



digipax

Viewer Version 2.0.1

User`s Manual

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1 General

All figures (digipaX screenshots) show the program windows in Classic Style. This allows the images to look clearer in the documentation. The program is normally set to Black Style, which is more suitable for viewing medical images.

2 System requirements

2.1 Supported operating systems

The following Windows operating systems are supported by this software:

- Windows 7 (SP1)
- Windows 8.1
- Windows 10
- Windows Server 2008 R2 (SP1)
- Windows Server 2012 / Windows Server 2012 R2
- Windows Server 2016
- Windows Server 2019

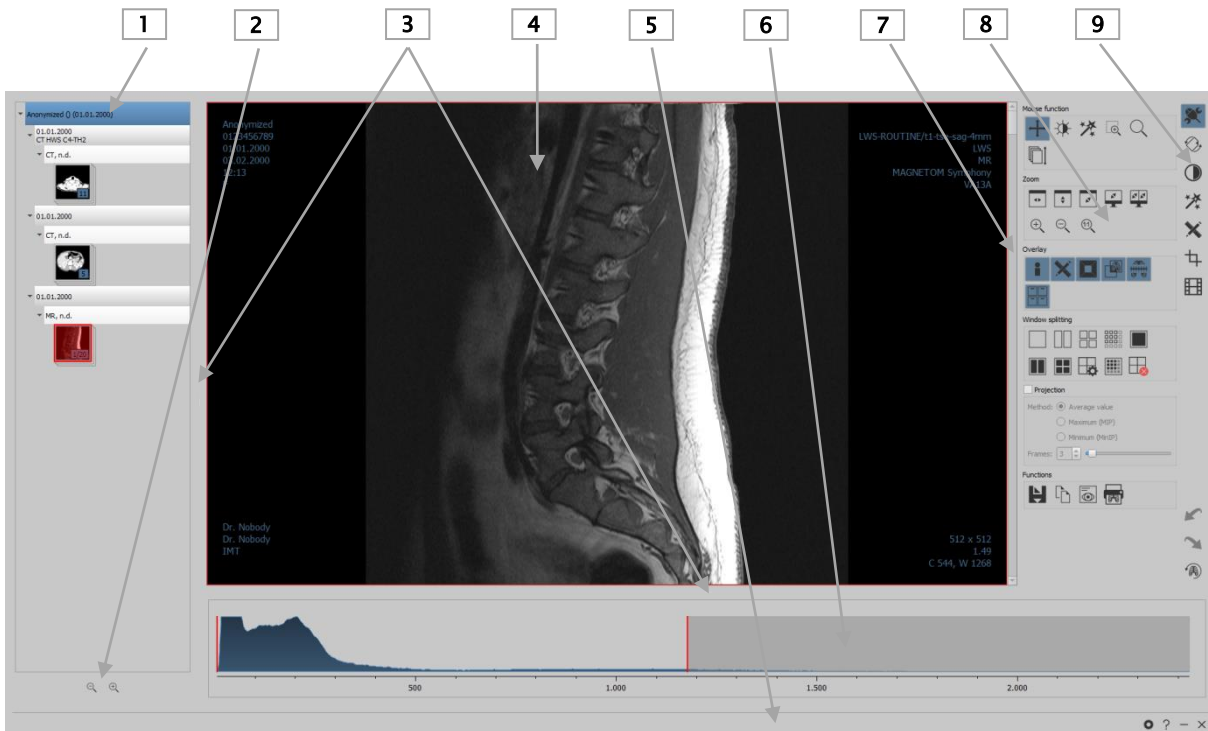
2.2 Minimum hardware requirements

- min. Pentium 4 CPU or comparable from 2,1 GHz
- min. 1 GB RAM
- - up-to-date graphics, SXGA, resolution min. 1280 x 1024
- DVD-ROM (if simple CD used, then CD-ROM is sufficient)
- for USB medium USB port 2.0

3 Start

The software "digipaX Viewer" will start automatically when you insert the CD, unless the auto-start option in Windows is not disabled. You can start the software by running the file "dpView2.exe" manually.

4 Screen layout



Screen layout and split

- 1 – Preview tree: with information and display of the thumbnails of the patients (in a tree structure with studies and series)
- 2 – Zooming in and out the thumbnails
 - 🔍 Zoom in
 - 🔍 Zoom out
- 3 – Window splitter: moving window split
 - ⏏ Drag left or right to change window split
 - ⏏ Drag up or down to change window split
- 4 – Image area / Viewer: display of one or more selected images one beside / under the other
- 5 – Bottom bar: with additional search box and further functions
 - ⚙ Accessing configuration
 - ❓ Service
 - Minimise
 - ✕ Exit
- 6 – Histogram of an active image
- 7 – Scroll bar to scroll single images of the series
- 8 – Tool with functions for editing images (divided to various toolboxes)
- 9 – Toggling between various toolboxes

4.1 Bottom bar

The bottom bar is always visible. It contains buttons for Configuration, Help function as well as the buttons for minimizing and exiting the program.

4.1.1 Configuration and Service

The button Configuration opens the dialog for the program settings. The button Service provides information on manufacturer and product as well as the link to the User's Manual.

4.2 Navigating through the program

4.2.1 Drag & drop function

The drag & drop function is used for easy operation throughout the program. Whenever you want to transfer an image, a series, a study, or a patient to the viewer, you only have to left-click the desired object with the mouse and drag it while holding down the mouse button to the desired location.

5 Viewing images / Viewer

The component Viewing Images comprises the areas of image selection, image display and image editing or manipulations.

Both greyscale and colour images are supported. These can be presented uncompressed, RLE- or JPEG-compressed.



There is an indication shown on the top edge of the images compressed with lossy data compression. Those images are unusable for diagnosis as possibly important information on the image could get lost due to compression.

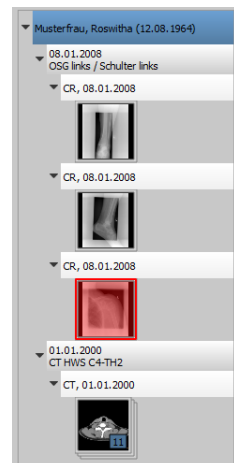
Changes made to greyscale images are stored in the so-called Presentation State. This means that rotations, flips, windowing changes, filters, annotations and measurements, zoom changes or shutters are saved when closing the image, and are available when the image is opened again. All changes can also be deleted later and the original images can be restored.

Changes to colour images are not saved and are lost when closing the image.

5.1 Selecting images

The images are selected in the preview at the left margin of the screen. The width of the preview can be changed by the window splitter and the preview can also be completely hidden.

At the top of the preview area detailed information on the current patient is displayed. The tree view below contains the studies of the selected patient. The patients form in each case a superordinate node. Thereunder the nodes of the existing studies are presented that can also have a number of subitems: image series and images. All these nodes can be expanded and collapsed. In the nodes of the series the thumbnails are displayed. The series are displayed as stacks, therefore only one thumbnails can be seen on which the number of images of this series is stated. In the Configuration under image preview a setting can be made to display each image individually in the preview, even for the series. The exception are multiframe series that are always displayed only as a single thumbnail. Multiframe series are the image series packed in a DICOM file. In the right upper corner of the preview image a number of currently displayed frame and number of the frames are shown.



The thumbnails are marked by a red framework, even if this image is displayed in a large image view.

When stopping the mouse over a node (patient, study, series or image) information on it is displayed in the tooltip window.

The size of the thumbnails can be set by using two buttons Plus and Minus below the tree structure. The size of the images is stored and used at the next program start.

By clicking a thumbnail this image will be uploaded to the viewer. If there is an image window still free in the viewer (by splitting images in the display area of the viewer in for example 2x2 images, more images can be displayed next to each other in the viewer), it is displayed in this free image window. If no image window is free, the image is replaced in a current image window.

