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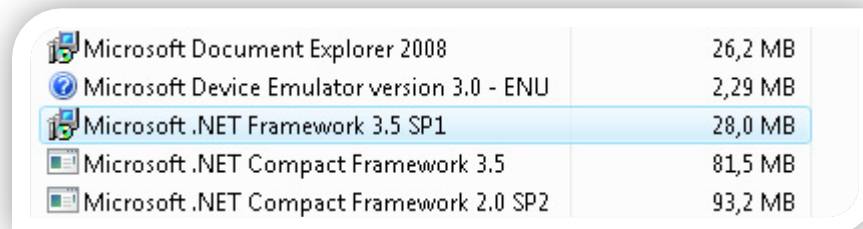
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Installation

Prerequisites (check for .Net framework 3.5)

1. Make sure that you have Microsoft .NET Framework 3.5 installed on your system. To check if you have .NET Framework 3.5 installed:
 - a. Open the Control Panel. Click on **Start → Control Panel**.
 - b. In the Control Panel open the **Programs and Features** icon.
 - c. Try to locate **Microsoft .NET Framework 3.5** (it might be followed by a SP number). If you could not locate it or if the number is less than 3.5 then you need to install the latest (free) edition of Microsoft .NET Framework , which can be found at www.microsoft.com/downloads



Microsoft Document Explorer 2008	26,2 MB
Microsoft Device Emulator version 3.0 - ENU	2,29 MB
Microsoft .NET Framework 3.5 SP1	28,0 MB
Microsoft .NET Compact Framework 3.5	81,5 MB
Microsoft .NET Compact Framework 2.0 SP2	93,2 MB

Install Doctor Eye

2. Download the appropriate version of the software from the following address: <http://biomodeling.ics.forth.gr/>
3. Extract the contents of the zipped file to the local drive C:. The folder **C:\DoctorEye.ver.3.0** should have been created.
4. Move to the **C:\ DoctorEye.ver.3.0** folder
5. Right click on the **DoctorEye.exe** file. Click **Send To → Desktop (create shortcut)**. Now the icon that is going to be used by the user - in order to start the application - has been created on the Desktop.

Start Using Doctor Eye

In order to start the application double click the Doctor Eye shortcut icon, the Red Cross icon, located on the Desktop (Provided that you have followed the procedure described in the installation instructions.).



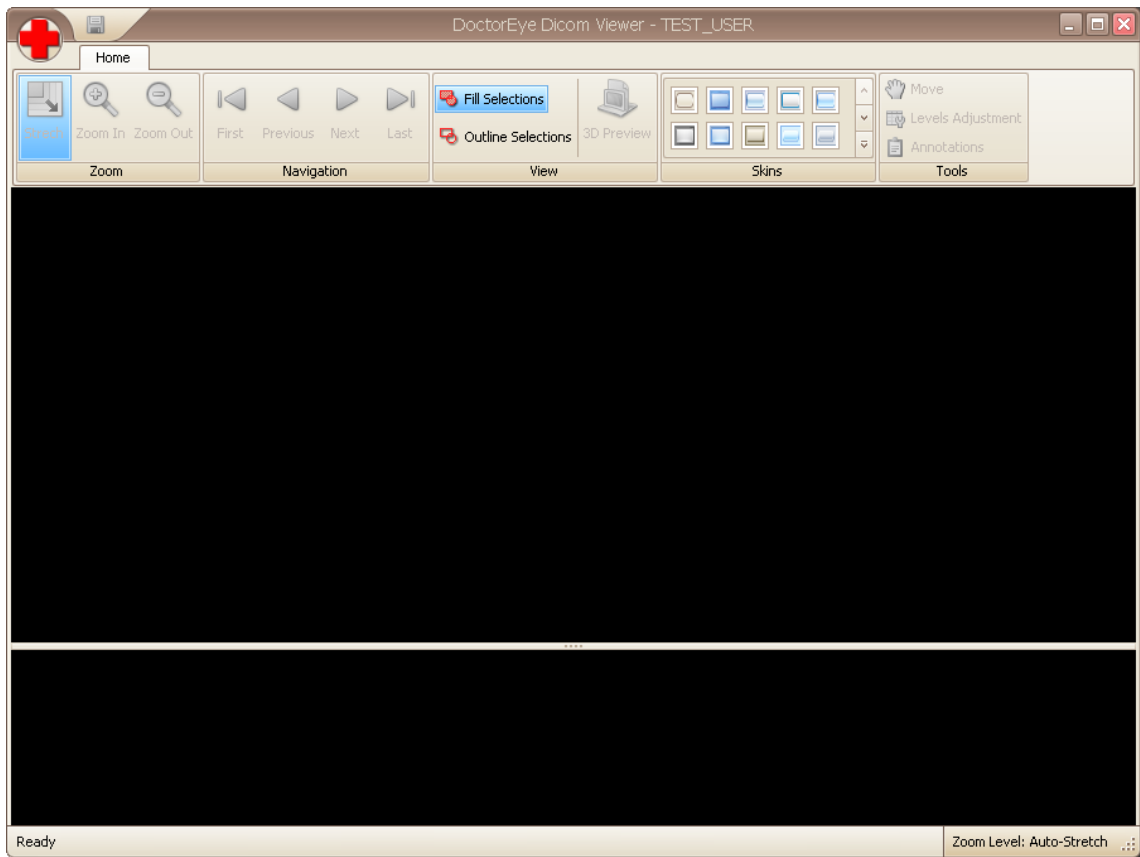
After the application starts, the following Login window is displayed. Enter your Doctor Eye account information and press the Login button.

