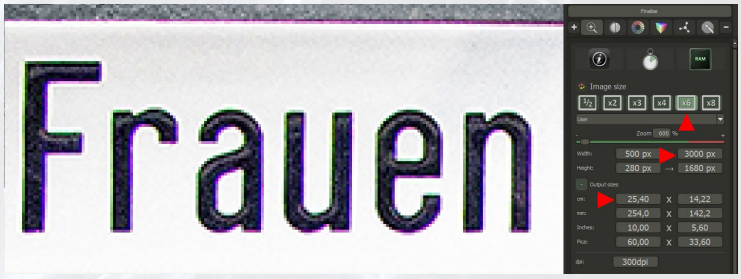
1. **Scaling by 'view'**: You **scroll the image** to the desired magnification or reduction with the mouse, the zoom slider moves in parallel and the current zoom values are displayed.
2. **Direct input** of the desired magnification/reduction.
3. Select a **Default setting**, e.g. **Full HD** or **Website small**.
4. Scaling with the **zoom slider** up to the desired scaling size.
5. **Select a value in %**.
6. **Enter the desired image** width and height in **pixels**.
7. **Change output sizes** in the options.
8. **Overwrite the dpi number if required**: The output sizes, e.g. in cm, always refer to the displayed dpi number, in the example 300 dpi. If you overwrite the dpi number, the output values will change accordingly.

Scaling by 'view':

Use the mouse wheel to scroll the image to the desired size and hold down the mouse button to determine the image section that you would like to see in the comparison window after the calculation to assess the quality. Each time you enlarge or reduce the image, you will also see the changes in the **Super-resolution area**:

- The **zoom slider** moves to the right (zoom in) or left (zoom out).
- The **value for the increase** in % is displayed.
- The **output sizes** are displayed depending on the dpi value.

Direct input of the desired magnification/reduction



This option, which is often the fastest, allows you to quickly set the desired resolutions for the image zoom (from left to right):

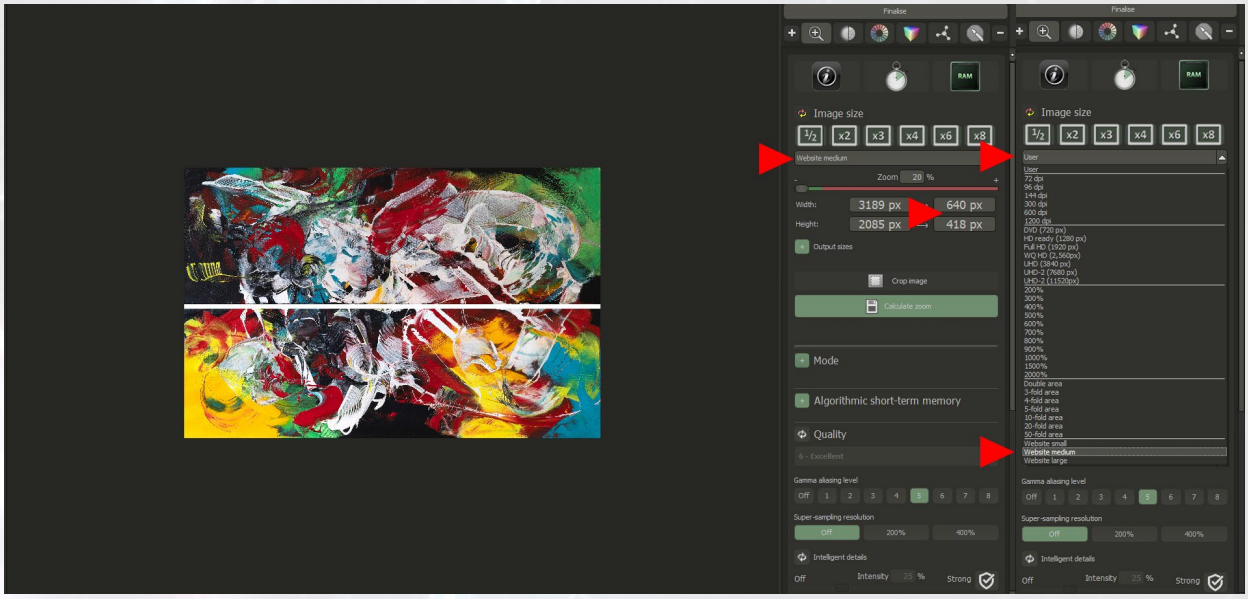
- **Half the image** width and height (**1/2**).
- **Double the image** width and height (**x2**).
- **3 times the image** width and height (**x3**).
- **4 times the image** width and height (**x4**).
- **6 times the image** width and height (**x6**).
- **8 times the image** width and height (**x8**).

As with scrolling, the slider moves parallel to the selected scaling, the zoom value in % is displayed (in the example **600% at x6**) and the corresponding values in pixels or the output values.
As always, it makes sense to set the appropriate image section for the assessment before calculating the selected zoom size.

Reset: Click on the coloured arrows to reset the selected scaling.

Select a Default setting, e.g. **Full HD** or **Website small**.

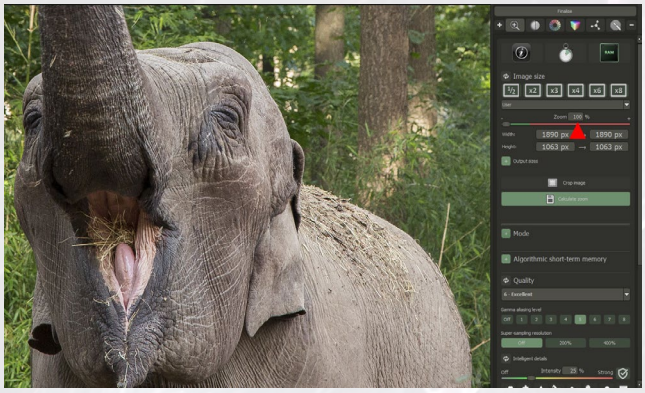
The **default settings** offer numerous popular **scaling suggestions** for enlargements or reductions and **dpi values** for conversion at the click of a mouse.
In the example, the image of an artist is to be prepared for the website. The graphic also shows the presets on the left because these thumbnails always show the original, not the 100% view.



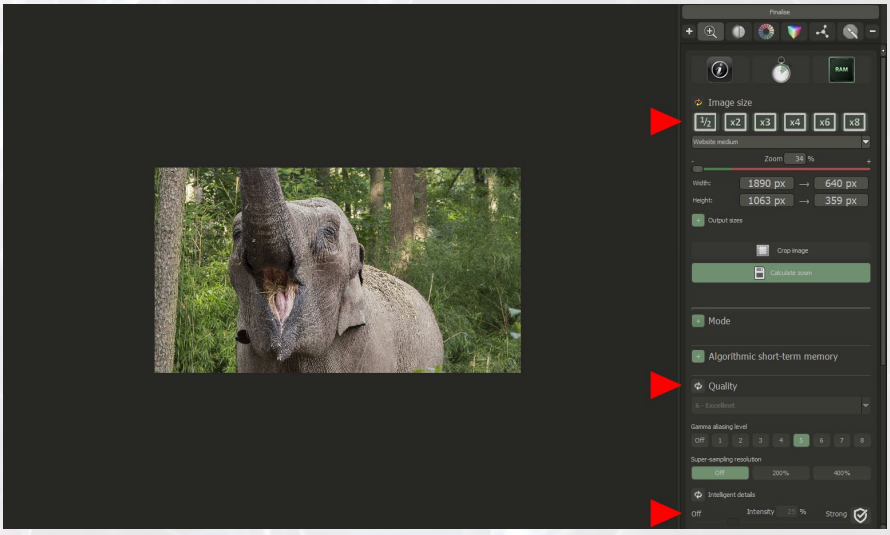
Click on the **User** button or the small arrow next to it to display all the default settings for the size of the image to be calculated.
If you now select **Website Medium**, for example, the corresponding pixel values are displayed immediately and you can switch to the comparison window with the save option by clicking on **Calculate ZOOM**.

Scale image files smaller

Details in the image are lost with every ‘downscaling’ because the resulting image has fewer pixels than before.

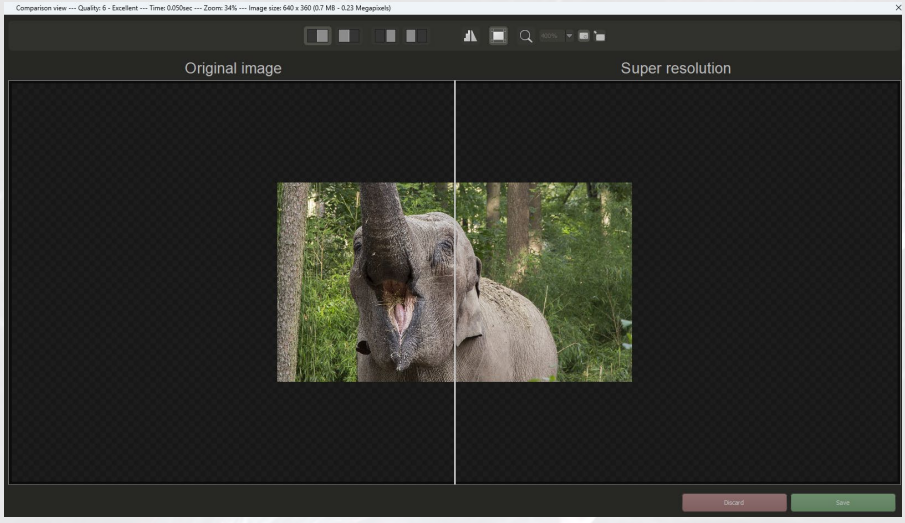


ZOOM reduces image files to the same high quality as it enlarges images, ‘conceals’ the loss of detail with a sophisticated technology and maintains the impression of sharpness of the image that is important for the **judgement**.
If you load an image file, the zoom control is always set to **100%**, as in the image example on the previous page, with all the **standard settings** known from the flash workflow in the super-resolution range.

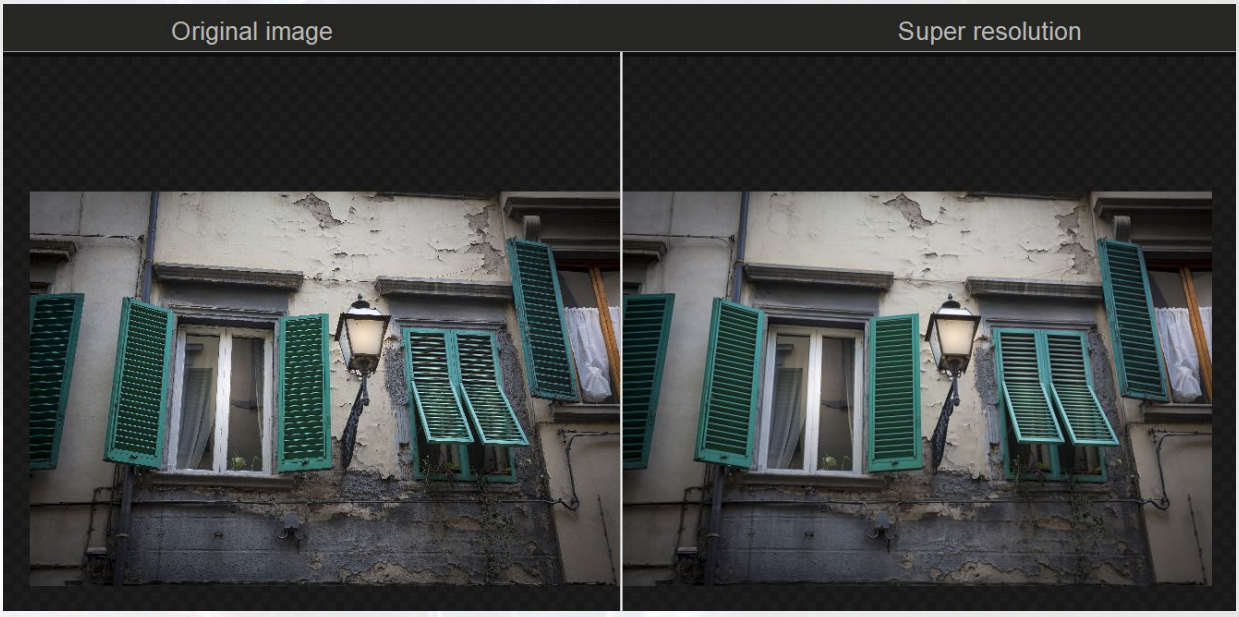


If you scroll the image to the desired size using the mouse wheel or select one of the other options, e.g. ‘½’ or the default setting **Website Medium** as in the example, certain modules such as **Quality** and **Intelligent details** are deactivated by the programme and have no influence on the calculation because **ZOOM** performs the reductions using a different process and these buttons are no longer relevant.
The automatic presetting selected here and on the previous page with the art image were chosen deliberately because **ZOOM is the ideal tool and problem solver for such and other challenges where any reduction in size up to miniatures, icons, logos and much more**.

Scale image files smaller - comparison views



Normally, ‘downscaled’ images are always somewhat pixelated and lead to a visible loss of quality, e.g. on a website or a photo CD.
If downscaling is calculated in ZOOM, the result looks impressively good, ‘clean’, without pixelated edges and with very little loss of detail. The **integrated sharpening** during downsizing also ensures that the resulting image is not too ‘soft’.

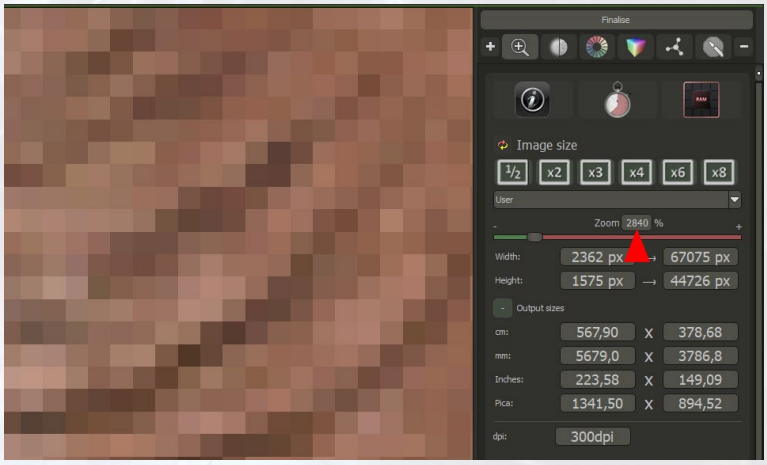


Note for those interested in technology: This special process, ‘**quantising** (“counting”) **reduction**’, does not just remove **one** pixel from a **block** during the reduction like other common processes, but the entire block that is to become the new, reduced pixel, then reduces it and forms the average.
The 3rd image example with the same preset **Website medium** illustrates the result of this high-quality reduction particularly clearly on the green shutters, because the contours have become impressively smooth with an absolutely convincing overall impression.