Thumbnails can also be dragged and dropped to an image window of the viewer. So the user can split very flexibly the images on his display.

When you click the node of a study the images of this study are automatically uploaded to different windows of the viewer according to the modality of the images. Window split is to be defined in the Configuration (see 8).

5.2 Image display

In the viewer images are displayed. The viewer can be sliced in many even pieces, which allows displaying multiple images one beside the other. Simultaneous display of 1 to 36 images is possible. These pieces can be split into subsections to present single images of the series in one grid.

For the viewer, there are many functions for image representation available.

These functions are placed in the toolbar that can be displayed by using the button at the top right. These functions are described in next sections.



5.2.1 Mouse functions



Moving



Windowing



Magic Sharp



Dragging on zoom rectangle



Loupe



Scrolling

In this toolbar the action for the left mouse button can be selected:

- **Moving (if display size is larger than image window) – this is a default setting**
- **Windowing (brightness/contrast)**
 - ➔ horizontal mouse move: modifying window centertab (brightness)
 - ➔ vertical mouse move: modifying window width (contrast)

In the Configuration (category Others) these moves can be also modified.

- **Magic Sharp Filter (size/sharpness)**
 - ➔ horizontal mouse move: changing size
 - ➔ vertical mouse move: changing sharpening amount

For detailed description of the filter functions please refer to chapter 5.3.3.1 Magic Sharp.

- **Zoom rectangle**
- **Loupe**
- **Scrolling (scrolling single images in the series)**

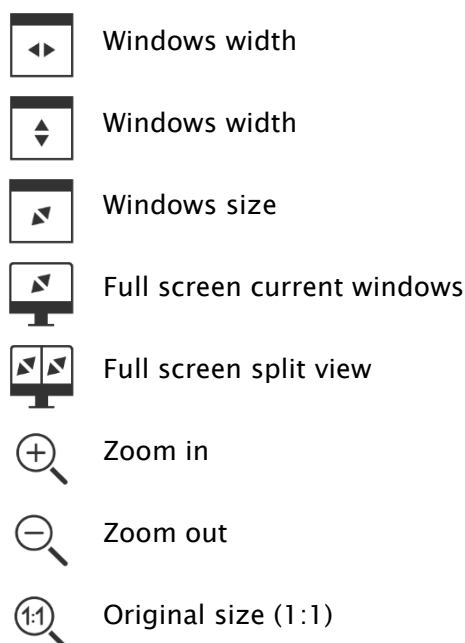
The function can be impacted by the following combinations of keys:

- Alt + left mouse button: windowing
- Alt + Shift + left mouse button: dragging on zoom rectangle
- Alt + right mouse button: loupe

Further mouse functions:

- Right mouse button: zooming in / out (with vertical mouse movement)
- Middle mouse button or pushed scroll: windowing
- Rotating scroll: next or previous image of the images series, study or the patient (for each setting), if existing
- Ctrl + Shift + left mouse button held down: Magic Sharp filter
- Left and right mouse button held down: Magic Sharp filter

5.2.2 Zoom



The options for zooming images refer in each case to currently active image.






According to the standard the image display in a window is initialized in this way, that the image is scaled to the window size. If the size of the window changes in this option, e.g. by division of the image, the zoom factor is adapted accordingly, so that always the full image is seen.

The full screen mode can be activated by simply pressing the Enter key or by double-clicking the image, or Shift + clicking the preview image, or clicking the button "Current window in full screen". The current image is now scaled to the full screen size. If you press Shift + Enter or Shift + double-click, or click the button "Split view in full screen", all displayed slices (when window sliced) are scaled to the full screen size. The full screen mode can be exited by pressing the Esc key or double-clicking.

Key combinations at a glance:

Enter key:	Active image in full screen (red frame)
Double-clicking the image:	Image in full screen
Shift + clicking thumbnail:	Image in full screen
Shift + Enter key:	Split view in full screen
Shift + double-click:	Split view in full screen
Escape key:	Exiting full screen
Double-click:	Exiting full screen

5.2.3 Overlay

-  Show information
-  Show annotations and measurements
-  Activate display shutter
-  Activate bitmap overlays
-  Show scoutlines











Overlay divides into following areas:

- Information (in the image corners),
- Annotations + measurements (e.g. measured sections or angles),
- "Display Shutter" (blanking everything outside the selection),
- Bitmap overlays (overlay images)
- Scout lines (presentation of the position of particular sectional images in CT und MRT series)

For each of these areas there is a button in the toolbar that is used to hide and unhide the area.

If an image is opened, in which a selection was set, or if a selection range is set by the user, the button "Display Shutter" is automatically set, so on, and the user can turn it off or on using the button.

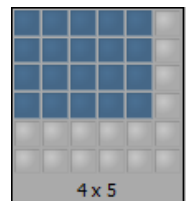
5.2.4 Image split

-  Series grid: 1 x 1
-  Series grid: 1 x 2
-  Series grid: 2 x 2
-  Series grid: user-defined
-  Image grid: 1 x 1
-  Image grid: 1 x 2
-  Image grid: 2 x 2
-  Image grid: automatic
-  Image grid: user-defined
-  Reset image split

The image window can be split into even pieces to arrange particular series of a study in one grid. These pieces of the series can also be sliced to display single images in one grid.

To split the series of a study into a grid, use the buttons for a series grid (see above). You can choose between 1x1, 1x2, 2x2 and user-defined up to 6x6 grid. To slice one of the pieces, click this piece and use the buttons for image grid (see above) with the same functionality.

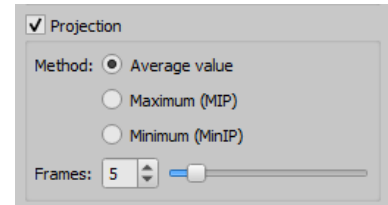
The button “Automatic image grid” can be used to arrange single images of the series automatically arranged into the current slicing. The button “Reset window split” restores the main window.



5.2.5 Projections

In reconstruction of images, intensity of the same pixels of the consecutive images is evaluated and from these values a new output image is generated and visualized. For example, if there are five images, for each pixel of the output image a new intensity value is calculated from the five values.

- Average intensity: an average intensity value is calculated
- Maximum (MIP): a maximum intensity value is calculated
- Minimum (MinIP): a minimum intensity value is calculated



- Frames: amount of evaluated images

5.2.6 Other functions



Export image

see chapter 6



Copy image to clipboard

see chapter 5.2.6.1



Header information (DICOM Dump)

see chapter 5.2.6.2



Print image

see chapter 7

5.2.6.1 Clipboard

By using the button for clipboard the current image in the current presentation form can be copied to the clipboard. This means that the overlay objects (information on image, annotations and measurements as well as display shutter) will also be copied in the image, provided that they are unhidden. If clicking this button is accompanied by coevally press on the Shift key, the image will be copied to the clipboard in its original size.

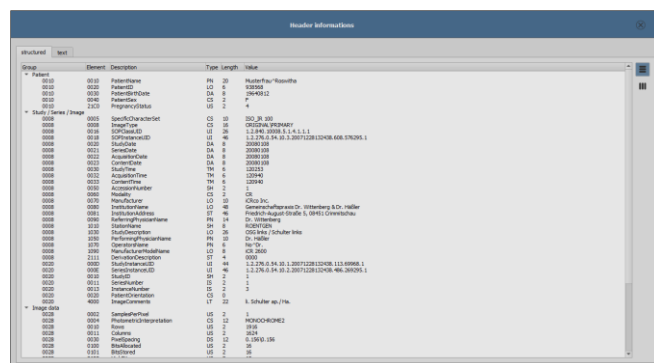
5.2.6.2 Header information (DICOM Dump)

By using the button on the toolbar a dialog can be opened, in which the DICOM information (tags) of the current image are displayed. These tags are structured in groups for a better overview.