How to create a new user

In order to create a new user click on the **Create User** button located at the bottom left corner of the Login window. The following window appears. Enter your information at all the fields and press the **Create** button. If you accidentally pressed the Login Button at the previous window, press **Cancel** to return back.

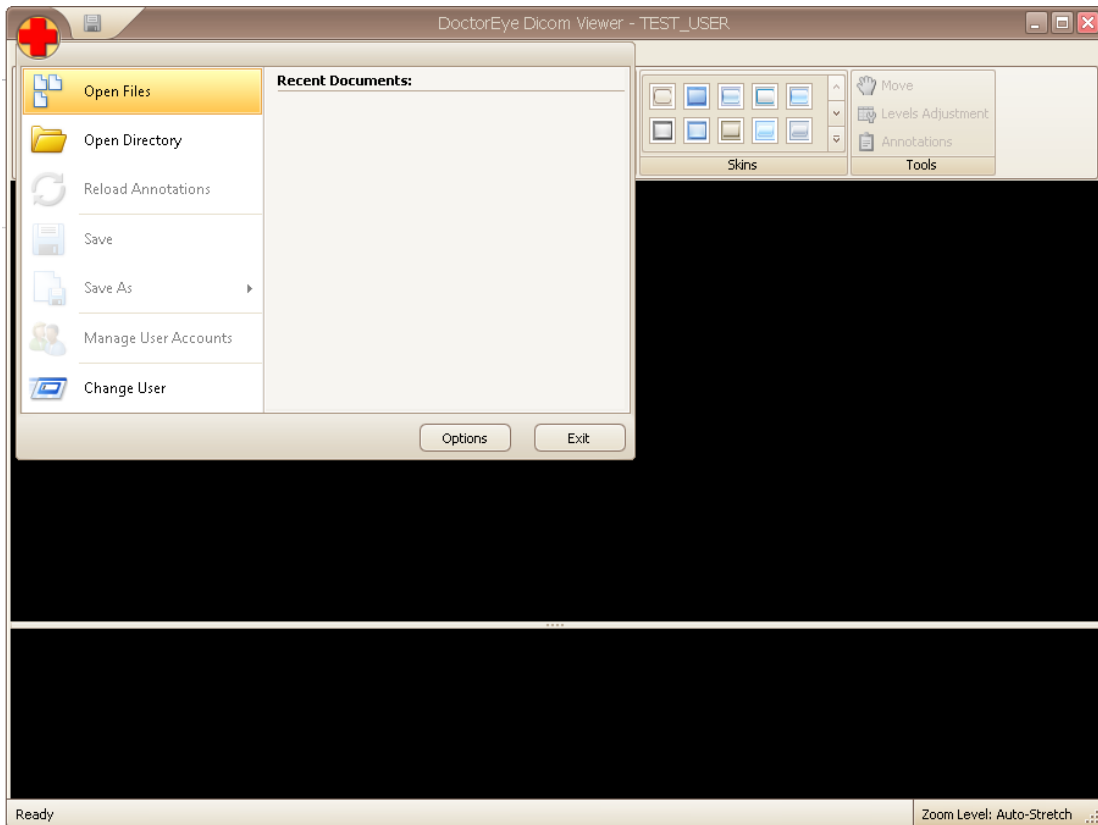
The Main Window

After you enter your Username and password to the login window, the main window of the Doctor Eye is displayed (the following window).