Zoom slider with green and red area

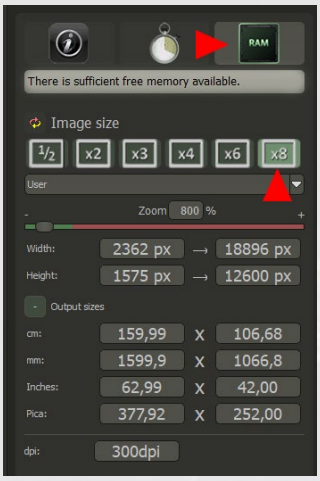
The enlargement of pixel images has its limits, or to describe it more strikingly: Even the best scaling programme cannot calculate a **10x10 m** poster for printing from a **5x5 pixel image** and do so as loss-free as possible without artefacts, blurring or loss of detail.
However, **ZOOM** sets new standards in the enlargement of images and pushes the limits of what is possible, as the following example shows:

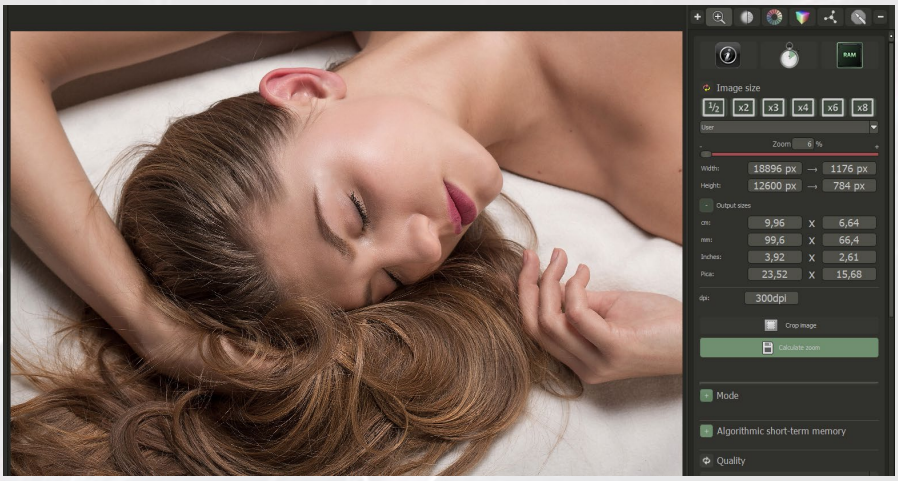
The zoom slider is divided into a **green** (‘good, uncritical’) and a **red** (‘critical’) area.
For small image files such as the sign on the historic railway carriage, the green area is significantly larger, for larger files such as these, it is smaller.



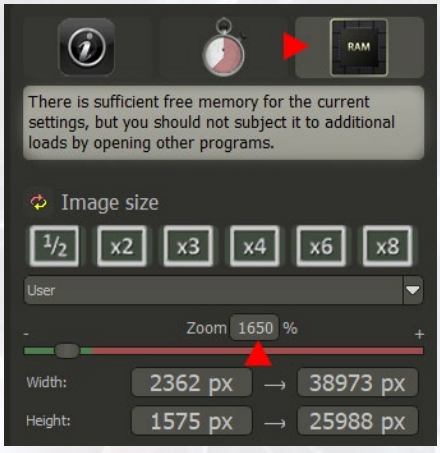
The red area starts exactly where the maximum image size is reached, which corresponds to **3 gigapixels** (**3 billion pixel image**) or in this example a zoom value of **2,840%, 67,075 x 44,726 px** or for a print at 300dpi **5.68 x 3.79 m**, i.e. very impressive figures.
The working memory has then reached its limit, whereby the limit naturally depends on the size of the user's working memory.

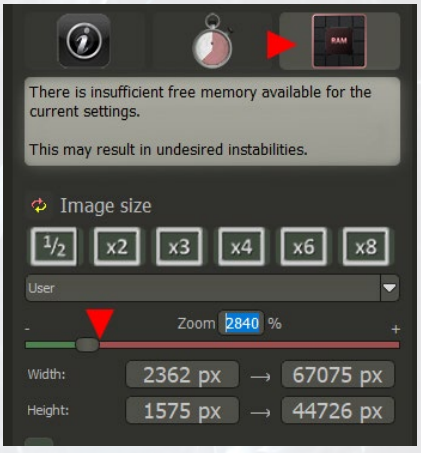
Memory monitoring with ‘traffic light colours’

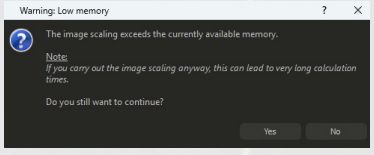




The memory monitoring, which not only takes into account and monitors the currently set scaling, but also all other standard or individually changed settings, visualises with the 3 traffic light colours **green**, **yellow** and **red** whether. The example shows that you only reach or exceed this limit in extreme situations: With an **8x zoom**, a magnification of **800%**, the button lights up green and indicates: there is sufficient free working memory available.
After calculation and reloading, the zoom value is set to 6% and shows an impressive, print-ready result image of 160x107 cm.



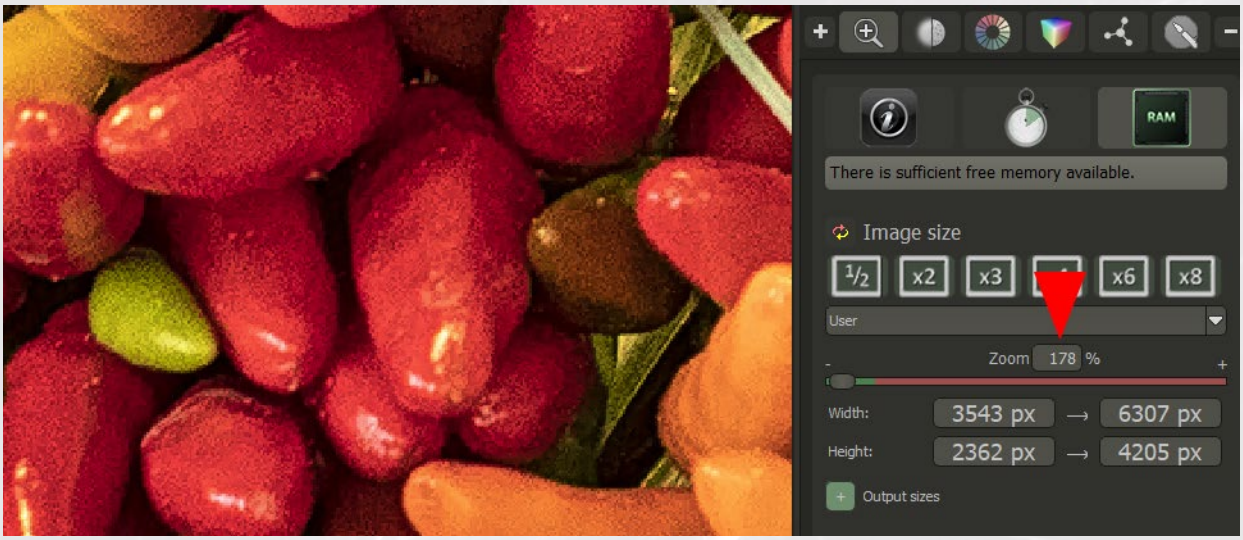




If the zoom slider is pulled up to a value of **1,650%**, the **green** changes to a light **yellow** with the following information: **There is sufficient free memory available** for the current settings, but you should not subject it to additional loads by opening other programmes (diagram on the left).
At **2.840%** the zoom slider is blocked, the **yellow** colour changes to **red** with the information: **There is insufficient free memory available for the current settings**. This may result in undesired instabilities (programme termination) (centre graphic).
Note: The warning message is based on the size of your PC's working memory.

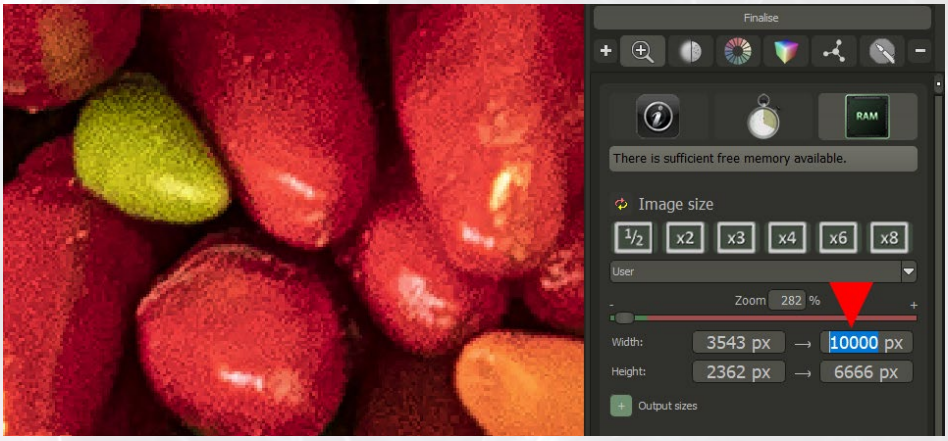
Warning: If you now click on **Calculate zoom**, a warning will appear that the calculation times will be very long if you start the calculation anyway, which is not recommended (graphic on the right).

Enter a value in %



Click in the field with the displayed zoom **value in %** to enter a desired value, e.g. **178** as shown in the graphic.
As you change the input, the position of the zoom slider is adjusted and the corresponding target values in pixels are shown in the display below.
If you select a value that exceeds the **maximum size** in this example, e.g. **2000**, the value is automatically reduced to the maximum possible size, which would be **1,893%** in the image example.

Input of target values in pixels

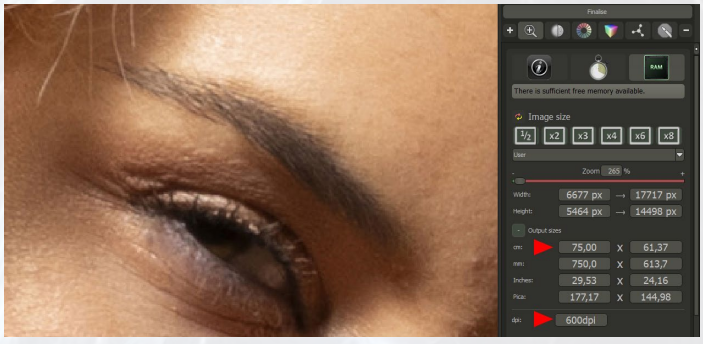


Click in the field with the displayed **target value in px** to enter a desired value, e.g. **10,000** as shown in the graphic.
It does not matter whether you enter a value for width or height, the corresponding other value always **changes proportionally** and cannot be changed separately.
As you change the input, the position of the zoom control is adjusted and the corresponding target value is displayed in the field showing the zoom in %.

If you select a value that **exceeds the maximum size** in this example, e.g. **70,000** for the height, the value is automatically reduced to the maximum possible size, which would be 67,082 px in the image example.

Change output sizes and Dpi values

If you want to **print the scaled result images, use them for photo albums or output them on other media and materials such as T-shirts**, the information in metric units such as cm or mm is helpful.
Click in the **Output sizes** field to display the available output sizes in width x height.
As with the pixels, you can specify the desired output size by clicking in an input field, in the example 150 cm, the other side length is adjusted proportionally accordingly, in the example 122.75 cm.
The frame conditions for entries that are too large are identical to the examples on the previous pages.



Change the print resolution (Dpi values) for prints, output media

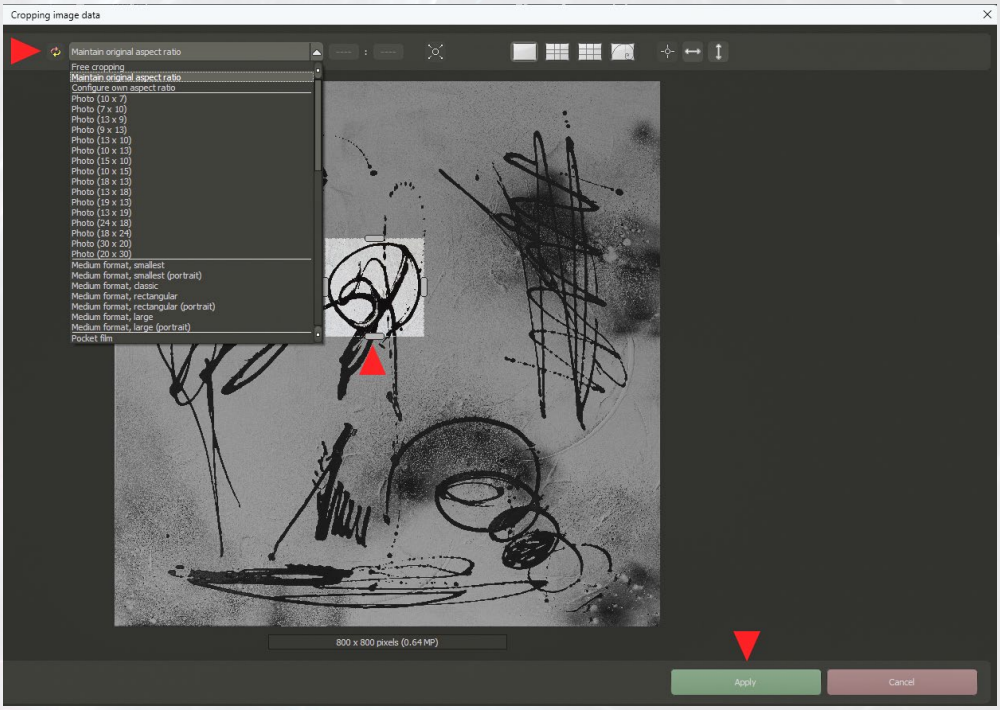
This value is only important in connection with the output sizes if, for example, you want to produce high-quality individual prints (fine art) as described above.
The **DPI** (dots per inch) **value** determines the print resolution of the loaded image. A higher print resolution generally ensures better print quality or output quality on other media.
The selected output size is inversely proportional to the Dpi value: The higher the print resolution value, the smaller the printed file. In the graphic above, the Dpi value is set to **300**, the output size is **150 x 122.5 cm**. If you change the print resolution to twice this value, e.g. **600** dpi, the output size is halved to **75.0 x 61.37 cm**.