All tags, also private, are shown.

A modification of the values is not possible.

In the first tab "structured" of the window, individual data from the header can be copied to the clipboard by using the Copy function and pasted in another application (e.g. text processing). To do this, double-click the element required and right-click the Copy but-



ton. For the multiframe series, it should be noted that these series have only one header for the entire series, in which the information on single images is contained.

In the second tab "Text", entire parts or a complete header can be copied to the clipboard. To do this, check the desired rows with the mouse or the complete header with the Ctrl+A keys and copy the text to the clipboard. From there the data can be pasted into a text file or a Word document etc.

5.2.7 Structured reports

Structured reports are various types of reports stored along with the patient in the archive or on patient CDs in DICOM format under the SR modality. These reports are displayed as icons in the image preview.

Click the icon in the preview or drag it with the mouse to the image viewer, then double-click the large icon in the viewer and the report will be opened in a separate window.

5.3 Manipulation on images

On the right side of the image display the tools for editing images are placed. These tools can be hidden or unhidden by using particular buttons. They are arranged vertically and sorted according to the topics.

Below the tools the buttons for undoing the last actions and restoring the undone actions are placed. The actions are displayed as text in tooltips. The actions refer each time to the active image. I.e., if the image is changed, one cannot undo the actions for it considering the circumstances and the buttons therefore are deactivated.

The last button "Restore original image" is used to undo all modifications performed. Before undoing the system requests confirmation and the original image is then restored just as it is stored in the image archive.



For CT and MRT images, the operations on images are automatically applied for the entire image series, otherwise each time for the active image.

For greyscale images the modifications on the images are stored. For colour images the modifications are not stored, but they are only temporary. I.e., if you change the patient or close the program, the adjustments/modifications to a colour image will be lost.

5.3.1 Transformations (rotation, flip, inversion)

The images can be rotated by using the button 90° left, 90° right or 180°. They can be flipped horizontally and vertically, and also inverted.



Each operation can be undone as well as redone by using both arrows at the bottom.

Rotate:



Rotate left



Rotate right



Rotate 180°

Flip:



Flip horizontally



Flip vertically

Invert:



Invert

5.3.2 Windowing

Windowing is a usual method for the preparation of greyscale images. For colour images windowing is deactivated.



The greyscale range to be displayed is selected by specifying window center (brightness) and window width (contrast). These values are adjustable each time by using the sliders or input fields.



Edit presets

Furthermore, the settings can be used quickly from the list of presets.



The modification of these presets or adding the user-defined presets is possible through a dialog that is displayed when the button "Edit presets..." is used.

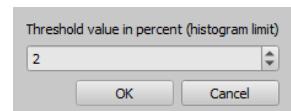
With the automatic windowing, additional special default settings can be defined which will be then applied to the open image just by one click.



Configurable buttons 1 to 3 are intended to determine automatically appropriate values for windowing using calculation algorithm based on the histogram. For this algorithm, a threshold value must be defined.

Klicken Sie mit gehaltener Shift-Taste auf einen Schalter, um den Schwellwert für diesen Schalter zu bestimmen. In a subsequently opening dialog you can enter values between 1 and 49. The higher is the value entered, the sharper the image will be. In

this way, you can define default setting for each of the 3 buttons. By single-clicking the corresponding button the algorithm for calculation and the values obtained out of it for windowing apply immediately to the image.



The button "Set ROI" (ROI = Region of Interest) is used to draw a rectangle in the image (ROI). From this rectangle the optimum values will be calculated and applied to the image. To do this, first click the button and then set the rectangle by double-clicking the image. The values will be immediately calculated and applied to the image.

The next button is an interactive rectangle (ROI). Click the button and draw the rectangle along the image. The optimum value is determined automatically inside the rectangle and displayed throughout the entire image. When you have found the appropriate representation, click again to apply the value to the image. With the mouse wheel you can increase or decrease the rectangle size. With “Control” (Ctrl) or “Shift” keys pushed additionally, the rectangle size can be modified, either in its width or height. You can cancel the process with “Esc” key.



With the button “Entire area”, the entire visible area from the minimum to the maximum of grey levels contained in the image is being displayed.

5.3.3 Filters

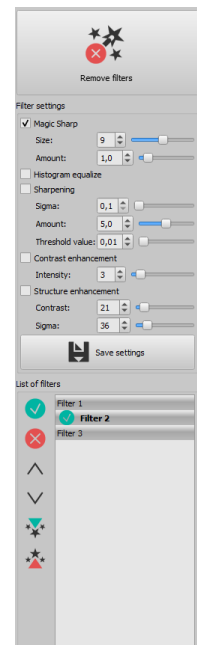
The filters: Magic Sharp, histogram equalization, sharpening, contrast enhancement and structure enhancement are available. They can be used individually or in combination. To use a filter, tick the relevant box.



With the button “Remove filters” all filters are disabled and the values reset.

As soon as the filter is activated, a small icon is shown on the lower edge of the image. The filter may be deactivated by single-clicking this icon and with another mouse click reactivated. This way, you can compare images with and without the filter. Double-clicking the icon removes the filter.

Various filter settings may be stored in the list of filters. These filters may be then quickly applied for other images. You can export and import this list at another working station. Thus, various filter presets may be easily shared with many stations.



5.3.3.1 Magic Sharp



This filter will have no effect for colour images. It may be used only for greyscale images.

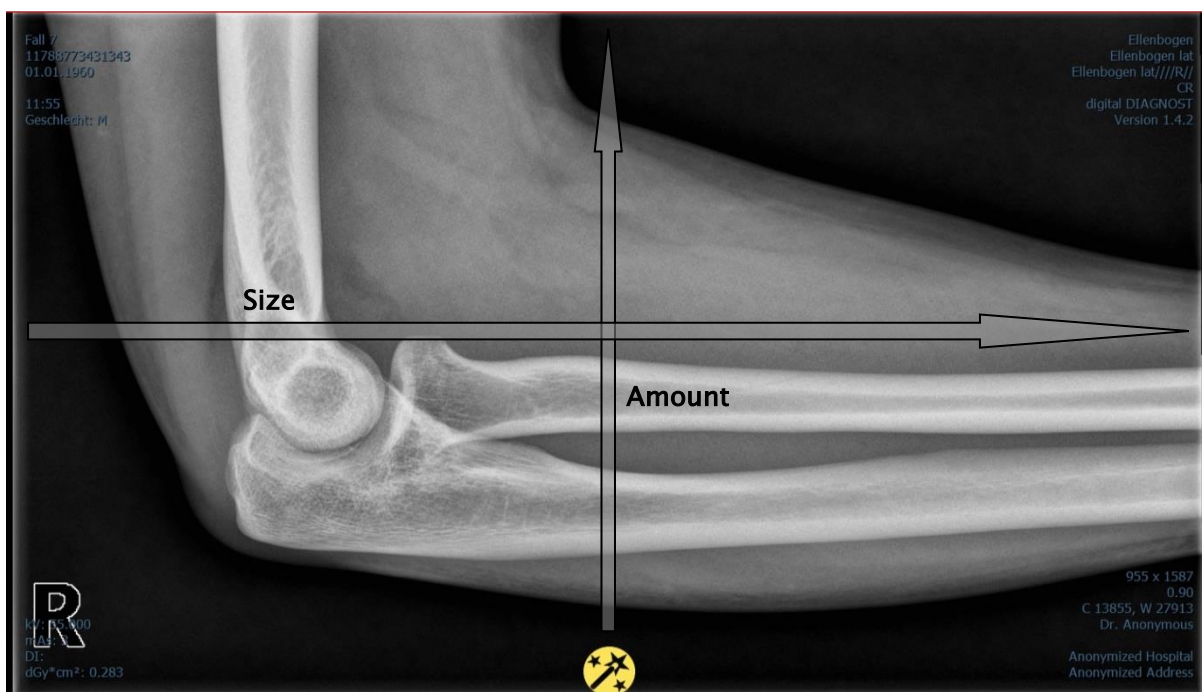
The algorithm of this filter will automatically adjust image contrast and the adjustment will be made individually for partial areas of the image. In this way, the contrast will be optimized for individual partial areas of the image, which usually leads to better results than contrast adjustment to the entire image. The size of each partial area is adjusted with the parameter “Size”. This value can be set in a range from 2 to 16. The higher the set value, the smaller the partial areas of the image. The value of 5 stands for 1/5 of the image while 10 stands for 1/10 of the total image size. Thus, the higher the value, the more visible small structures will become. The parameter “Sharpening amount” defines intensity of the effects. This value can be set in a range from 0.1 to 10. Values smaller than 1 lead to unsharpness, values larger than 1 increase the contrast. If the value is equal 1, the resulting image is identical as the original image.