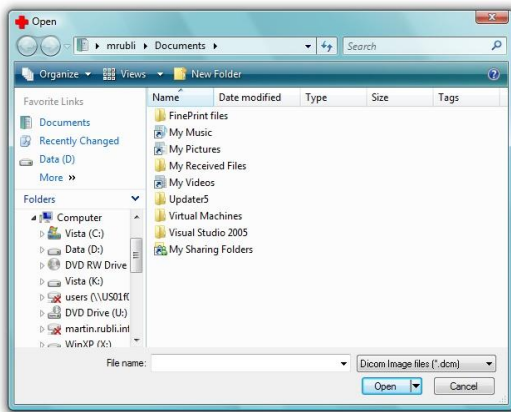


Open a single DICOM file

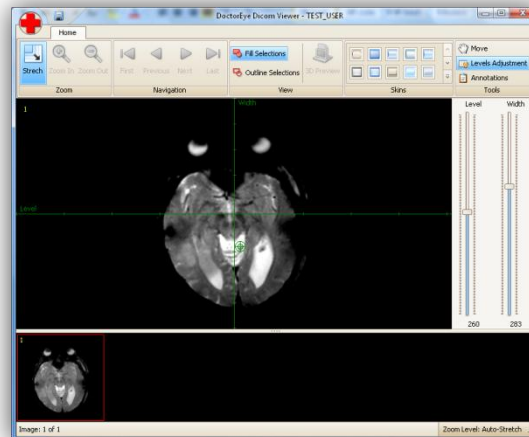
To open a single DICOM file, click on the Red Cross button and then select **Open Files**.



The Open dialog appears, in which you must specify the file you wish to open. Browse to the DICOM file (usually a file with .dcm extension) you wish to view, select it and click the **Open** button.



The Open dialog window.



The Main window with one DICOM loaded.

Open Multiple DICOM files

To open multiple DICOM files, click on the Red Cross button and then select **Open Files**. The Open dialog appears, in which you must specify the files you wish to open. Browse to the DICOM files you wish to view, select them and click the **Open** button.

Ways to select multiple files.

Select multiple files that are grouped together

If you need to select multiple files that are all grouped together follow the below steps.

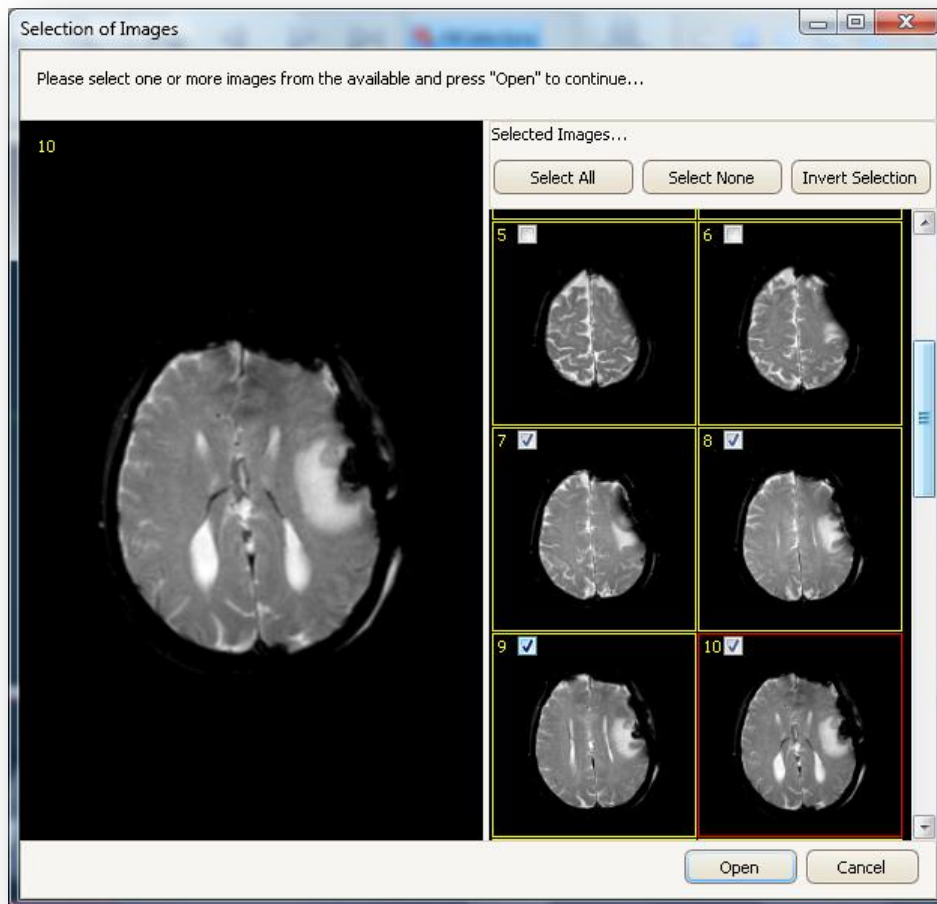
1. Select the first file and then press and hold the **Shift** key.
2. While holding the key down click the last file. This will select all the files in-between the first and last file.