Note: The **print resolution** (dpi) has **no significance for images that you have uploaded to the Internet,** for example, or that you see on your screen. **Only the number of pixels is decisive here**.

6. Crop Image

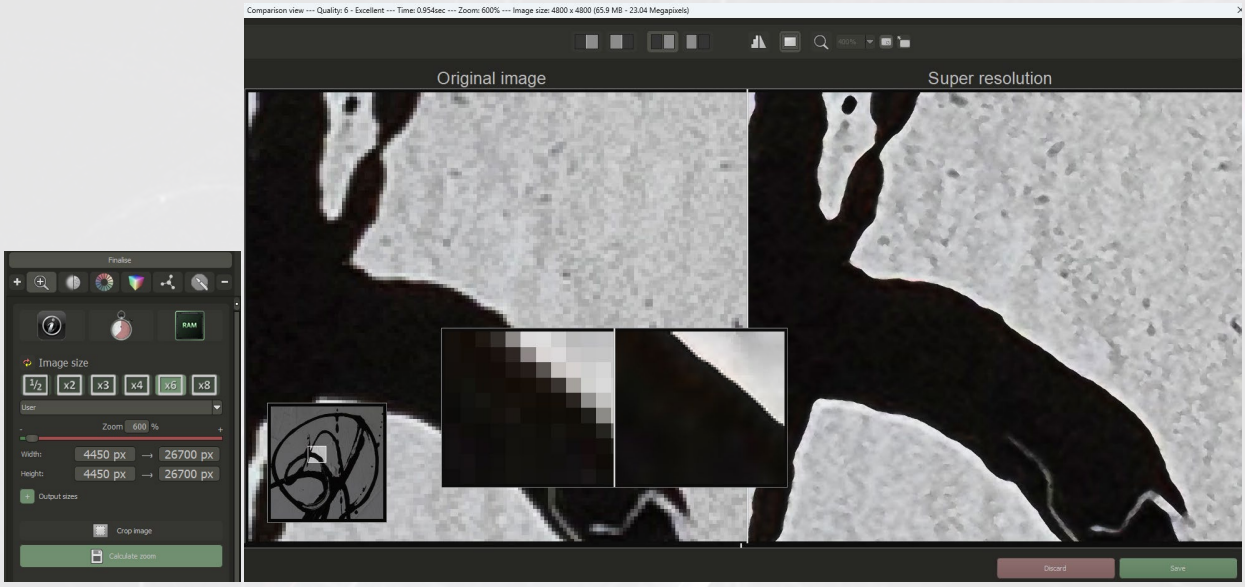
Image cropping is very important in **ZOOM** because often only a section of a subject, e.g. a bird, part of a portrait or selected details are to be enlarged or an image section selected 'in the meantime' enables a better assessment of the later resulting image.
The significantly shorter calculation times make it easier to experiment with different individual settings.
Note: Image cropping is described in detail in the guide **General programme functions/Individual image cropping**.

Example 1: This image section of an artist's image, visible at 100% zoom, is to be enlarged 6-fold so that the entire image can be enlarged in the same way later if required. Click on the button with the **image cropping symbol** ...



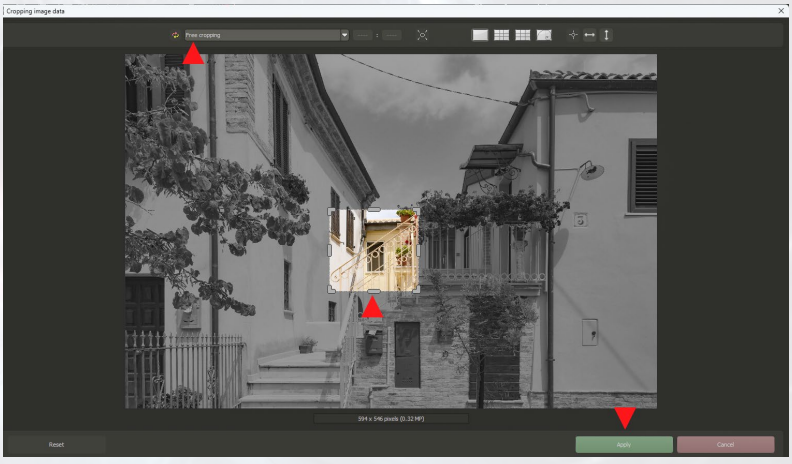
... opens the **cropping image data window**.
Click on the **Maintain original aspect ratio** button to display the context menu with all other options. In the example, the default setting **Maintain original aspect ratio** has been selected and the desired image section has been defined using the handles. The aspect ratio is displayed in pixels below the image.
Click on **Apply** to return to the original interface.

Calculate zoom and compare result



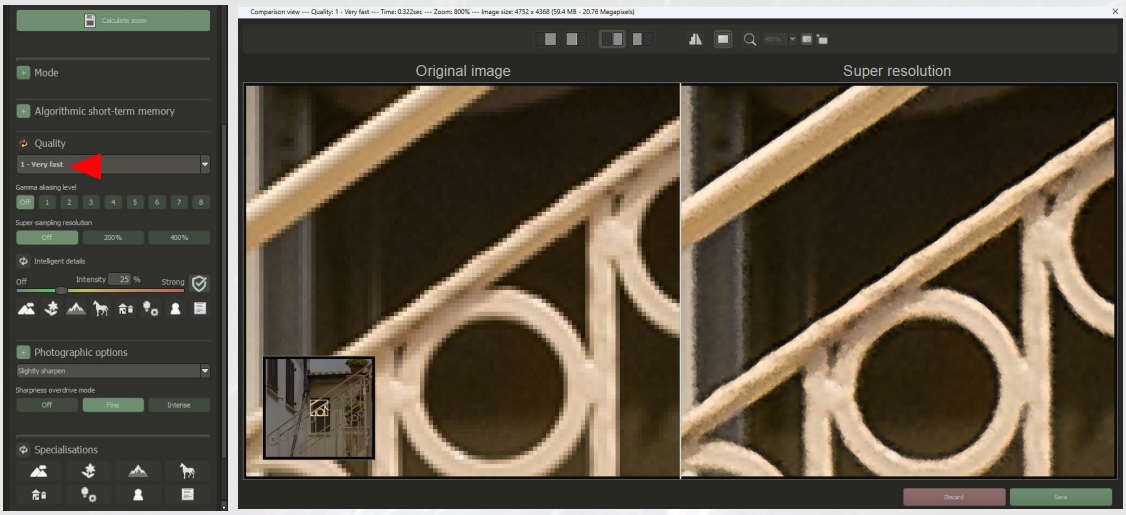
After selecting the **6x zoom** size and triggering the calculation, it is clearly visible without and with a magnifying glass that this strong magnification of a section 'provides' an excellent result image.

Example 2: This image file is to be enlarged **8 times**. To be able to quickly compare different quality levels, a section of the image, e.g. of the banister, is useful.

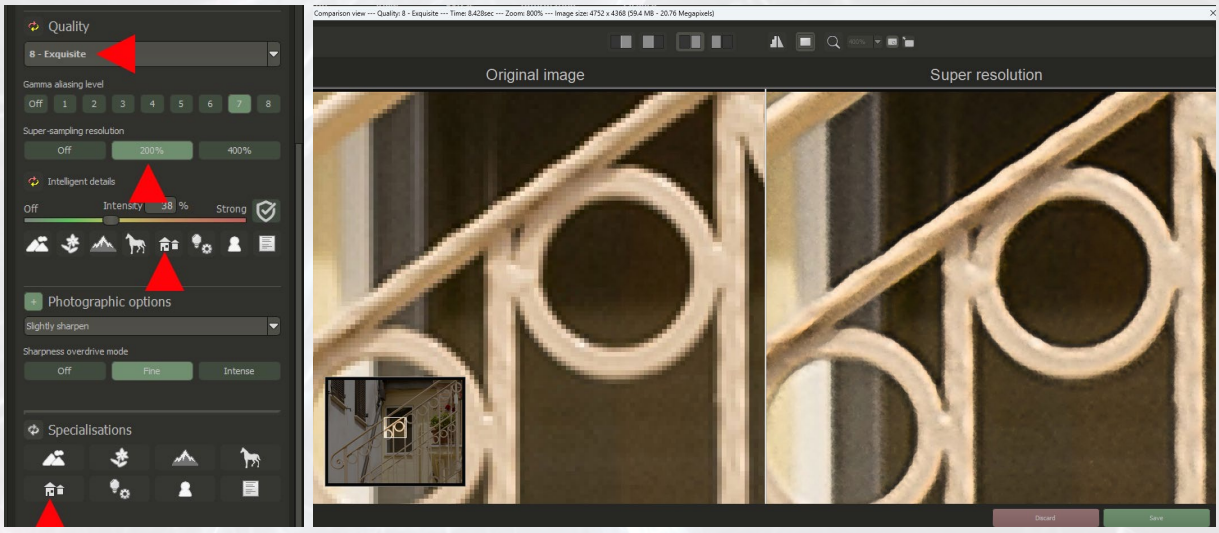


After switching to the image cropping window, **Free cropping** has been selected in this case, the desired image section has been defined using the handles and confirmed by clicking on **Apply**.

Comparison of the quality levels



Comparison view in the **Very fast quality level:** If you select the lowest **quality level Very fast** with the other standard settings, you will obtain a very acceptable result in 0.3 seconds at **8 times the image**.



Comparison view in **quality level 8 - Exquisite**: If you select the Exquisite quality level, for example, the gamma aliasing level is automatically set to **7**. In the example,

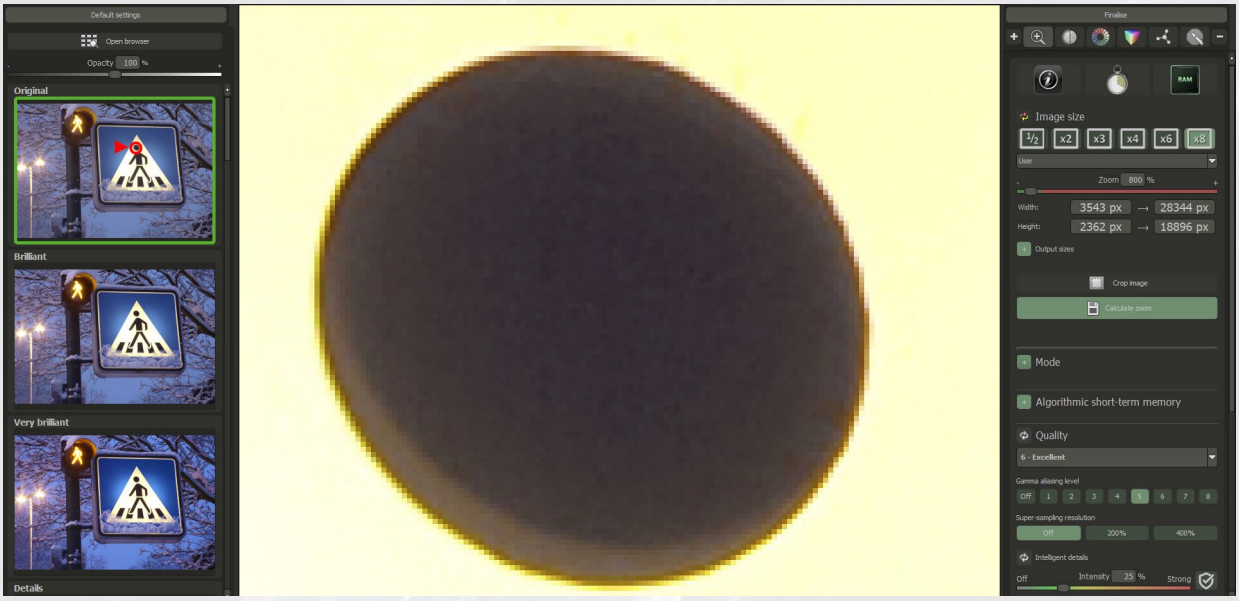
- the **Super-sampling resolution** has been changed to **200%**,
- the **Architecture** category has been selected for **Intelligent Details** and **Specialisations**.

The calculation time with these settings is **17.3** seconds compared to **0.3** seconds.

The result is a **very high quality enlargement that is impressive in every respect**, very homogeneous, does not appear uneven at any point and convinces with very beautiful edge transitions.

Note: The same calculation for the original file would have taken **274 seconds** or **4.6 minutes**. When experimenting with different settings, it is therefore always worth taking the 'diversions' via a small image section.

7. Calculate zoom, Comparison view, Save



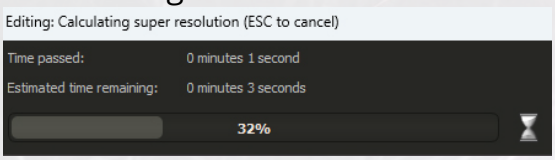
Once you have decided on a zoom level, accepted the standard settings or changed them individually if required, an intermediate step is performed in ZOOM before saving.
In the example, **8 times the image** has been selected. Click on the button to see the correspondingly enlarged section of the pictogram, which is circled in red in the preset thumbnail for better orientation.

.