5.3.3.2 Mouse function "Magic Sharp"

With this function the Magic Sharp filter can be set by dragging the mouse over the image. This function is activated with the mouse functions that are described in chapter 5.2.1. The easiest way is to press right and left mouse button simultaneously. This will start only the "Magic Sharp" filter. Other filters will remain inactive.

Enable the function using one of the methods described. By dragging the mouse horizontally from left to right, the value increases from minimum 2 to maximum 16, and by dragging the mouse from right to left, the value decreases back.

To adjust the value for sharpening amount, drag the mouse vertically from bottom to top to change the value in a range from 1 to 10.



Filter active



Filter inactive

5.3.3.3 Histogram equalizing

With histogram equalizing grey levels of the areas of interest will be extended to greyscale and the less frequently used grey levels will be narrowed. Thus, the structures in the image areas of interest will be highlighted.

Tick the box to activate or deactivate this filter. This filter has no further settings.



The changes that results by use of the histogram equalizing will not be reflected in the histogram itself because in the histogram, always the values of original image are represented without the filters applied to it

5.3.3.4 Sharpening

With sharpening the differences in brightness are highlighted making the image "sharper". The sharpening is calculated in pixels. The "sigma" parameter specifies size of the structures to be sharpened. The larger this value is, the more coarse structures are sharpened. The parameter "Sharpening amount" defines how much the image is to be sharpened. Higher values lead to intensifier sharpening. The parameter "Threshold value" is set in order to avoid simultaneous refining smooth areas in the image. In order to sharpen all areas of the image, set this parameter to 0. In order to sharpen only the high contrast areas, increase the threshold value.

Select the image area that is to be studied. Zoom the image in this area in if needed. Start with a higher value for strength and then increase the sigma value until the structures are emphasized well enough. The sharpening amount may then be reduced again.

5.3.3.5 Contrast enhancement

With contrast enhancement the differences between bright and dark areas in the image can be yet stronger distinguished. Bright image areas are then presented yet brighter and dark areas yet darker. An enhancement factor of 1 (slight) to 25 (very strong) can be set for this functionality.

5.3.3.6 Structure enhancement

Structure enhancement helps to make structures in the image better emphasized. The values for contrast and sigma can be changed between 1 and 255. A small value for contrast leads to a strong enhancement of the structures. The smaller is the value for sigma, the stronger coarse structures are smoothed.

5.3.3.7 List of filters


With the list of filters, various filter settings may be stored and re-used easily. In order to save filter settings, click "Save settings".



Save settings

A new entry will be added to the list of filters. Enter the name of the new filter. Thus, a number of filter settings may be saved in the list of filters.


A filter from the list of filters may be set as the default filter. If a filter is set as the default filter, it will be automatically applied to every image unless another filter has been set for this particular image. In order to deactivate the default filter, uncheck the Default definition. With the export function you can export filter settings as a configuration file and import them to another station using the import function.


 Set as default / Suspend default setting

 Delete filter

 Up

 Down

 Import list of filters

 Export list of filters

5.3.4 Annotations / measurements



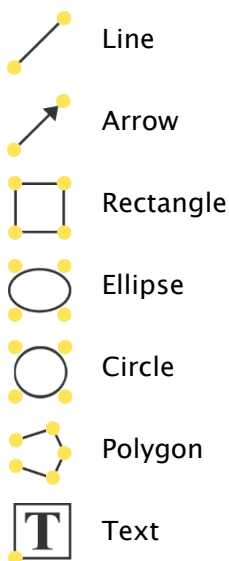
Misalignments of length and angle measurements may be caused by modality or image acquisition!

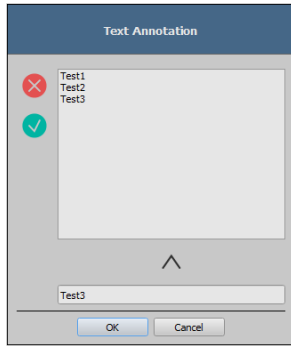
Evaluations are based on information for pixel size saved in the DICOM image. However, the misalignments may be also caused by an exposure – particularly if conventional radiography (CR, DX), i.e. of pelvis or ilium is considered. The distance of the exposed part of the body from the imaging plate / detector skews the presentation of length on a 2D radiograph. Also, if a scale (sphere) has been x-rayed withal, a misalignment is possible, insofar as the scale was placed not exactly at the same level with the measured part of the body at the exposure. If details for pixel size in the images are not specified then the measurement results follow in pixels.



For the possible deviations listed above the annotations and measurements available in the program are not suitable for surgical plannings or making prostheses. For these purposes additional special planning systems with scale and reference standards are necessary.

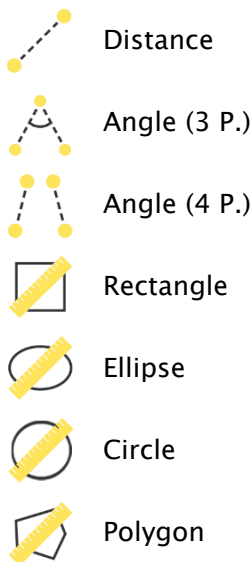
Under the annotations come lines, arrows, rectangles, ellipses, polygons and text. Thereby the rectangles, ellipses and polygons can be also drawn filled out. Explanations how the objects are to be drawn using the mouse, are each time displayed after the selection is made, i.e. after clicking the button in the bottom right corner. The drawn objects can be yet modified afterwards in all directions or relocated to get the form and to be placed in the position desired. In addition, the objects are shown in a list to the right and can be hidden or shown by single clicking the eye symbol. Particular objects can be deleted by clicking Recycle Bin icon or pressing "Delete" key on the keyboard.





After the text is selected, first a dialog appears, in which new texts can be added to the list of standard texts (enter text in the input field and then press the arrow symbol), or the text from this list can be selected (double-click or click and Ok), or the desired text can be entered (enter text in the input field and press Ok), which will be then used and placed on the image. You can determine your own standard entry, which is then already activated after you open the dialog.




Under measuring comes measuring of the sections and angles as well as measuring of the content of the area of rectangles, ellipses and polygons. The measuring of an angle can follow thereby by entering 3 or 4 points. When measuring the angles, external angle is represented in brackets.



When measuring rectangle, ellipse, circle or polygon, the area and densities are measured as well. The actual average grey level out of original pixel values as well as minimum and maximum grey level are shown next to the figure. For colour images only a normal area measurement is done. For CT series values of these objects are expressed in Hounsfield units (HU).

During drawing the measurements current measured data are shown live. As for annotations, the drawn objects can be yet modified afterwards in all directions or relocated to get the form and to be placed in the position desired. The field with measured values can also be moved to another place in the image.