Select multiple files that are not grouped together

If there are multiple files you need to select but they are not grouped together follow the below steps.

1. Select the first file and then press and hold the **Ctrl** key.
2. While holding down the **Ctrl** key, select each of the other files you wish to select.

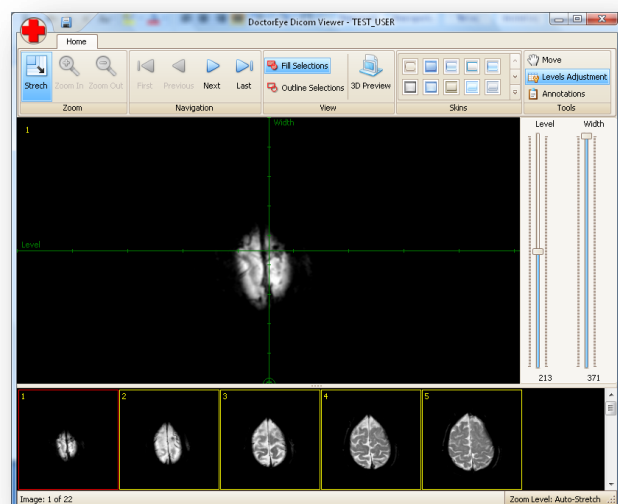
The “Selection of Images” window appears.



At the right side of the window lies a list of thumbnails of the selected images, while at left is the preview area (where the selected image –the one with the red border- is displayed in a larger view). At the list of thumbnails tick the checkbox of each image you wish to load.