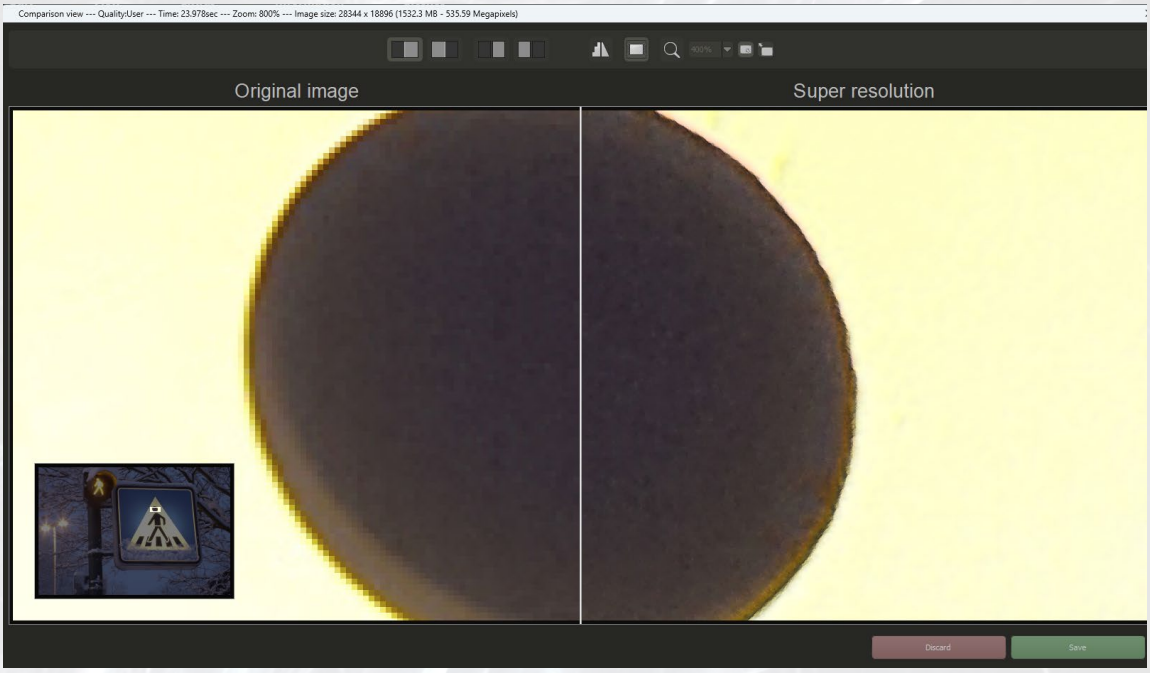
The input of a desired magnification/reduction is immediately visible, but neither at a zoom level nor any changed settings do you see the calculated result image live, but always only the enlarged or reduced view of the original, which can be disappointing at first glance, especially at high zoom levels, and does not allow any conclusions to be drawn about the result image.

Calculate Zoom

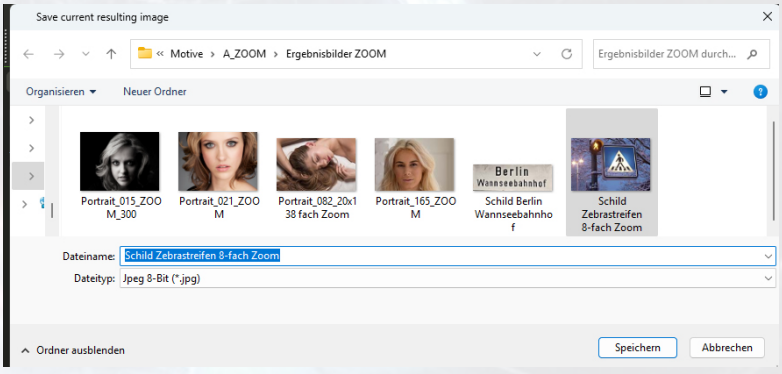
So that you can check the calculation quality and, if necessary, cancel it again to try out other settings, after clicking on Calculate zoom ...



... the message appears: Edit: Calculate super-resolution, which you can cancel with the **ESC** key if required.



In the window that then opens with the comparison view, you can decide whether you want to try out other settings by clicking on Discard. However, this decision also makes sense if you have cropped an image section to try out the best possible quality before the original file is calculated with the same settings.



Saving the resulting image: If you are satisfied with the before/after comparison, as shown here, click on Save to switch to a folder of your choice and save the file, preferably with a ‘descriptive’ name.

Note: If you have entered a target path for the result images under Extras/Settings/Programme, this folder will be opened automatically after saving.

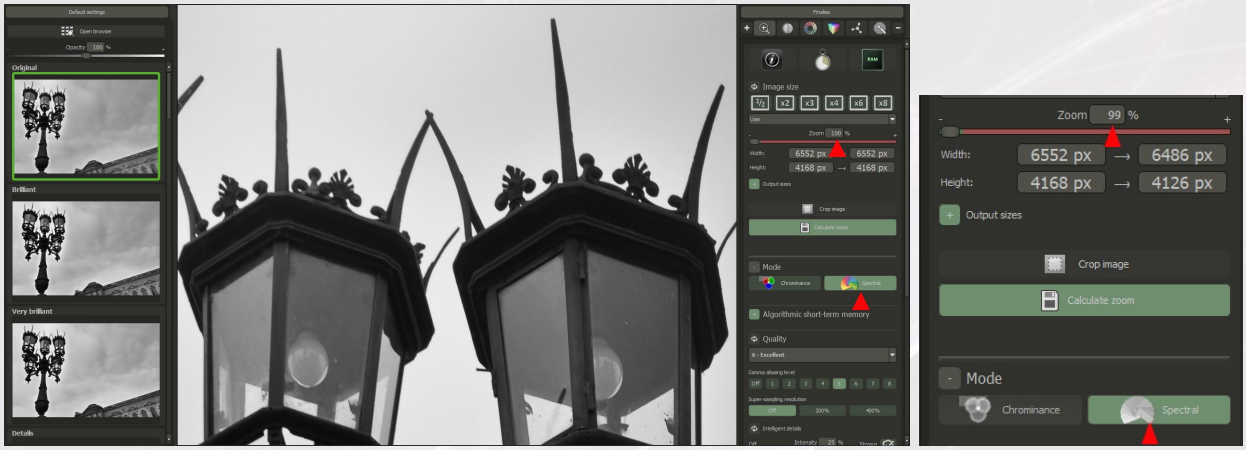
8. Mode – Chrominance and Spectral

In this module, which is collapsed by default, you can have the programme calculate in 2 different modes.
By clicking on the **plus** sign, these two options are displayed:
- **Chrominance**, the default mode,
- **Spectral**: **specialised for black and white and monochrome images**.

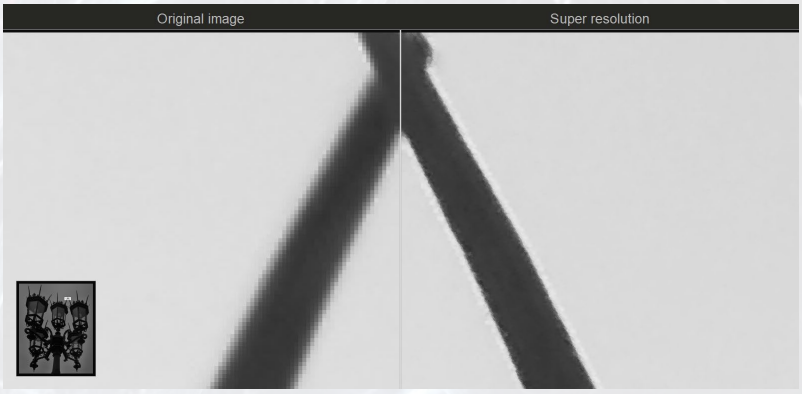
Chrominance mode: Here, the red, green and blue colour channels are used for the loaded image. The scaling process 'learns' from colour images.

Spectral mode: Here, the scaling process also 'learns' from **monochrome image data**, whereby this can be **any image with monochrome colours** in the image, from black and white to sepia to any other dominant single colour, i.e. only one colour channel in the image.
In these cases, the program uses all 'cross combinations' such as red/green, red/blue or blue/green from the colour channels, i.e. an **extended spectrum of channels**.
This even more complex process with improved scaling leads to even better results under 'difficult' scaling conditions, especially with monochrome images, which offer fewer 'puzzle pieces' for the calculation in the original than colour images.
In this mode, **ZOOM** generates and modifies more artificial variants, combinations and 'puzzle pieces' from the existing 'material' for the calculation with the set scaling and other values (data augmentation).

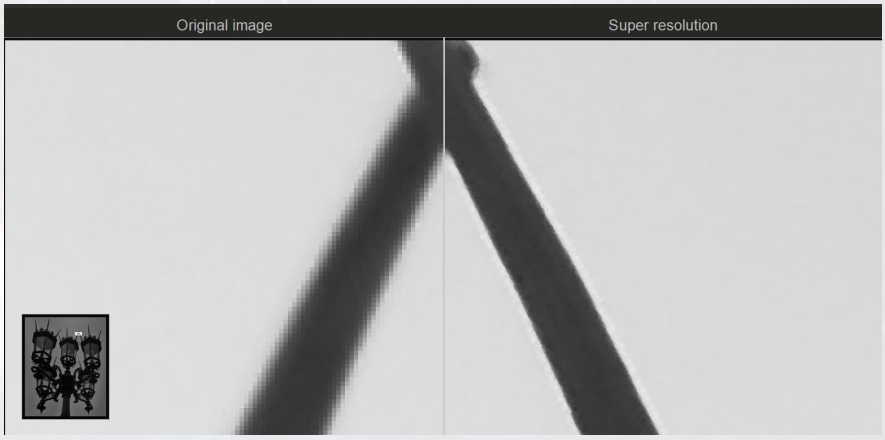
Mode comparison with a monochrome image section



Example: The image converted to black and white in the **RAW module** (**Colour**/luminosity slider set to '0') is to be scaled up to **800%** with the historical lanterns.
Note: The two modes only become active from a zoom value of **100%** and the 'buttons' light up. Up to 99% and all reductions, the modes remain inactive and the colours of the buttons remain pale.



Chrominance: After selecting **x8** scaling and retaining all standard settings, the result is very good, as expected.

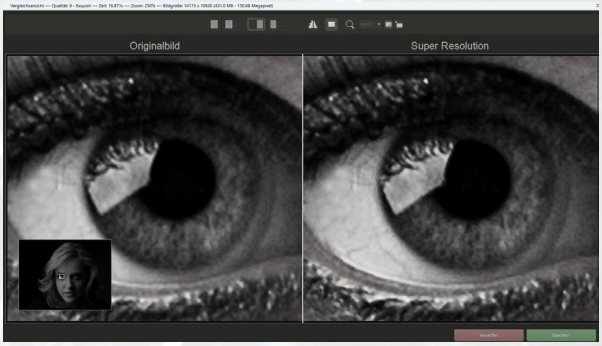


Spectral: After switching to Spectral and restarting the calculation, the comparison shows an optimal, further improved result with a very homogeneous overall impression.

Spectral mode for old black and white images, select print

As a rule, you can dispense with a mode selection and leave the module collapsed.

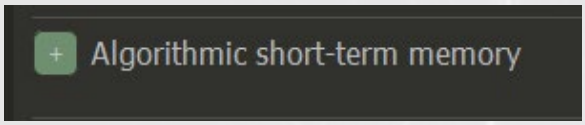
For old black and white images or scanned old toned images, however, it is worth switching from **Chrominance** to **Spectral**.
The same applies, for example, to high-quality prints as in the example. Here the original file is to be prepared for printing on **120 x 90 cm**.

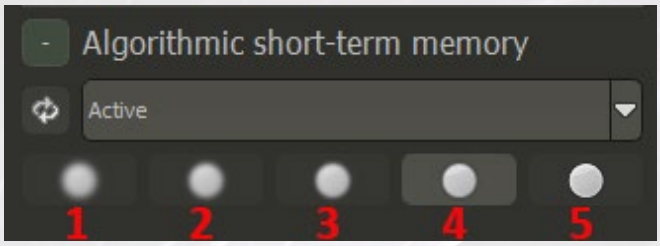


According to the calculations ...

you will get the impressive result you want, which will be just as impressive when saved as a print.

9. Algorithmic short-term memory





This module, which is always active and collapsed by default, is an optimisation function that speeds up calculations.

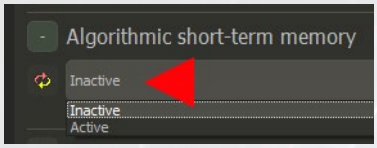
ZOOM memorises certain image areas that have already been calculated and may be repeated in the image, e.g. **lines, diagonals or circle segments**.
If one of these elements has already been calculated once during the calculation process (e.g. from top to bottom), the programme 'remembers' it and 'copies' it, which shortens the calculation time.
Behind the buttons is information on how precise this match must be, from **not so precise** (**1**) to **very precise** (**5**):

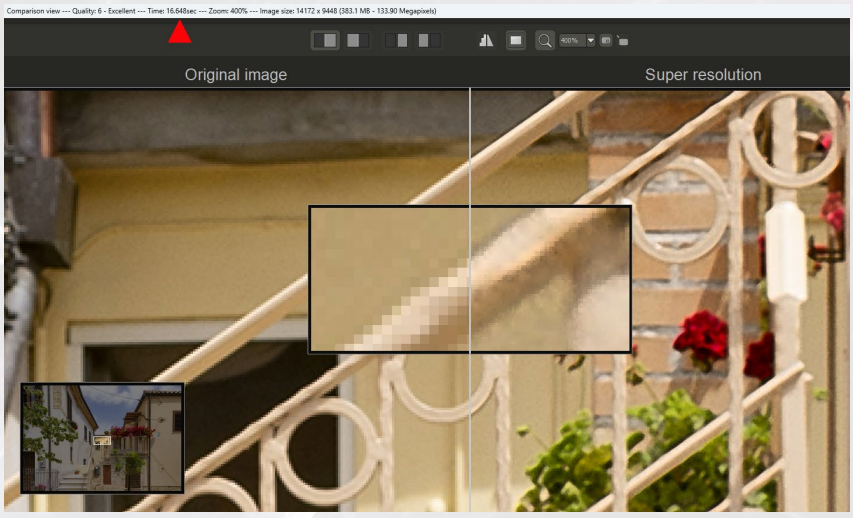
1. Sets the sharpness of pattern recognition and memory to **very soft contours**.
2. Sets the pattern recognition and memory to **soft contours**.
3. Sets the pattern recognition and memory to **normal contours**.
4. Sets the pattern recognition and reminder to **sharp contours** (default setting).
5. Sets the pattern recognition and reminder to **very sharp contours**.

The selection of a very precise pattern and edge recognition increases the calculation time, a less precise one accelerates it.