The measurements are shown in a list to the right and can be hidden or shown by single-clicking the eye symbol. Particular objects can be deleted by clicking Recycle Bin icon or pressing "Delete" key on the keyboard. All annotations and measurements can be deleted with single-clicking the button "Delete all" at the bottom right.


 Object visible Object hidden Delete object or Delete all

Graphic objects that already exist cannot be changed.

Settings for drawing the graphic objects in the overlay can be set in the Configuration (category Overlay).

5.3.5 Display shutter

For each image, the different selections zones in the form of a rectangle, ellipse or polygon can be defined. Thereby, for each type exactly one object is possible, whereby the types can be also used together. Explanations for drawing using the mouse are displayed below the buttons, after the adequate button is pressed on. 

 Rectangle Circle Polygon Delete shutter

Setting up the selection zone of a certain type replaces a potentially already existing selection zone of this type.

Everything except for the zone that has been defined in this way, can be hidden and unhidden by using the button in the toolbar ("Display shutter" in the overlay options).

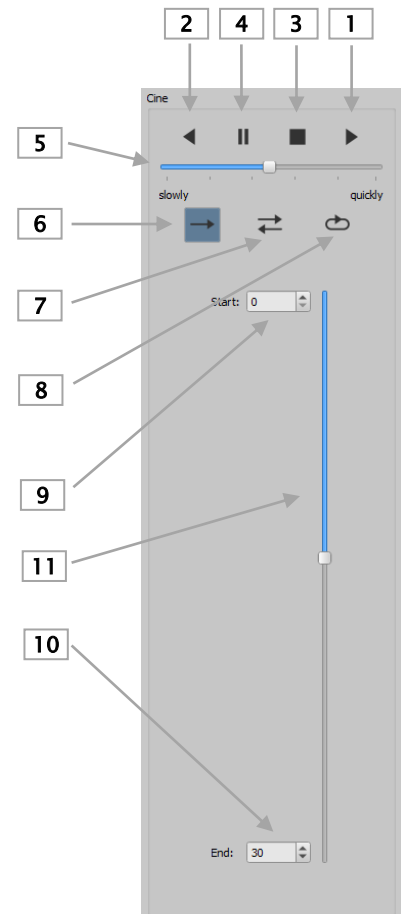
The objects can be individually deleted again.

5.3.6 Cine loop



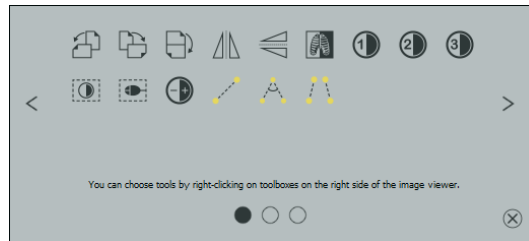
With this function, the image series can be played automatically. Various control functions such as the play direction or speed are available here. The speed can be set with special controllers. With “Start” and “End” you can determine from which image of the series the play is to be started and on which one it is to be ended. With the vertical scroll bars, individual images can be also selected manually.

- 1 - Play forward
- 2 - Play backward
- 3 - End
- 4 - Pause
- 5 - Play speed
- 6 - Play once only
- 7 - Automatic play forward/backward
- 8 - Endless loop
- 9 - Start play from this image
- 10 - End play with this image
- 11 - Manual selection of individual images



5.3.7 Quick Tools

The "Quick Tools" make frequently used tools or performed actions quickly accessible just by the right-click.



You can get to Quick Tools by right-clicking with the mouse in the viewer. There are 3 tab pages displayed in the window. For more details please refer to the following sections.

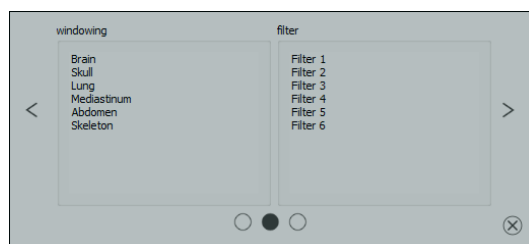
5.3.7.1 Tab page Quick access to tools

The first tab contains the tool icons for quick access. By default some tools are already activated in the "Quick Tools". You can manually add or remove all other tools of the viewer from the list.

To do so, expand the toolbar and right-click the toolbar. A configuration menu opens. Click the icon of the desired tool to activate it for the "Quick Tools". When you access the "Quick Tools" again, the tool will be displayed in the list and therefore quickly available. You can remove the icon from the list in the same way.

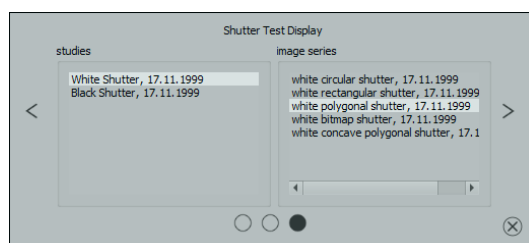
5.3.7.2 Tab page Windowing and filter

In the chapters 5.3.2 Windowing and 5.3.3.7 List of filters the way how to create and manage presets for windowing and lists of filters is described. These presets and lists of filters are automatically displayed in this tab page.



5.3.7.3 Tab page Deliberate image retrieval

On the third tab page you can deliberately retrieve studies on the left and series on the right of the current patient.



5.4 Scout lines

By the scout line (localizer line) the cut edge of two layers (planes) and the position of particular sectional images of the CT and MRT series are presented. The position of images of any other image series in relation to the active image is thereby visualized.



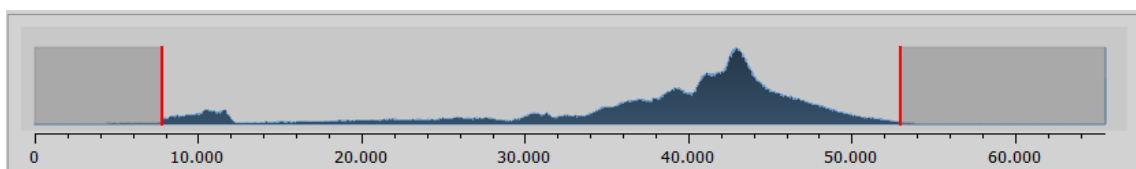
In presentation as projection lines, they do not provide information on angle under which two layers are crossing. These lines do not indicate if two layers are perpendicular or inclined to themselves. Therefore, you cannot draw conclusions to mutual position of two layers on the base of projection lines only.

The better idea on mutual position of planes may be obtained in presentation as planes due to the 3-dimensional image. The required presentation form may be set up in configuration User::Overlay / Scout lines by setting the type in "Scout lines / Localizer" group.

Before you open a series, you should modify the image split so that you can view the particular series next to each other. Then open each series in a field. If the presentation of scout lines is activated, the scout lines will be shown automatically. Click the series and scroll with the mouse wheel through the images of this series. Alternatively you can use "Page up" and "Page down" keys. The position of the current image is shown in another series as a projection line or as a plane. You will find the settings for the presentation of scout lines in the section Overlay / Scout lines in the chapter 8 Configuration.

5.5 Histogram

Below the image or the images the histogram window with the histogram of an active image is displayed. When shutting down the histogram window can be also completely hidden.



For multi frame series, a histogram of a currently displayed frame is shown.

For colour images, a red, green and blue curve for the channels R, G and B of the image are displayed. For grey scale images, a blue curve (like presented on the image above) for spreading of grey scale values is displayed.