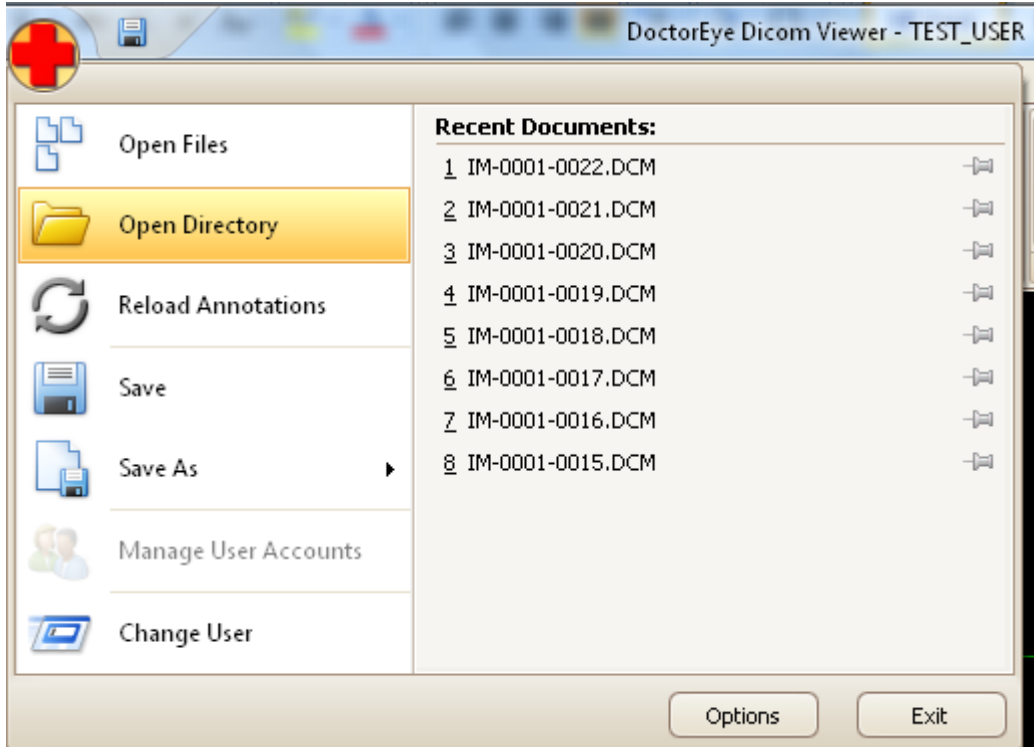
If you wish to load all the images, click the **Select All** button. If you want to deselect all the selected images, click the **Select None** button. If you wish to select all the images except the ones already selected, then click the **Invert Selection** button.

Finally click the **Open** button to load the selected DICOM images in the viewer.

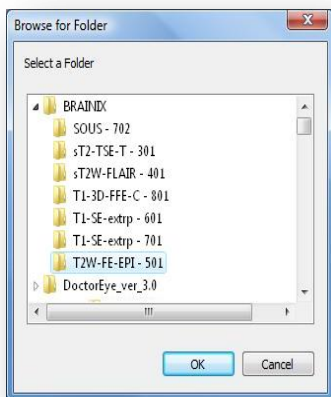


Open a directory containing DICOM files

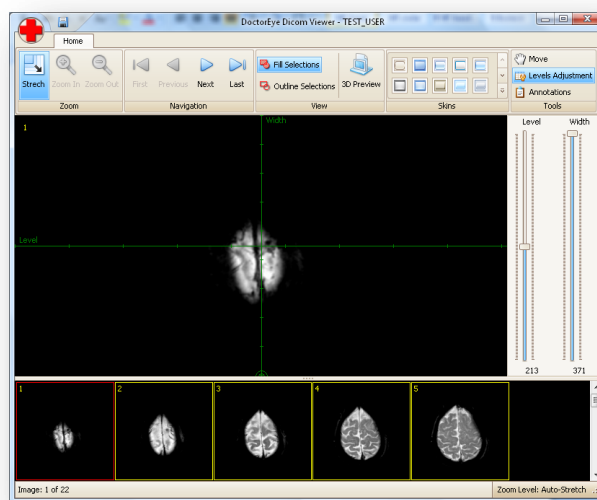
To open a directory of DICOM files, click on the Red Cross button and then select **Open Directory**.



The **Browse for Folder** dialog appears, in which you must specify the directory you wish to open. Select the desired folder and press the **OK** button. The **Selection of Images** window appears and the rest steps are described in the **Open Multiple DICOM files** section.



Browse for Folder dialog.



Main window with multiple DICOM loaded.

Reload Annotations

You have been working on an MRI dataset, but the results are not satisfactory and you judge that it needs to be done from the beginning. If you haven't selected save or save as while you are working, your work is not saved and thus you can reload the annotations saved from previous work stored in the medical files.

Save

You must select this option to save your work in the medical files before closing the platform the same way it is done in the Microsoft Office programs.

Save As

You can save your selections (annotations) alternatively as:

1. **Annotation:** Presents the selected areas of your annotations in a txt file
2. **Annotation's Outline:** Presents the contour of your annotations in a txt file
3. **Xml file:** Presents the area of your annotations in an xml file
4. **3rd party application:** This option produces 3 files:
 - a. **Size.dat:** Includes the size of the MRI Images and the number of the slices in the specific MRI dataset (ex. 512,512,22 means that the dimension of the images are 512 rows x 512 columns x 22 slices).
 - b. **TumorPoints.dat:** Includes the position of the tumor's points in all the slices.
 - c. **Volume.dat:** Includes all the points of the tumor in all slices, starting from the first point until the last one continuously (as a volume).