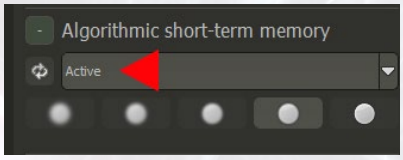
Time comparison at 4x magnification

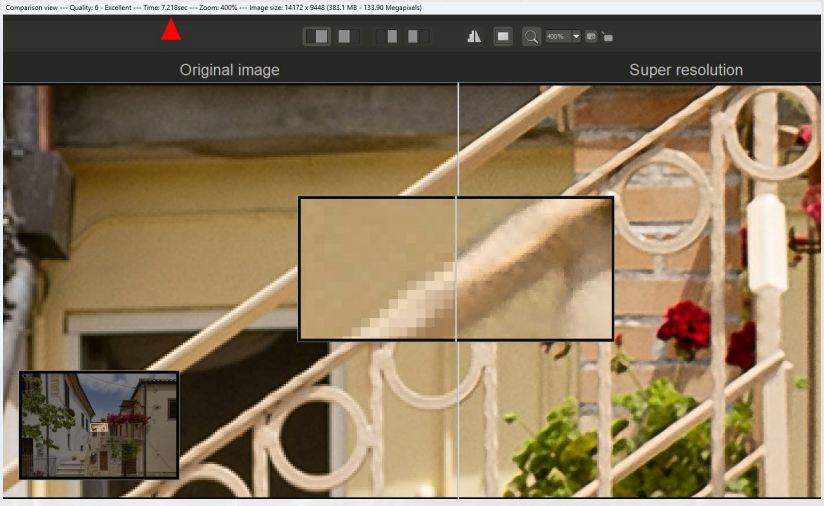
In the example, a 4x magnification with all standard settings has been selected.





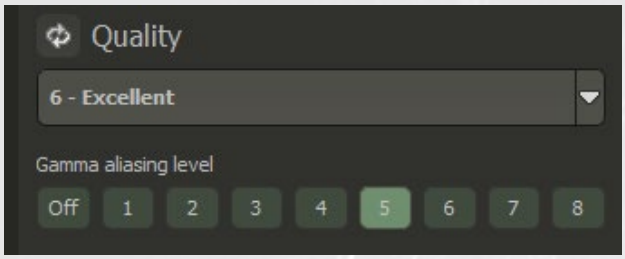
If you now switch off the algorithmic short-term memory and start the calculation, the comparison window displays a calculation time of **16.6 seconds** in the header.

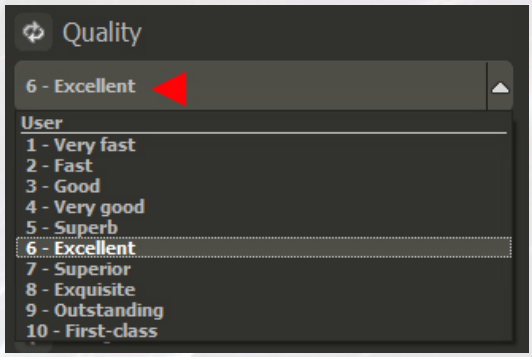




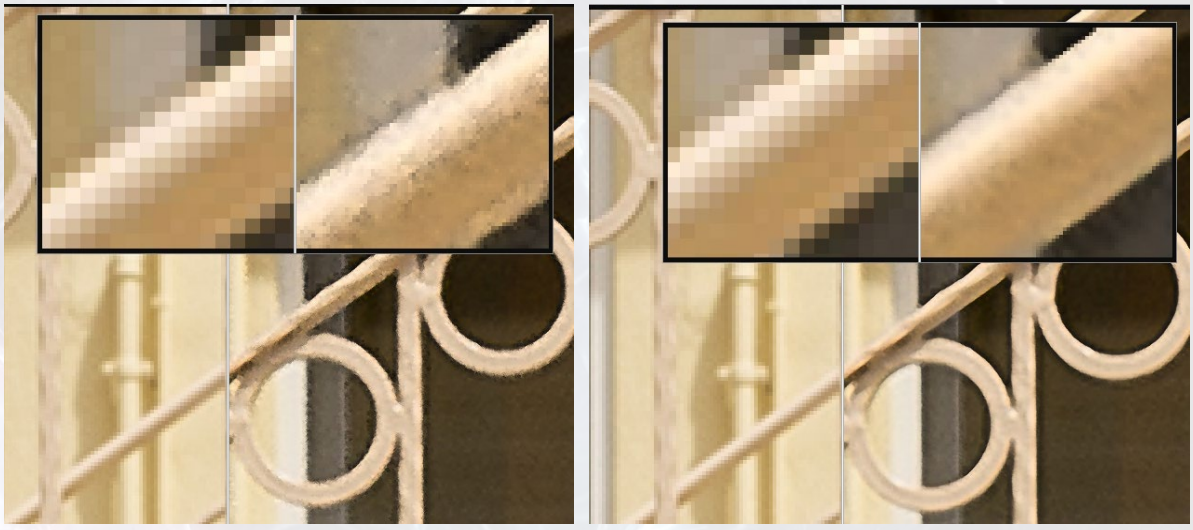
If you **reactivate** the algorithmic short-term memory by clicking on the coloured arrows (click on the **minus sign** to fold it) and have the scaling calculated again, the calculation time is reduced to **7.2** seconds. The algorithmic short-term memory has shortened the calculation by more than half.
This time difference becomes even greater when the quality level is increased or additional options are used. In the example, the calculation time at quality **level 8 - Exquisit** is **50 sec**. with active short-term memory and **138 sec**. with inactive module. This corresponds to almost a **tripling**.
The theoretically measurable loss of quality is practically invisible visually, so you can leave this module active except in extreme cases.

10. Quality settings





ZOOM offers **10 quality levels** for the calculation. The default setting is **level 6 - Excellent** - and this calculation quality is in fact already so excellent that it only needs to be changed upwards in exceptional cases, e.g. for special enlargements or large-format prints, or downwards if things need to be done particularly quickly.
The range goes from **1 - very fast** to **10 - first class**, whereby the results achieved are also acceptable at lower levels.
A higher selected quality has its price: **Each increase by one quality level, e.g. from Excellent to Superior takes on average around twice as long to calculate as the previous one**. The increase is lower for the low levels than for the high levels.



Note: Doubling the calculation time from one level to the next does not mean doubling the quality. It will be slightly improved in each case, but you decide whether a further increase in the quality level makes sense depending on the subject and the selected zoom level.
Of course, the differences are most obvious and visible if you 'skip' several **levels** in the comparison, e.g. compare a **First class** with the **fastest** level (diagram on the left) and the highest first-class level, which lives up to its name and delivers a first-class result (diagram on the right). For subjects with clear contours and sharper contrast edges, as in the example, the differences are more obvious.

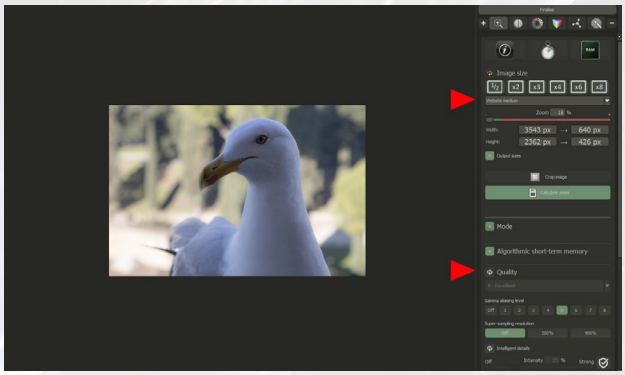
Memory monitoring

In addition to the zoom level, the selected quality level can also lead to the familiar warning message during memory monitoring that the currently available working memory space is being exceeded.

Interaction with other modules

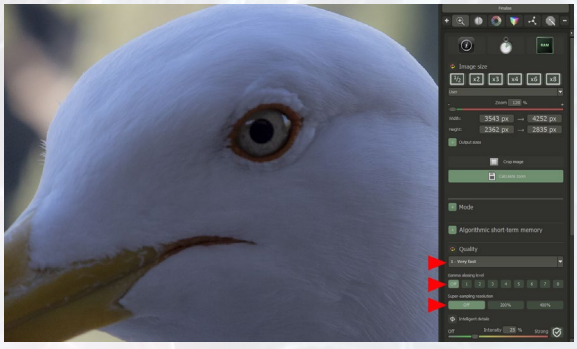
The module is not switched on in all cases and the different quality levels have an influence on other modules:

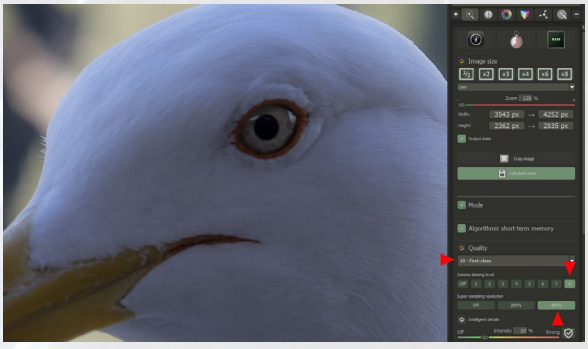
Change scaling below 100% - module is deactivated



If reductions below 100% are to be calculated, as in the medium website example, the quality module is automatically switched off and cannot be activated manually (**gamma aliasing** and **intelligent details** are also deactivated).

Interaction with Gamma aliasing and Super sampling

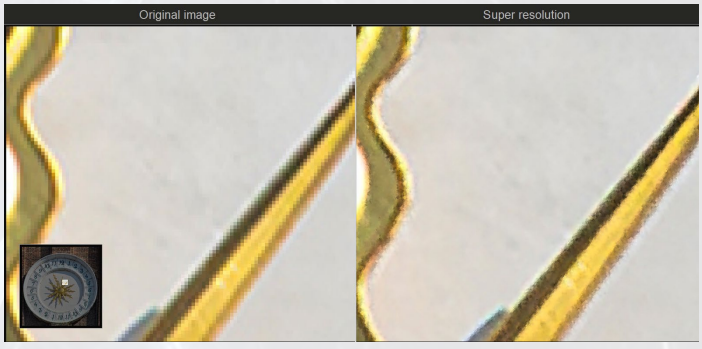




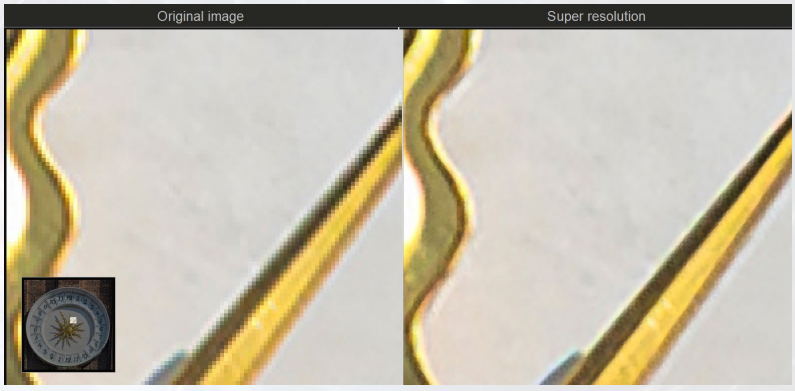
The quality module is active for all zoom sizes above 100%.
The values for **Gamma aliasing** and **Super sampling** change depending on the quality level set.
In the **graphic on the left**, the quality level is set to **1 - very fast**, **Gamma aliasing** and **Super sampling** are deactivated.
At **level 3 - good**, **Gamma aliasing** is set to **level 2** and **Super sampling** is deactivated.
Super sampling 200% is only switched on from the **7th quality level Superior** at **Gamma aliasing level 7**. In the last quality level (graphic on the right), Super sampling 'jumps' to **400%**, Gamma aliasing to the last **level 8**.

11. Gamma aliasing level

Gamma aliasing is a complex edge smoothing method that is set to **level 5** as standard at the **Excellent** quality level.
The individual levels determine how many variations of an image are generated and added together to produce the final result.
If gamma aliasing is switched off, the image is calculated as it is.
In **stage 1**, this image is scaled and then recalculated at **half brightness**. Both images are superimposed on each other and calculated (stacked). The result is smoother contours.
At **level 2**, the brightness levels **25, 50, 75** and **100%** are used, etc. **With each higher level, the contour stability (contour smoothing) is significantly improved**. At the same time, the calculation time increases.
For example, in the **3rd level, 8 variants** (2 to the power of 3) of the image are scaled with **deep learning** to a result image, in the last level 256 variants (2 to the power of 8), based on 8-bit images.



The differences become more visible if you **switch off gamma aliasing**, as shown here at 8x magnification in the example of a section of a sundial, and select a very fast calculation time ...



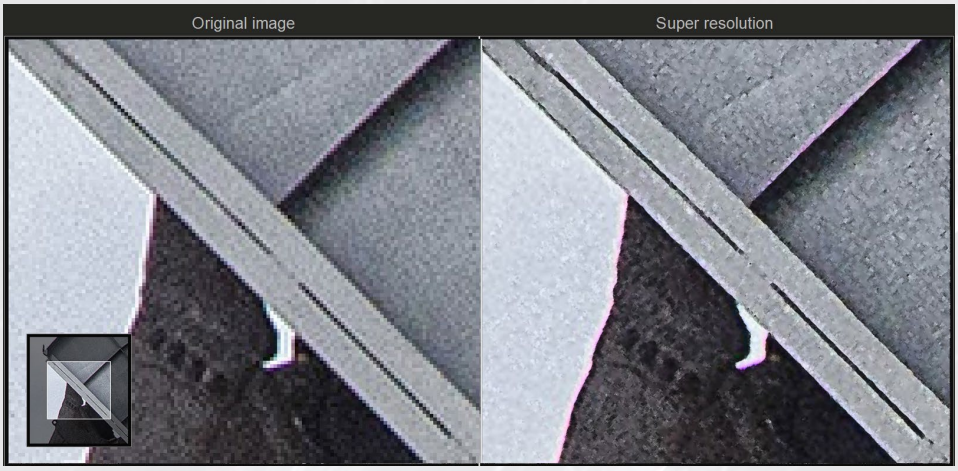
and then, for example, set the standard setting with quality level **Excellent** and **gamma aliasing level 5** for calculation with very clean, 'smooth' edge transitions and a convincing overall impression.
In the two highest quality levels, **Outstanding** and **First Class**, Gamma Aliasing automatically 'jumps' to the highest **level 8**.