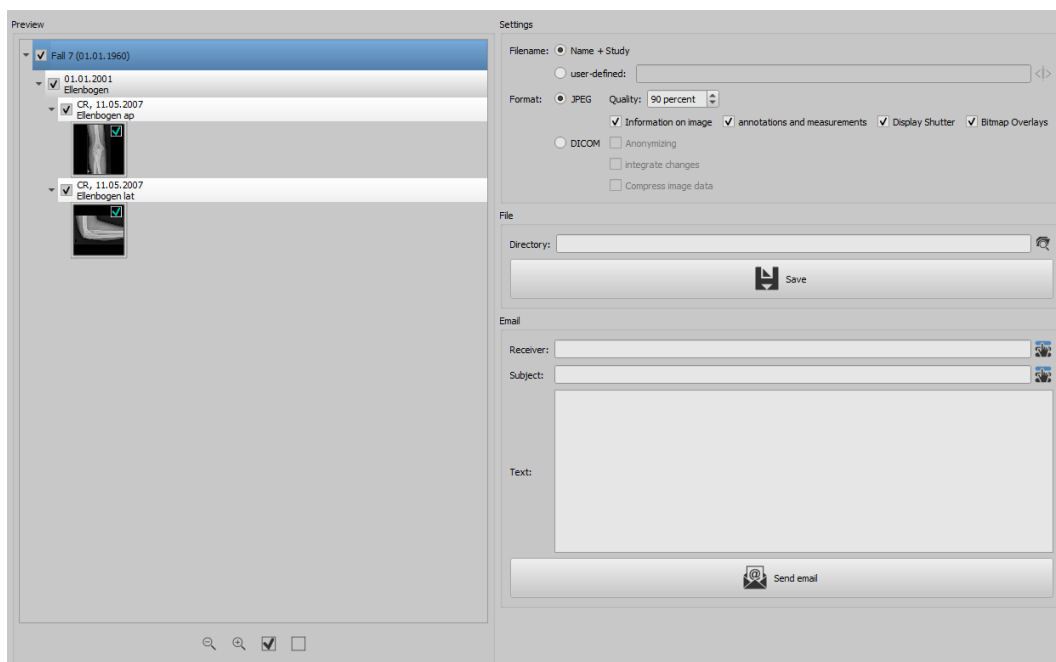
In the histogram for the grey scale images the current setting for windowing is always displayed and can be here also modified. The left and right zones of the visible window space are thereby lightly coloured, so that this is clarified. The red lines show the edges and are coincidentally the sliders, for modifying window edges. The performance of windowing can be improved with a higher histogram smoothing. The smoothing can be changed in the Configuration page histogram. See chapter 8. The window can be completely moved by clicking the space between the red lines with the mouse and then moving it using the mouse.

A zoom rectangle for zooming in the histogram can be dragged on by dragging with the mouse with Shift + left mouse button. Right-click the histogram to return to full size display.

Settings for work with the histogram can be set in the Configuration, category Histogram.

6 Export

The component Export is used for exporting images or entire series from the program or sending them per email. The images can be exported as the JPEG graphics or in the DICOM format.



6.1 Selection

In the preview tree the single elements (patient, study, series, image) can be activated and deactivated by ticking the relevant checkboxes. Deactivated elements are then skipped in the action.

6.2 Settings

6.2.1 Filename for exporting images

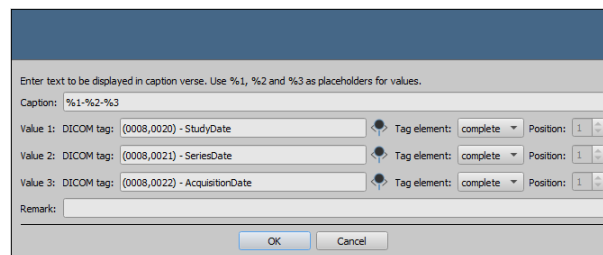
With the option "Name + Study", the filename is built automatically from the name of the patient and description of the study plus an incremental number (e.g. Smith-John-Elbow-1.jpg).

If you wish to use different filenames, please select "User-defined". With the button "Edit" you open a dialog. You can use there a free text or other information from the image (e.g. date of acquisition) as a filename.



If you wish to use a free text, just enter this text in the line for the description. Every exported image obtains then this filename and an incremental number at the end (e.g. Image-1.jpg).

You can also use up to three values from the image information. Select out the values desired from the DICOM tags. Enter %1 for the value %1, %2 for the value %2 and %3 for the value %3 in the line for description. The filenames are then built automatically from this information. The order can be chosen freely. If you separate the values in the line with dashes, the dashes will be placed at this place in the filename as well.



It should be noted that the characters \ / : * ? , " < > | are not allowed in filenames in the MS-Windows®.

6.2.2 Format for exporting images

6.2.2.1 Exporting as JPEG

You can export images either in JPEG format or as DICOM image. The data amount can be reduced in the case of JPEG images by change of the quality. The images are compressed at that. It can be useful if the images are to be sent as an email. The higher percentage value, the better quality. File size increases then too.

You should keep in mind that multi frame series are saved in only one DICOM file. Thus an entire series is always exported even if only one single image was selected and many single JPEG images arise accordingly.

Furthermore, it can be defined whether the image information, annotations and measurements, display shutter and bitmap overlays are to be also exported.

6.2.2.2 Exporting as DICOM file

The next option is exporting images as a DICOM image. The images are then exported in original directly as a DICOM file as it is with a patient-CD.

Here too, the patient data can be anonymized.

With the option "Integrate changes" the rotations, inversions, windowing, filters and display shutter are permanently integrated in exported images. The annotations and measurements cannot be exported with the image in DICOM format.

In veterinary version, an additional option "DICOM veterinary standard" is available. With this option, the internally used patient data are saved in DICOM tags provided for this purpose in accordance with the standard. This ensures compatibility with other DICOM systems.

6.2.3 Exporting as a file

If you wish to export images as a file, for example on a USB stick, you have to specify a path directly or navigate to a target directory. Use the "Save" button and the images will be stored accordingly to the options set in the target directory.



Search for directory



Save

6.2.4 Exporting as an email

You can also transfer images directly to your email program and send them per email. For this it is necessary to have an appropriate email program installed and configured on the PC. These can be such programs as Outlook, Outlook Express or Windows Mail etc. If you send your emails directly via internet website, you have to export the images first as a file as described in the previous section and afterwards send them via your email supplier.

If you have an appropriate email program, you can use the function offered here.

Specify the receiver's email address in the line "Receiver", enter the subject in the line for subject and write your message in the text field.

Afterwards, click "Send email".



Select receiver or subject from the list



Send email

The email program opens and the data is applied automatically. The corresponding images are attached to the message. You can also specify the data for receiver, subject and text yet in your email program and e.g. use the address book and text formatting of your email program. If all data and information is correct, you can send the email.

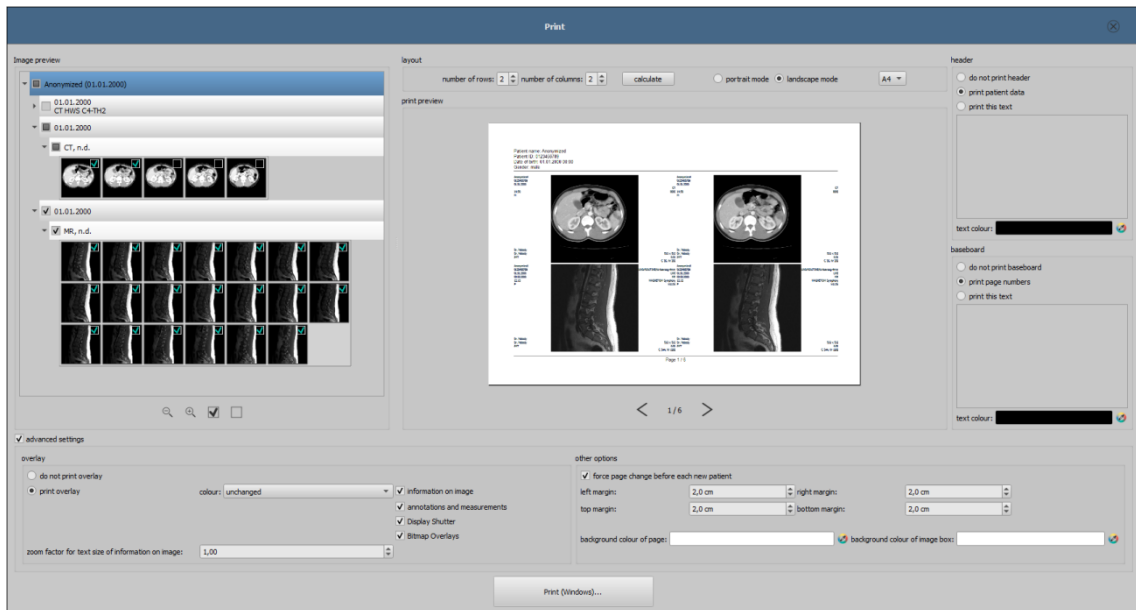


The provisions of law require that messages sent by electronic means which include information on patients or their personal data must be coded. There-