12. Super-sampling resolution

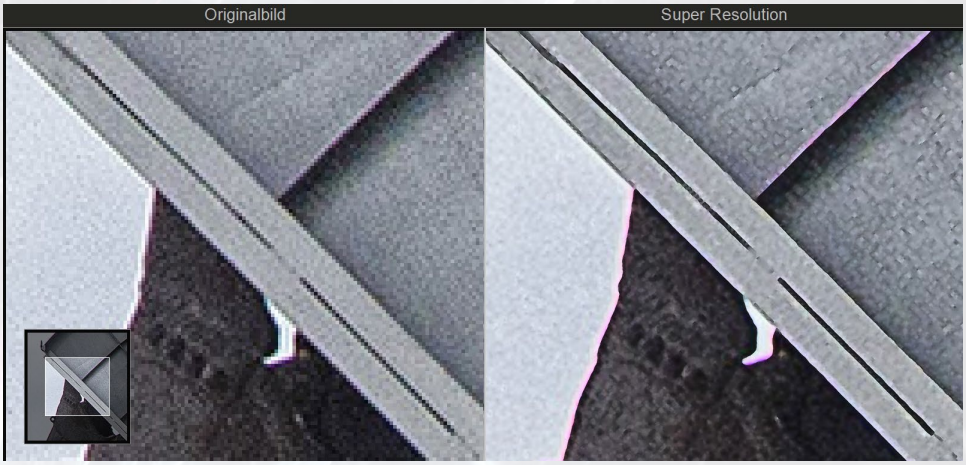
If you also own **SHARPEN**, you will already be familiar with this unusual technology, although it is slightly modified in **ZOOM**.
Super sampling is switched off by default and is set to **Off**, which is visible in connection with the other default settings for **Quality** and **Gamma aliasing**.
At a selected quality level of 7 - **Superior**, the resolution automatically 'jumps' to **200%**, at the highest **First Class** to **400%**.
All changes made are made 'internally': For example, if you change the resolution to **200%** at a zoom level of **300%**, the image is scaled "internally" to **600%** and this 'intermediate result' is scaled back down to **300%**.
With a selected resolution of **400%**, the image is scaled up to **1,200%** and then down again to **300%**.
In the meantime, a very large image is created before it is scaled down again to the selected resolution, with the result that the edges and contours in particular become visibly better, clearer and 'calmer'.

Example: This excavator is to be enlarged 6 times.
For a quicker comparison of the difference between **deactivated** super-sampling and the highest level of **400%** and subsequent interaction with the highest levels in quality mode and gamma aliasing, the image section outlined at the top left has been cropped.

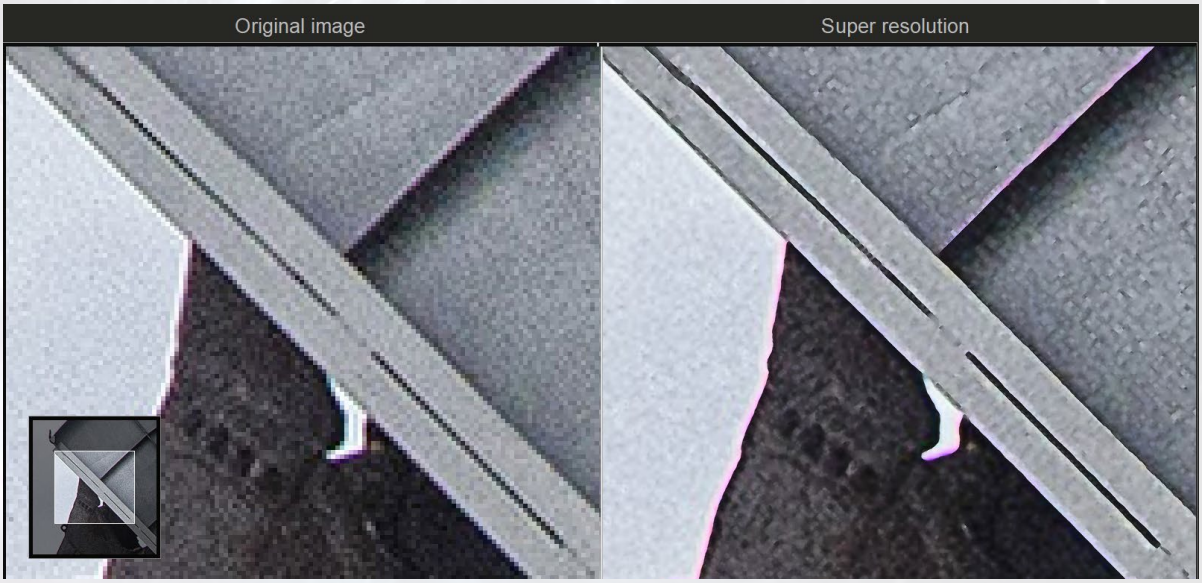
Comparison Super-Sampling **Off** to **200%**



With super sampling switched off and fast calculation, the result is of course acceptable. With identical calculation quality ...



... and a super-sampling resolution of **200%**, the edges look much ‘smoother’.

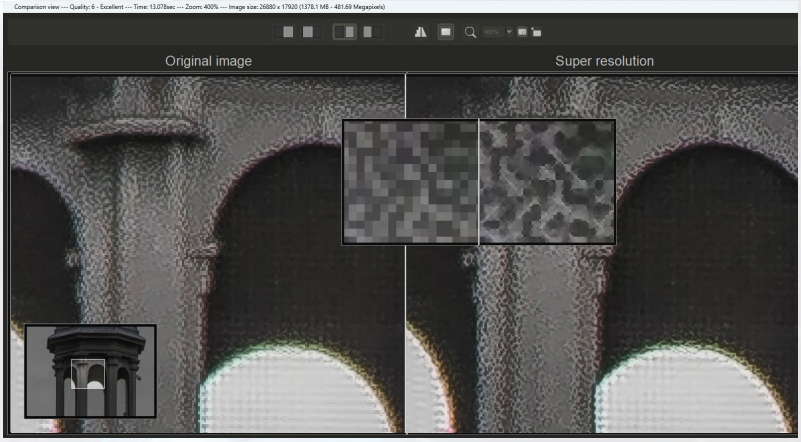


But only the interaction of the selected quality and gamma aliasing levels (in the example **Superior** and **level 6**) leads to the desired excellent result in outstanding quality.

13. Intelligent details

Intelligent details (Smart details) are **additional details** that are added to the image.

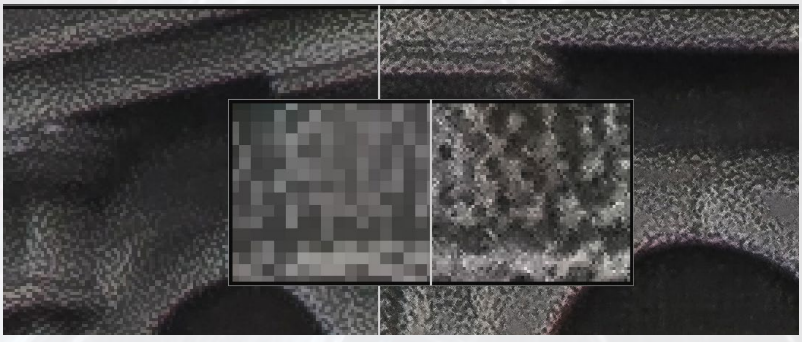
The intensity is set to **25%** by default. This means that details are always included in the image if you do not set the intensity slider to **Off.**



On closer inspection (in the example at a zoom size of 400%), small microstructures become visible that are not present in the original.
If you move the intensity slider to **Off**, the microstructures that have been calculated in are gone.

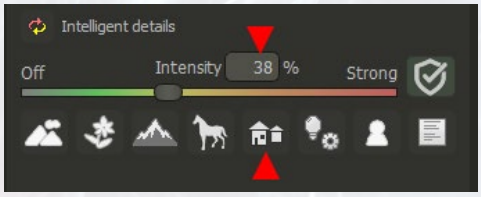
Intelligent details should appear natural, probable and plausible

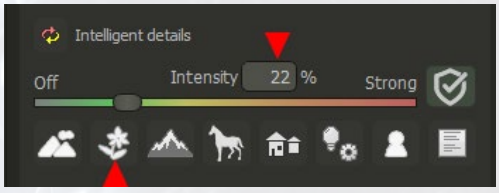
The decisive factor with this module is that these **additional details appear so natural and plausible that they enhance the overall impression of saved and printed images**, ...



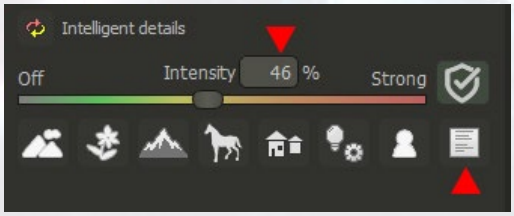
... but do not become image-determining themselves, as in the example where the slider has been set to **60%** and the added details suddenly 'stand out' and no longer appear natural, because the impression is created that something has been artificially added here.

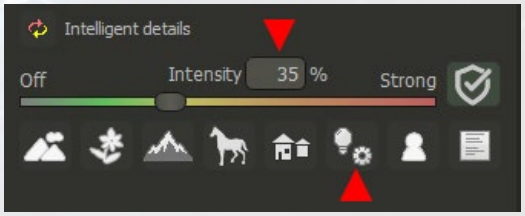
Selection of motifs





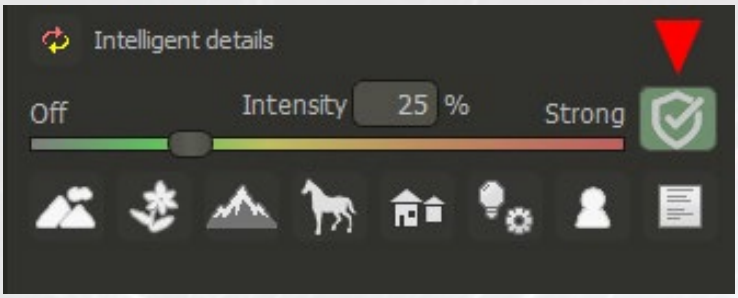
The **selection of motifs** under the intensity slider make it easier to find the 'right' value for the intensity. For example, if you click on the **architecture symbol** for an **Architecture motif** as in the example, **ZOOM** compares all architecture images from its 'archive' and suggests the value **38%** (graphic on the left). For **Plants and flowers** it would be **22%** (graphic on the right), ...



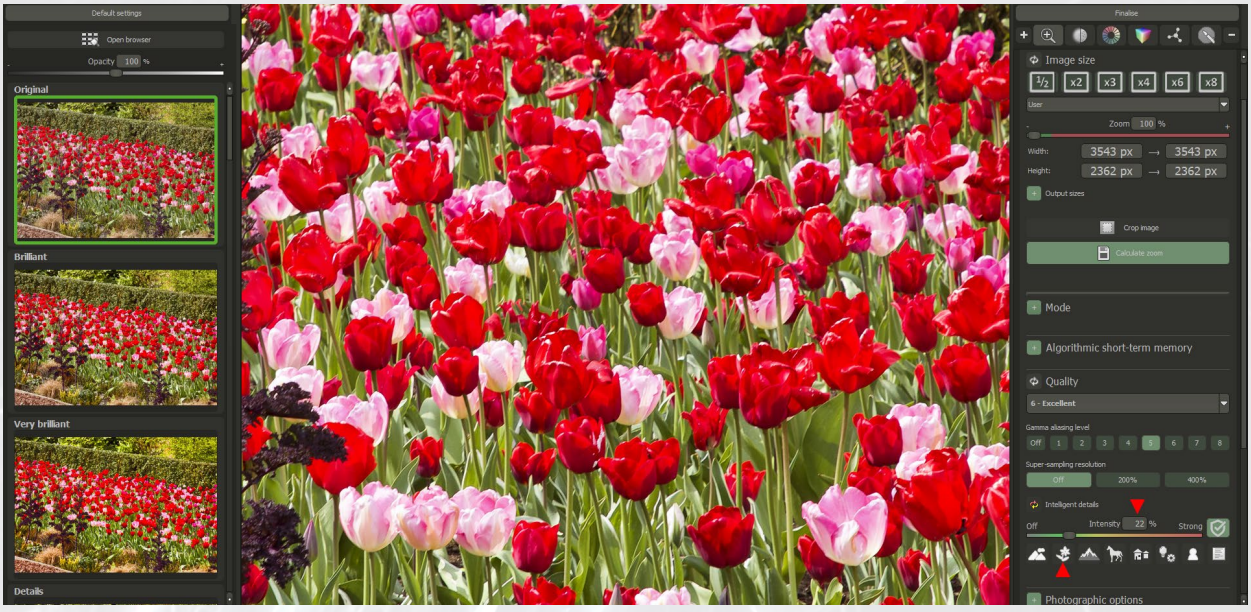


... **46%** for **Texts and drawings** (left chart) and 35% for **Technology** (right chart).

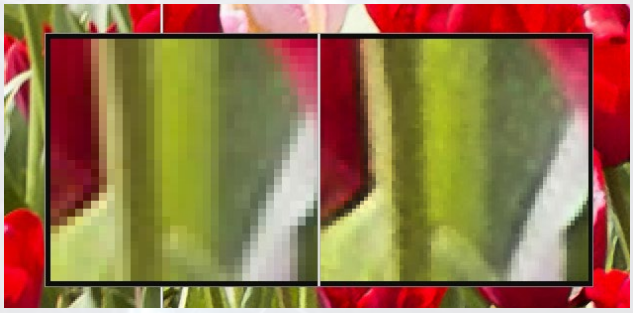
High-quality mode:



Click on the button to activate the special option **High-quality mode**.



In this mode, not only 'normal' microstructures (grains) are calculated into the image, but also **structure textures** are used to calculate 'real' structures into the image, which also take into account the respective colouring of the loaded motif.

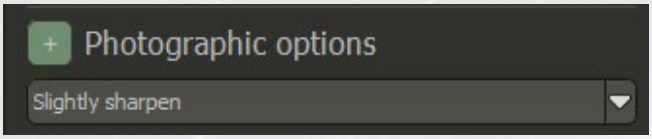


For example, different details are incorporated in the different colours of plants than in portrait shots.

Presets cannot be combined. If you have loaded an image with different types of motifs, e.g. flower boxes on a house wall, you must decide which type of motif should be prioritised as the **main motif** for the intelligent details, as the presets offered cannot be combined.

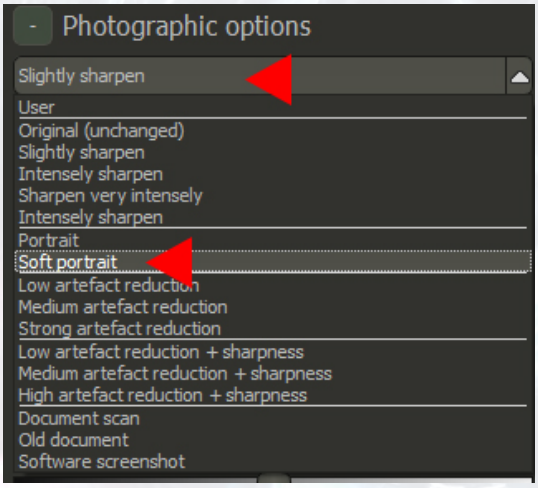
Reset: Click on the coloured arrows to reset the individually selected settings to the default values.

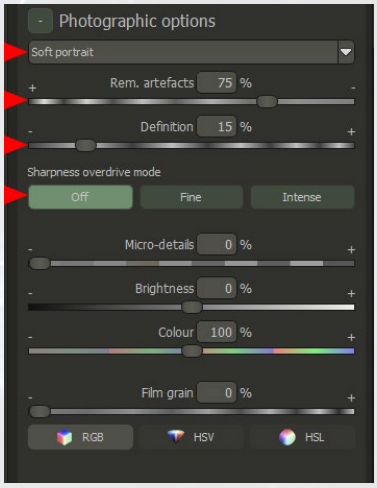
14. Photographic options



The photographic options are also part of the scaling algorithm. This means that all changes made here, such as influencing the brightness, cannot be tracked live as with the presets on the left-hand side, but **happen during the calculation** and only become visible in the comparison view afterwards. With the presets on the left-hand side as well as with all selectable modules such as **Colour module** or **Sensor error**, the **original image is always scaled and calculated**, but with these options **all settings are made during the calculation process**, which naturally leads to higher quality results.
By default, the module is active and set to **Slightly sharpen**.

Example: This portrait is to be enlarged to 300%. In addition to all other standard settings, the **Soft portrait** preset should be selected in the photographic options.

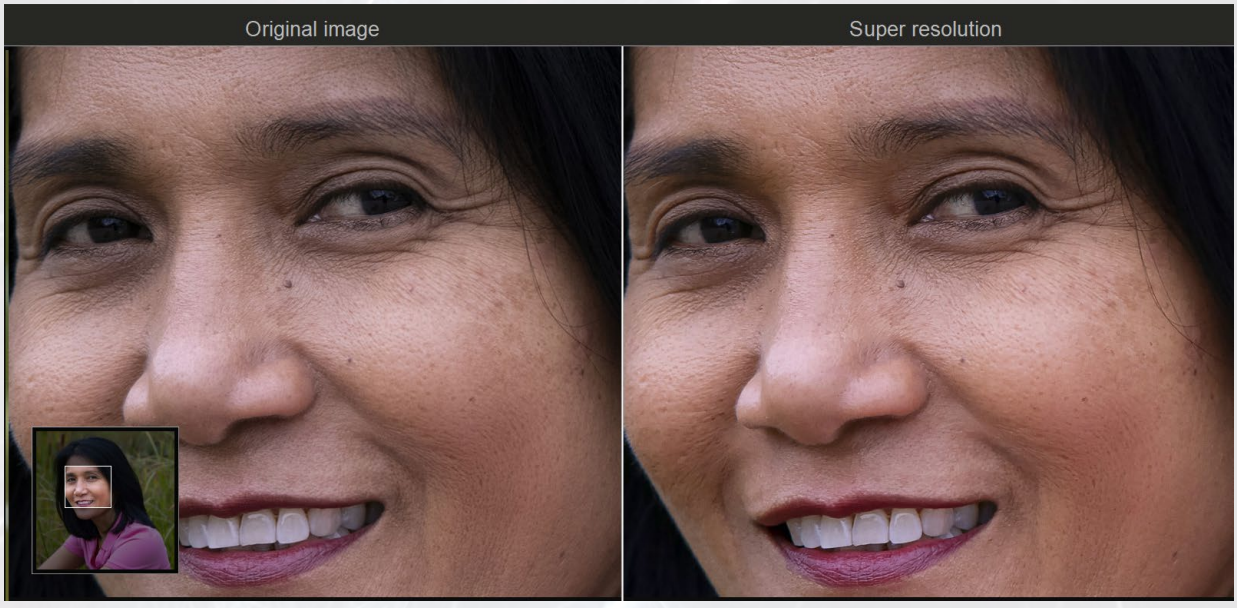




Click on **Slightly sharpen** or the small arrow next to it to display all the available presets, e.g. several **sharpening options**, **artefact reductions** or the lower **document options**, which are very helpful for old scanned documents.
By clicking on **Soft portrait** and then clicking on the **green button with the plus sign**, the module is switched to this preset and the associated parameters are displayed. In the example, only the two sliders **Remove artefacts** and **Definition** are active, everything else is in the initial position.

Overwrite parameters

If you change one or more of the associated parameters such as **Brightness**, **Colour** and **Film grain** for a selected preset, in the example **Soft portrait**, **Soft portrait** changes to **User** and the selected preset is of course retained.



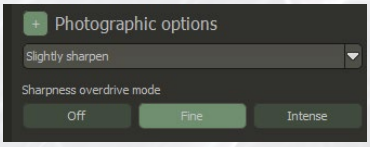
Click on **Calculate zoom** to calculate the selected zoom level and all settings, including the customised photographic settings, and display the changes in the comparison view.

Parameters are matched to the default settings

For example, if you select the **Old document** preset for historical documents or images as in the graphic (300% zoom), the **Remove artefacts**, Definition, **Micro details** and **Film grain** sliders are active.

Here, too, the quality of the result has been improved despite 3x magnification.
Note: The mode has been set to **Spectral** in the example.

Sharpness overdrive mode

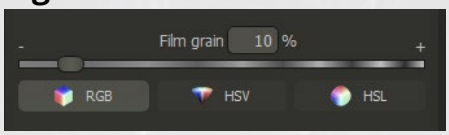


This mode 'belongs' to the photographic options and **sharpens the image automatically after the scaling calculation**, it is practically the 'final sharpening' of each image compared to the sharpness control, where the selected sharpness is **part of the calculation**.
By default, the **Sharpness overdrive mode** is set to **Fine** and thus **slightly** increases the sharpness of the image after the scaling calculation.

If you have selected the **Old document** preset, as in this example, the sharpening overdrive mode is switched off and is set to **Off**.
The same applies to **document scan**, **software screenshot**, **artefact reduction** without sharpening and the two **portrait** presets.

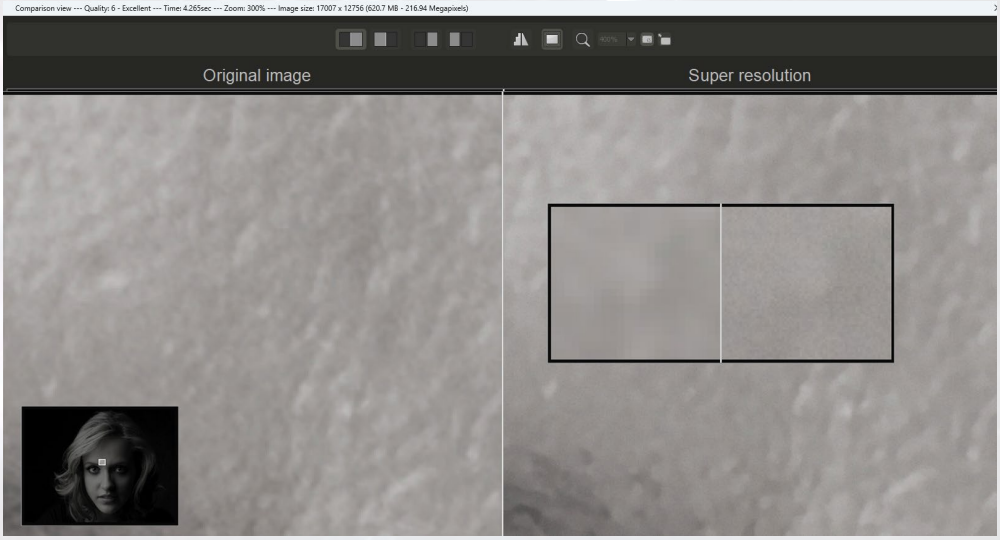
With the **Sharpen very intensely** and **Intensely sharpen** presets, **Intense** is activated and thus intensively increases the sharpness of the subject.

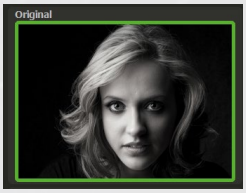
3 Colour spaces for film grain



If you select a light grain to ‘refine’ the smooth image, e.g. for a printout, you can choose between 3 colour spaces, which apply the grain in a more differentiated way depending on the brightness levels or colours in the image:

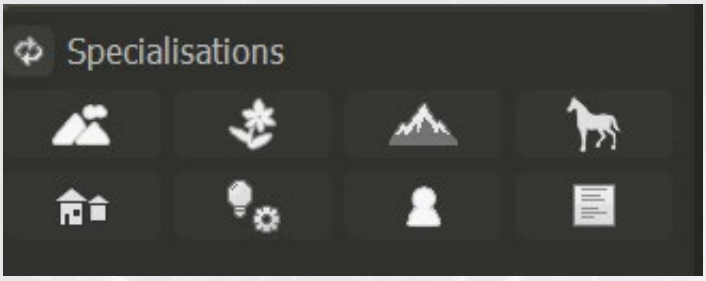
- **RGB**: This best-known and standard preset colour space has an even effect on all colours and brightnesses.
- **HSV**: This colour space (**H**ue, **S**aturation, **V**alue) reacts particularly sensitively to colours, whereby colour-intensive areas are covered with less grain than colourless areas.
- **HSL**: This colour space **(H**ue, **S**aturation, **L**ightness) reacts particularly sensitively to brightness. For example, if you want to apply more of the selected grain to darker areas of the image and remove more of the light areas, select this colour space.





For portrait subjects such as the two shown above and below, for example, you can achieve very fine grains at 3x magnification, **15% grain** and **Spectral mode**, which enhance and slightly ‘refine’ the image.

15. Specialisations

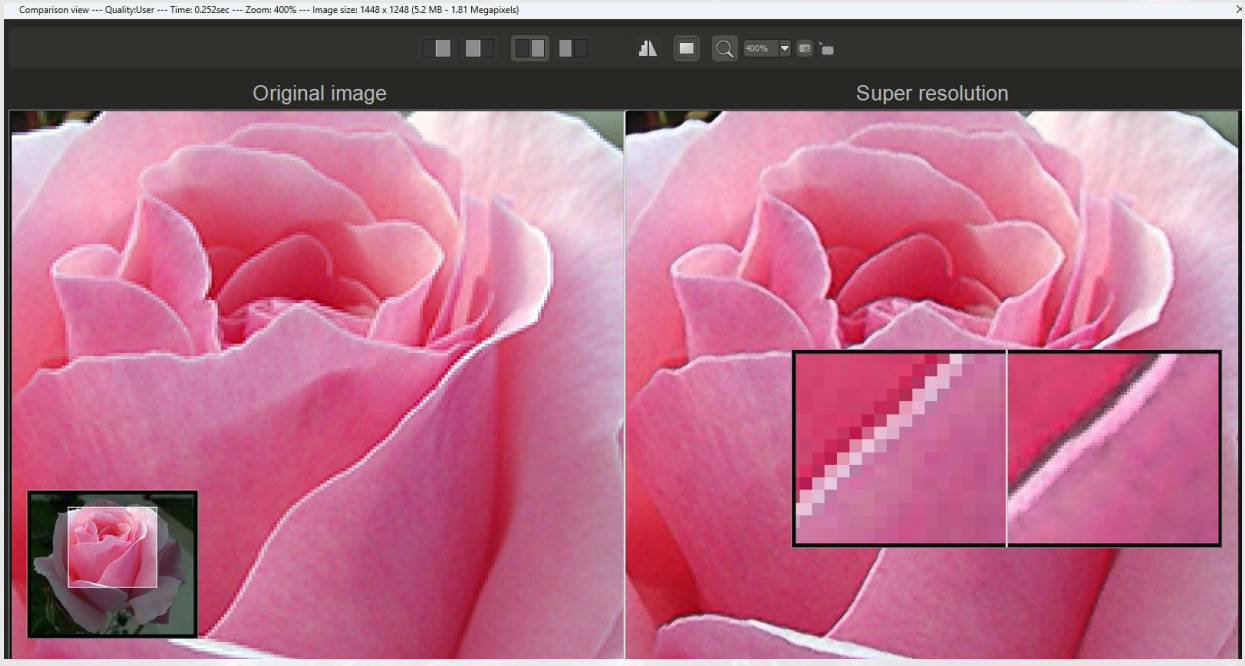


By clicking on one of the **specialisations** offered, you tell **ZOOM** which type of motif in the loaded image is or should be the focus. In contrast to the Intelligent Details module, where you only have one choice but can control the intensity, combinations are also possible in this module.

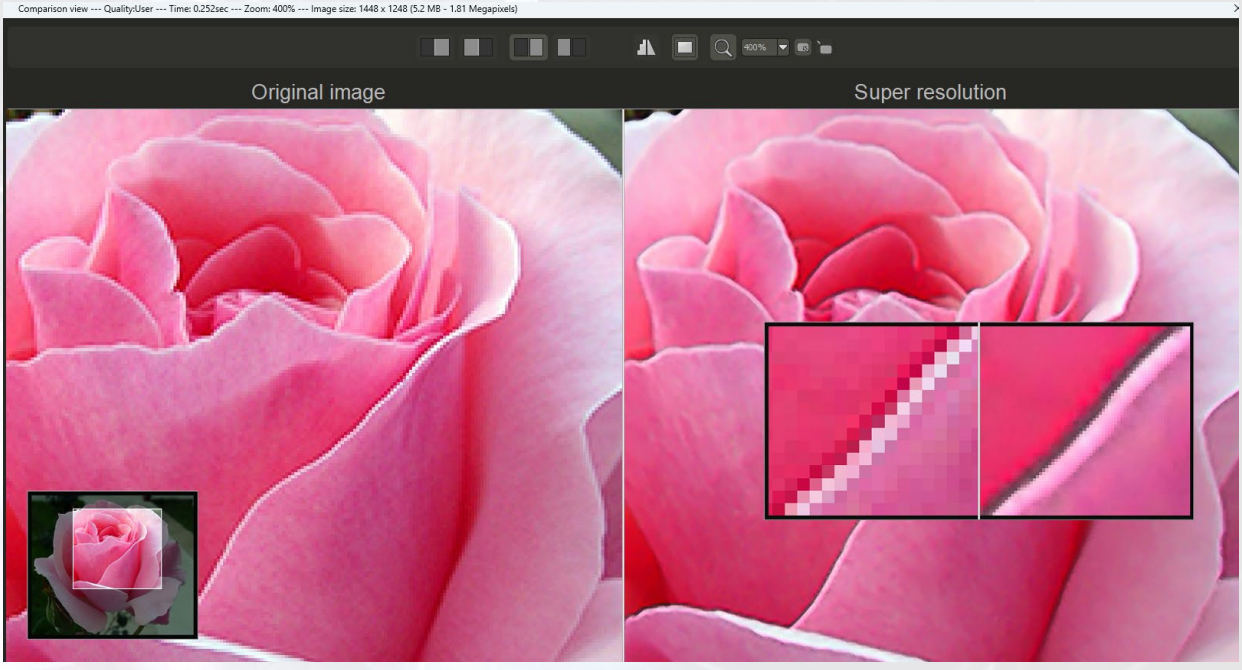
These specialisations contain, for example, **flower-specific 'puzzle pieces'**, which are added to the calculation after clicking in the **Flowers** category and optimise the result once again.
These improvements by selecting one or more specialisations are particularly useful if the original image is very small, as in the example **362 x 312 pixels**, and is to be scaled to **4 times the size**, because there are very few 'puzzle pieces' in this small image and all the additional ones created contribute to the good resulting image. The difference is much less visible with large original files.