fore, electronic mail software must be so configured that data is coded and only its recipient can read such data. There are special extensions for electronic mail programs which provide the message coding.

“The GNU Privacy Guard“ is a free cryptographic software. It may be downloaded and installed from <http://www.gnupg.org> site. Such installation and configuration shall be made by professional.

7 Print



Mode:

In standard mode, only the most important print functions are displayed. For advanced functions activate the button for Expert Mode in the bottom bar of the main window.

Image preview:

In the image preview you can select the images you wish to print. For a user-defined selection, select the corresponding node for patient, study, series or single images. Exceptions are multiframe series. For these no specific image selection is possible and all frames of a multiframe series are always printed.

Layout:

Multiple images per page can be printed. Number of lines and columns can be set up to maximum 6x6 in the group "Layout". Number of lines and columns as well as page change is automatically calculated appropriately to images selected in the image preview.

Print preview:

All changes made during setting up affect immediately the presentation in the print preview. Number of pages is currently updated. You can navigate with cursor keys between the pages. All settings are saved so that they can be re-used at the next call-up of the print components (after the program reboot as well).

Die einzelnen Vorschaubilder können noch gefenstert (Änderung von Helligkeit und Kontrast), gezoomt und verschoben werden. Modifications of thumbnails are at once applied on the print results.

Controlling all three functions goes in the same way as for the image viewer:

- Right mouse button: zooming in / out (with vertical mouse movement)
- Central mouse button or scroll wheel pressed: windowing (brightness/contrast)
- Left mouse button: moving zoomed image

The header, if activated, will be always printed at the top edge of the page, in a fixed defined size and fixed defined font type. These cannot be modified. Standard image information with the patient data can be printed as well as self-defined text. Colour of the text is selectable.

Footer:

The footer, if activated, will be always printed at the bottom edge of the page, in a fixed defined size and fixed defined font type. These cannot be modified either. Number of pages can be printed as well as self-defined text. Colour of the text is selectable.

Advanced settings:**Overlay:**

For overlay, it can be selected, whether this is to be printed over the image or images, or not. Overlay objects can be possibly difficult seen if printed, so it can be selected, whether overlay is to be printed black, white or unmodified. Unmodified means hereby that overlay will be printed in such way, like it is presented on the monitor. Display shutter will be always presented in the set colour (Configuration). Bitmap overlays will be presented in the same colour like on the screen.

If the images of different patients are to be printed, the changing page before each new patient can be required (recommended). In this way, it cannot come to mistaking as patient data of the patient, which belongs to the first image on the page, are always displayed. Thus on each page the correct patient data is shown.

You can adjust the text size of the information on the image by use of the zooming factor.

Other options:

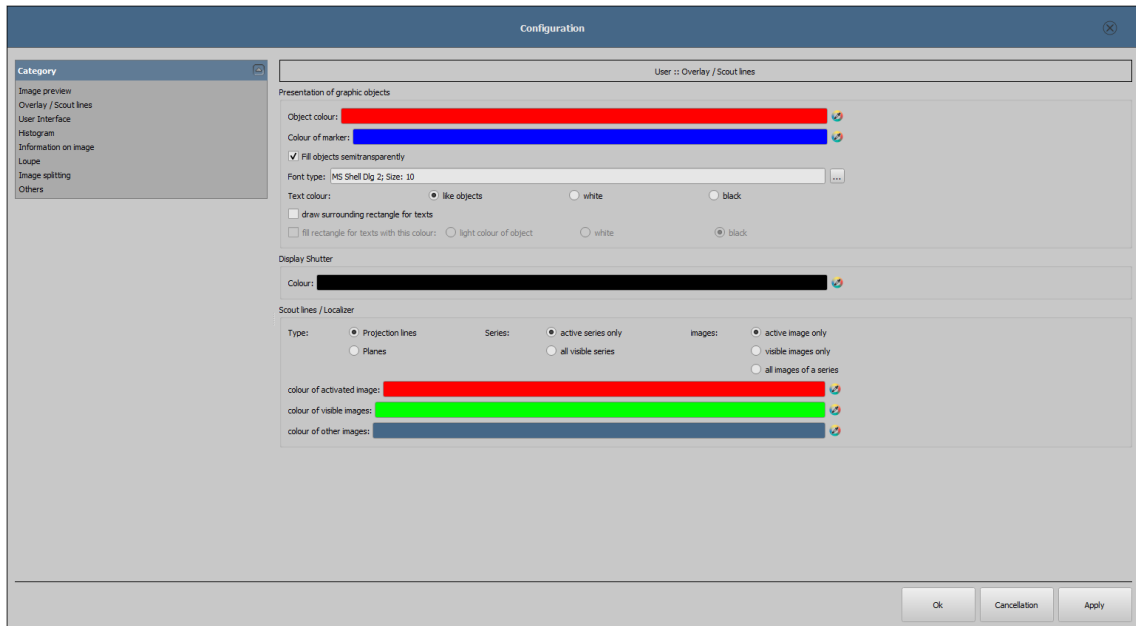
In other options you can define page layout and margins as well as colour of background of a page or background of image boxes in that the images are inserted.

Print:

Printing is performed by use of the button "Print (Windows)..." on one of the common Windows printers. The printer can be selected in the print dialog. In the print dialog you can also select pages to be printed if the print job contains many pages.

During the preparation and transfer of print data a progress bar is displayed. If many pages are to be printed, this process can be cancelled with the button "Cancel". After the print job is finished, an adequate message appears.