These puzzle pieces are taken from **training images**, in the example of the **Flowers** specialisation, with various flower/plant images (see next chapter), which are not displayed but added internally as training images.
The consequence of this is that selecting the '**wrong category**', e.g. **Portrait** for a **landscape** image or **Document** for a **flower** image, does not improve the result, but can worsen it.

Image example

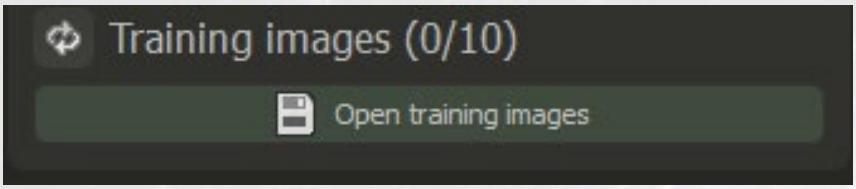


This rose has been scaled and calculated 2x with the standard settings and **Super-sampling resolution 200%** (hence quality **user** in the header) to **400%**. No specialisation was selected in the graphic above. The result is very good and convincing.



This graphic shows the comparison between the original and the resulting image with the **specialisation Flowers switched on**. The previously very good result has been surpassed once again and impresses with absolutely clean, smooth edge transitions and a harmonious, homogeneous overall impression.

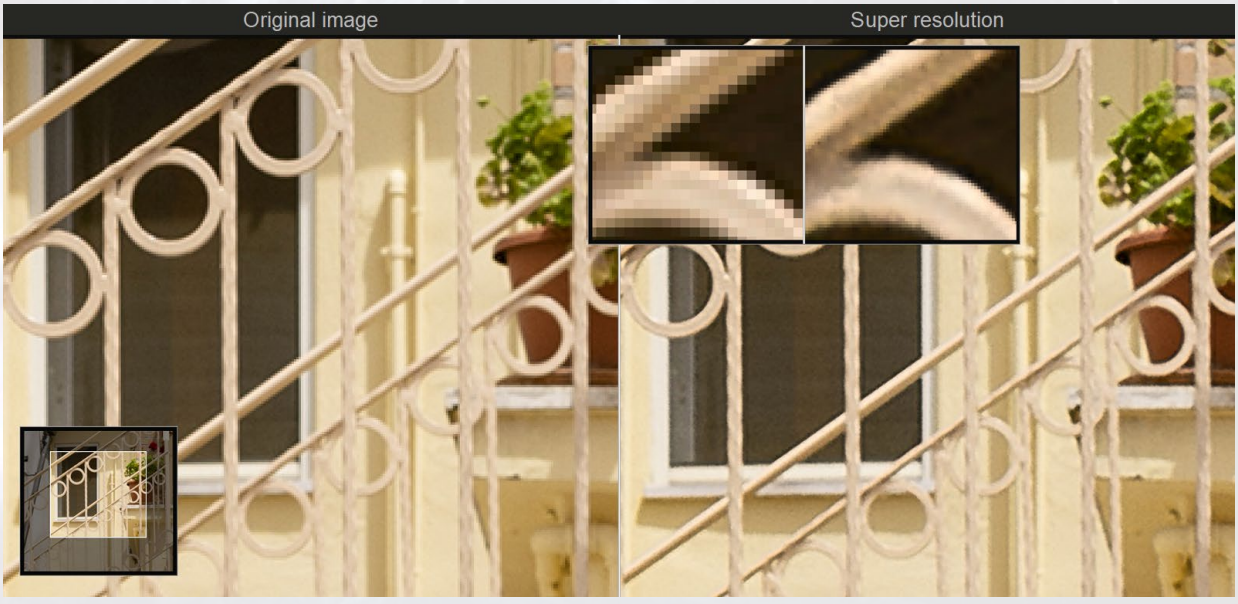
16. Training images



In this module, you can load up to **10 training images** as required to create additional ‘puzzle pieces’ for an invited motif and thus optimise the quality of the resulting images once again.
For this to be successful, the individual training image or several training images should ‘fit’ the respective image, i.e. architectural images to an architectural motif, landscape images to a landscape motif or female/male portrait images to a female/male portrait.

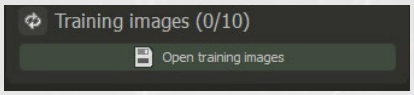
Example

This section of a banister is to be scaled to 3 times its original size and calculated.

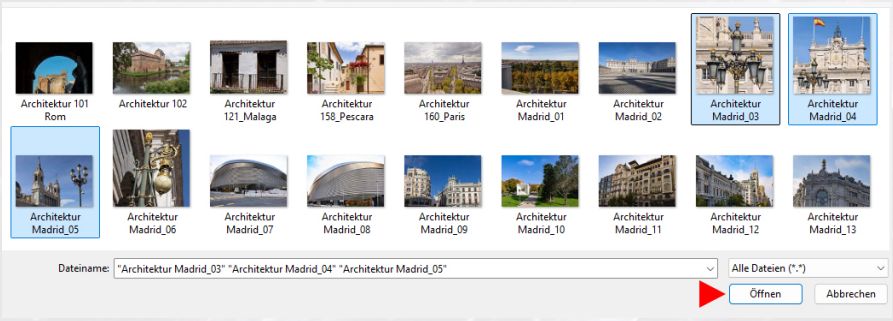


As expected, a very good result is achieved with all standard settings.

Open training images

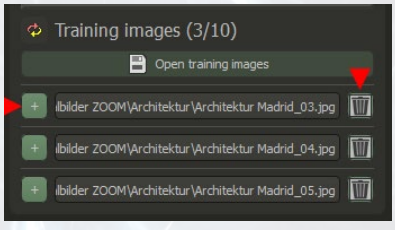


Click on the **Open training images** button ...



mark the images you consider suitable in a folder, in the example three.

By clicking **Open** again, these images are imported and displayed one below the other in the module. The number of imported images is displayed.



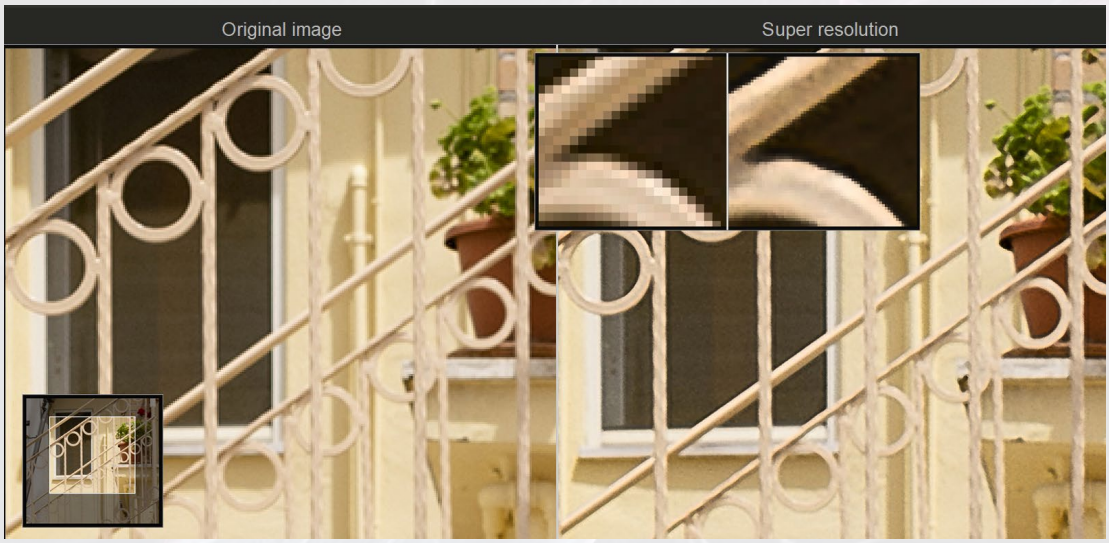
Hide images: As these training images are only important internally for the calculation, they can also be hidden by clicking on the **minus** sign and shown again if required by clicking on the **plus** sign.

Delete training images: Click on the **recycle bin icon** to delete **one** image, click on the coloured arrows to delete **all images**.

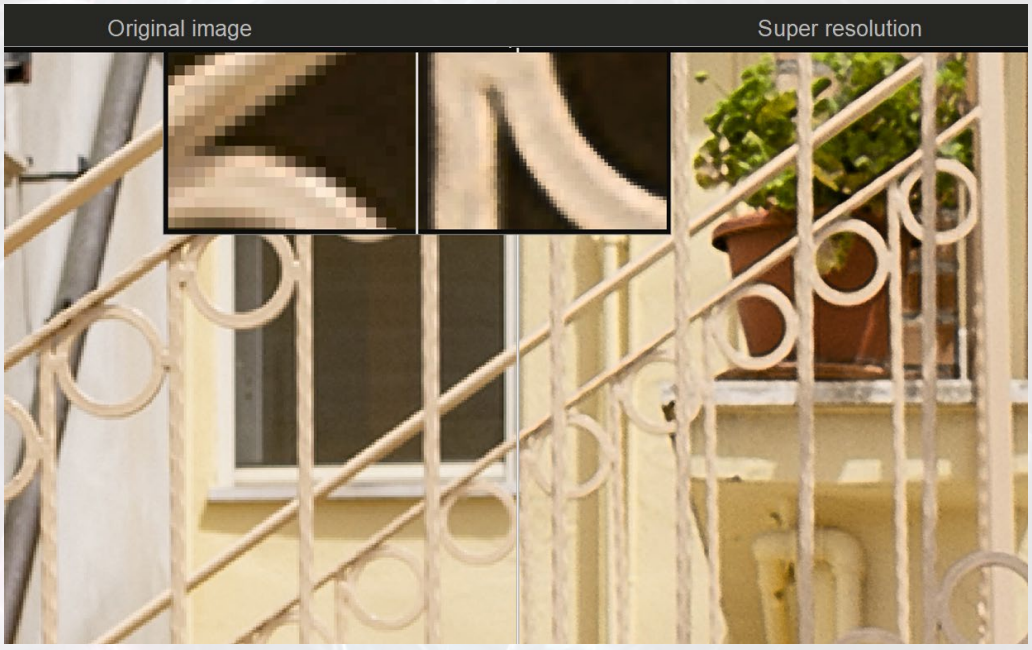
Note: The training images remain saved in the module until you close the programme or delete them manually.

Advantage of the training images

ZOOM selects the smallest additional image parts, ‘puzzle pieces’, from the invited training images in order to use them to reconstruct the arcs, lines and contours.



The excellent result image is of even better quality than the calculation without the imported training images.



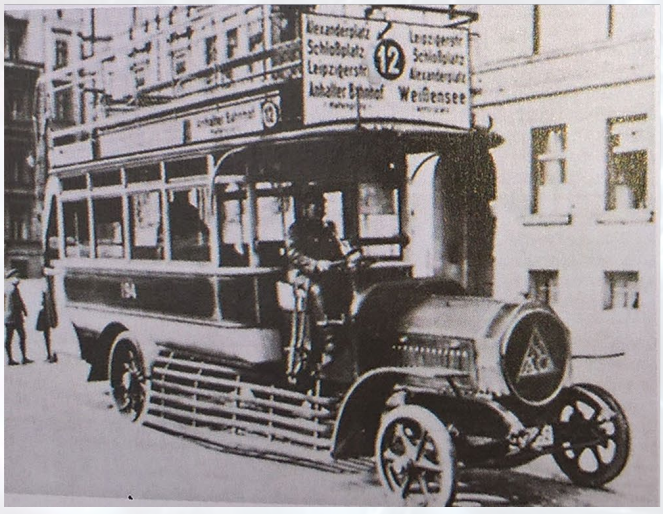
Combination of the ‘best’ settings: As each module in **ZOOM** can be combined with all others, you can try out different ‘best’ settings.

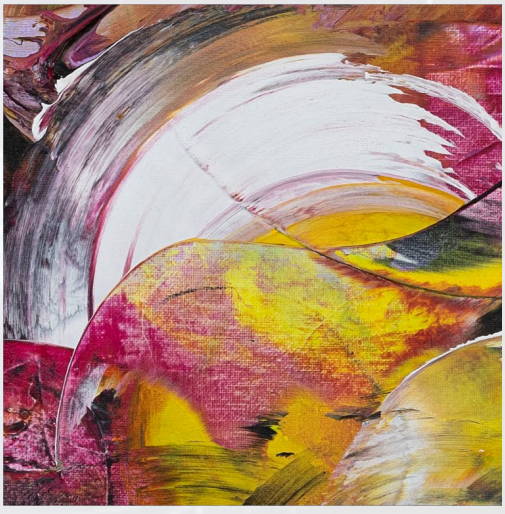
The example shows

- **Spectral** mode,
- **Excellent** quality,
- **Super sampling resolution 400%**,
- **Building**/architecture **specialisations**,
- **3 training images**

which give the image ‘the finishing touches’ at the expense of a correspondingly long computing time.

Decision selection





Depending on the original and the task, you decide whether you want to use the extensive range for individual changes and optimised result images or whether the already very good result achieved ‘in a flash’ with the standard settings meets your expectations.