8 Configuration



- **Image preview**
 - Drop-down mode :
 - *expand latest study*: only images of the latest study are being expanded
 - *expand all*: after a patient is selected, all study nodes and image series nodes are being expanded in the tree structure, in this way all images of the patient are displayed in the preview
 - *collapse all*: all study nodes are being collapsed and no image preview is displayed – it will be directed the study and image series selected, which is to be viewed
 - *new studies first*: sorting order in the thumbnail preview so that the latest studies are displayed on the top
 - *old studies first*: sorting order in the thumbnails preview so that the oldest studies are displayed on the top
 - Display mode image series: alternatively, all images of one image series are displayed in a preview tree or only one image of the series is displayed (this is adjustable separately for each type of image) – first select on the left an adequate modality, i.e. CT, and then on the right, which settings for this type of image are to be applied (all images or only the first, middle or last image of the series)

- **Overlay / scout lines**
 - Presentation of graphic objects:
 - *Object colour*: the colour for drawing the graphic objects
 - *Marker colour*: colour of markers (corner and end points, central points etc.) for editing the objects
 - *Fill out the objects semitransparently*: while drawing filled out image objects, these will be drawn semitransparently, if this option is activated, so that you can recognize the image behind it, otherwise they will filled out fully with the above colour
 - *Font type*: font type, which is to be used for text objects
 - *Text colour*: with the above selected colour, white or black
 - *Draw encircling rectangle for texts*: if this option is activated, an encircling rectangle for the texts in the above selected colour for graphic objects will be drawn; thereby these can be better read in certain circumstances
 - *Fill out rectangle for text with this colour*: if this option is activated, the encircling rectangle for text objects will be filled out with the selected colour (the above selected semitransparency will be also used), otherwise the rectangle will not be filled out an the image will be seen; the same colour can be used like fort he objects (lighter), white or black
 - Display Shutter:
 - *Colour*: the colour, with which the hidden areas are to be overlaid
 - Scout lines / Localizer:
 - *Type*: “Projection lines” – with this option, only intersection lines of the images resp. projections of edges are presented; “Plane” – with this option the images are shown as sectional plane three-dimensionally.
 - *Series*: “Only active series” – with this option, only projection lines resp. planes of an active series are shown; “All visible series” – with this option projection lines resp. planes of all visible series are shown – Please note: This option works not until the option “visible images only” or “all images of the series” is activated.
 - *Images*: “Active image only” – with this option, only projection lines resp. planes of an active image are shown; “Visible images only” – projection lines resp. planes of all visible images are shown; “All images of the series” – all projection lines resp. planes of all visible images of all series are shown.
 - *Colour*: colour in which the active image and colour in which the other images are displayed

- **User interface**
 - Design:
 - *Black Style*: for dark program presentation
 - *Classic Style*: for bright program presentation
 - Toolbox height (window placing):
 - *automatic*: toolbox height according to screen format
 - *short toolbox*: for portrait format monitors and correspondingly wider bottom work bar (histogram)
 - *long toolbox*: for landscape format monitors and correspondingly longer toolbox at the right edge of the screen
 - Font:
 - *Font*: setting up font size and type for descriptions of the buttons and windows as well as for tables, tips and information etc. in the program
 - Symbol size:
 - *automatic*: symbol size according to screen resolution
 - *manually*: symbol size of program buttons in pixels

- **Histogram**
 - Shorten margins:
 - *Shorten left and right*: with these options, the values in the left and right edge of the histogram will be set on the maximum value between them, so that the display of the whole histogram is well possible in the window. If the important areas will be thereby cut off or the values between these limits are still presented too small, the size can be accordingly reduced or enlarged.
 - Smoothing:
 - *Smooth histogram for display*: smoothes the histogram for displaying with the set number of runs. The images will be not smoothed thereby. Es dient nur der verbesserten Darstellung des Histogramms
 - Values:
 - *Used or possible values only*: on the x-axis only the values will be shown, which are actually used in the image, or all values, which could appear based on the colour depth of the image

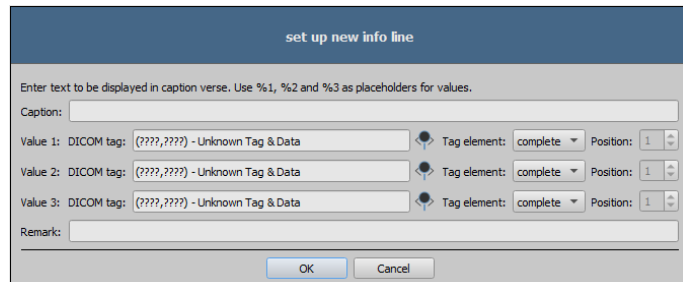
▪ **Information on image**

- Text formatting:

- *Text colour*: colour with which the information in the image corners are to be shown
- *Font type*: font type for presentation
- *Shaded*: the writ can be possibly poorly seen on the images with the white background, so with this option a shadow can be backed – if the images are black or dark, this is not hardly seen

- Elements:

- for each type of image (modality) you can determine which information are to be shown in the overlay corners. First select the desire type and next the option "Use these settings", if the default settings are to be used. Click the desired box, in order to determine the corner of the displaying and next the button "New entry in active field", in order to add an element to this box. In the caption row you can enter any desired text, which should appear on the images. Use %1, %2 and %3 as "Variables" (place holders). These will be exchanged by the defined DICOM tags in the display. You can also let display only a part of the tags if needed, i.e. a part of the person name or the value at the determined place for tags, which allow many values (multiplicity). By double-clicking the entry in the list fields or with the button "Process active entry" you can delete these. Use the button "Delete active entry" to remove this from the list. If you want to move or copy the entries within a list field or between the list fields, you can move these with the pressed left mouse button (drag & drop). For this, hold the Shift key pressed on, in order to move the entry. Without Shift this will be copied.



set up new info line

Enter text to be displayed in caption verse. Use %1, %2 and %3 as placeholders for values.

Caption:

Value 1: DICOM tag: {???,???} - Unknown Tag & Data Tag element: complete Position: 1

Value 2: DICOM tag: {???,???} - Unknown Tag & Data Tag element: complete Position: 1

Value 3: DICOM tag: {???,???} - Unknown Tag & Data Tag element: complete Position: 1

Remark:

OK Cancel

- **Loupe**
 - Loupe shape / Loupe size:
 - *Automatic size*: width and height of the rectangle or diameter of the circle will be set for a third of a current window width or window height of the image window, depending on that which value is smaller
 - *Rectangle*: usage of a rectangle loupe in the viewer with the specified pixel measures or automatic size
 - *Circle*: usage of a circle loupe in the viewer with the specified diameter or automatic size
 - Zoom:
 - *Zoom factor*: zoom factor for the image cutout, which is presented in the loupe (referring to original image)

- **Image split**
 - Activating:
 - the series of the most recent study are automatically displayed in the image viewer at opening of a patient; window is automatically split by default and each series is "hung " in a subwindow: when double-clicking the node of the study, the series of this study are hung either and the window split is adjusted automatically
 - Window split:
 - *Select modality*: for each modality an individual setting can be selected
 - *Window split*: automatically means that the window is split automatically correspondingly with the number of the series that are to be displayed, otherwise the image viewer is split always in the lines and columns set up

- **Others**
 - Mouse function windowing:
 - *Mouse properties*: horizontal move changes the value for center / vertical move changes the value for width (synchronous with histogram) or the other way – vertical move changes the value for Center / horizontal move changes the value for width
 - MagicSharp filter:
 - minimum and maximum values for MagicSharp filter can be limited (in this ways, strong tile effects can be avoided)
 - min. size = 2 to max. size = 16
 - min. amount = 1,00 to max. amount = 10,00
 - contrast enhancement can be activated automatically with the amount defined here using the mouse function
 - Scroll mode images:
 - images can be changed with mouse scroll or the "Page up" and "Page down" keys. This setting specifies, whether thereby only one image series can run, change also over the limits of an image series can follow and therefore all images of an study can run or even over all images of a patient, so over the limits of an study to the next study
 - Presentation of zoomed images:
 - if this option is activated, the pixels will be zoomed in and no smoothing follows (the images operate pixelated, details can be seen better in certain circumstances); if the option is activated, the strongly enlarged images will be smoothed (the images operate milder; details can blur in certain circumstances)
 - Units of measurement:
 - use this option to set whether the measurement values to be used are in "mm/mm²", or "cm/cm²"

9 Others

9.1 Tooltips

The most buttons, data or configuration fields contain so called "tooltips". If you move the mouse over a field without clicking it, after short while a small help-window at the mouse position appears. Darin erhalten Sie Informationen zu diesem Feld, die Aktion die dadurch durchgeführt wird oder die Bedeutung bei Konfigurationsmöglichkeiten.

9.2 Exiting the program

You exit the program by pressing the symbol **X** in the top right corner or by pushing **Alt + F4** keys.