Manage User Accounts

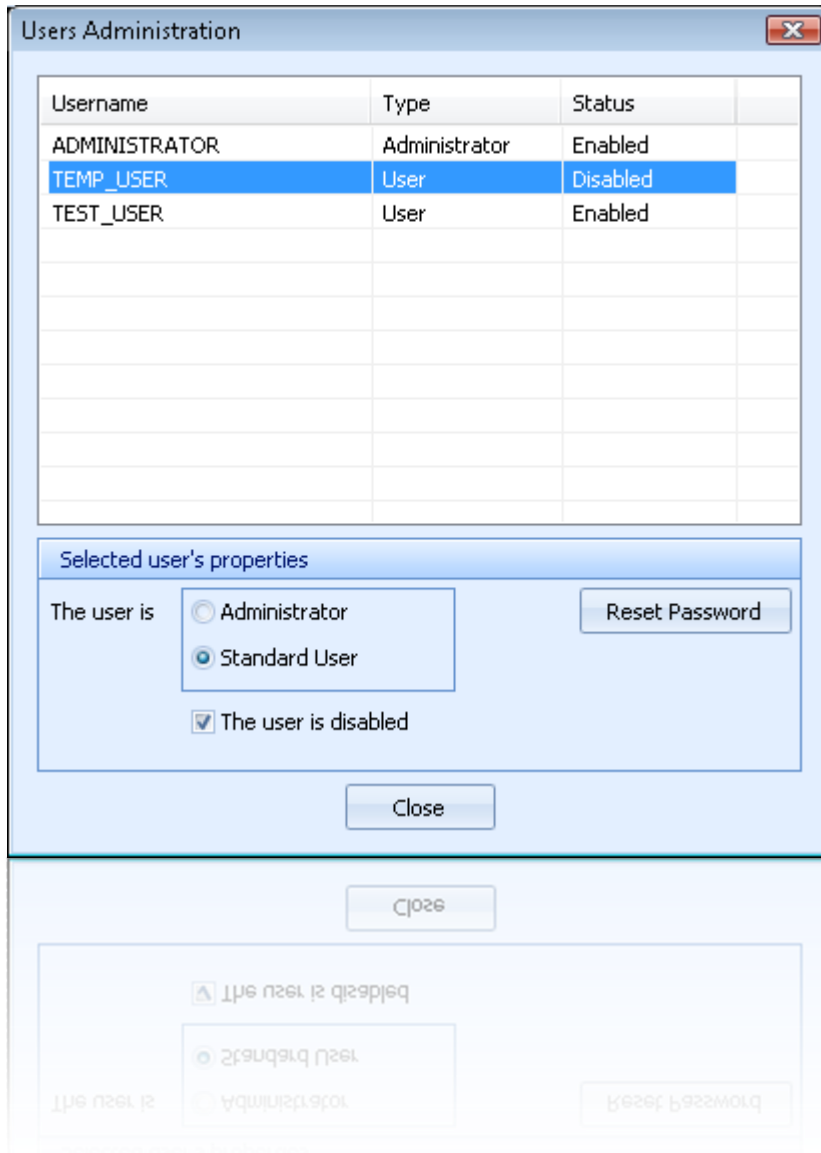
There are two user groups in the **Doctor Eye** application: The administrators and the simple users. The administrators can manage their work but also the work (ex. Annotations) of all the other users. However, the difference between a simple user and the administrator is that the former can only see the work of the other users, while the administrator can have full access to the data of all the users. The administrator can manage (add, rename or delete) other users' annotations. The administrator can also delete the account of a simple user, or to promote a simple user to administrator.

To manage users, you must login as **Administrator**. If you already logged in as a different user, you must log out first. To do so follow the guidelines described at the following sub-chapter, with title "**Change User**".

Quick Tip: In order to access the administrator account, use the following information in the **Login** window.

Username: **ADMINISTRATOR**
Password: **SADMIN**

If you are already logged in as administrator, the "**Users Administration**" window will appear.

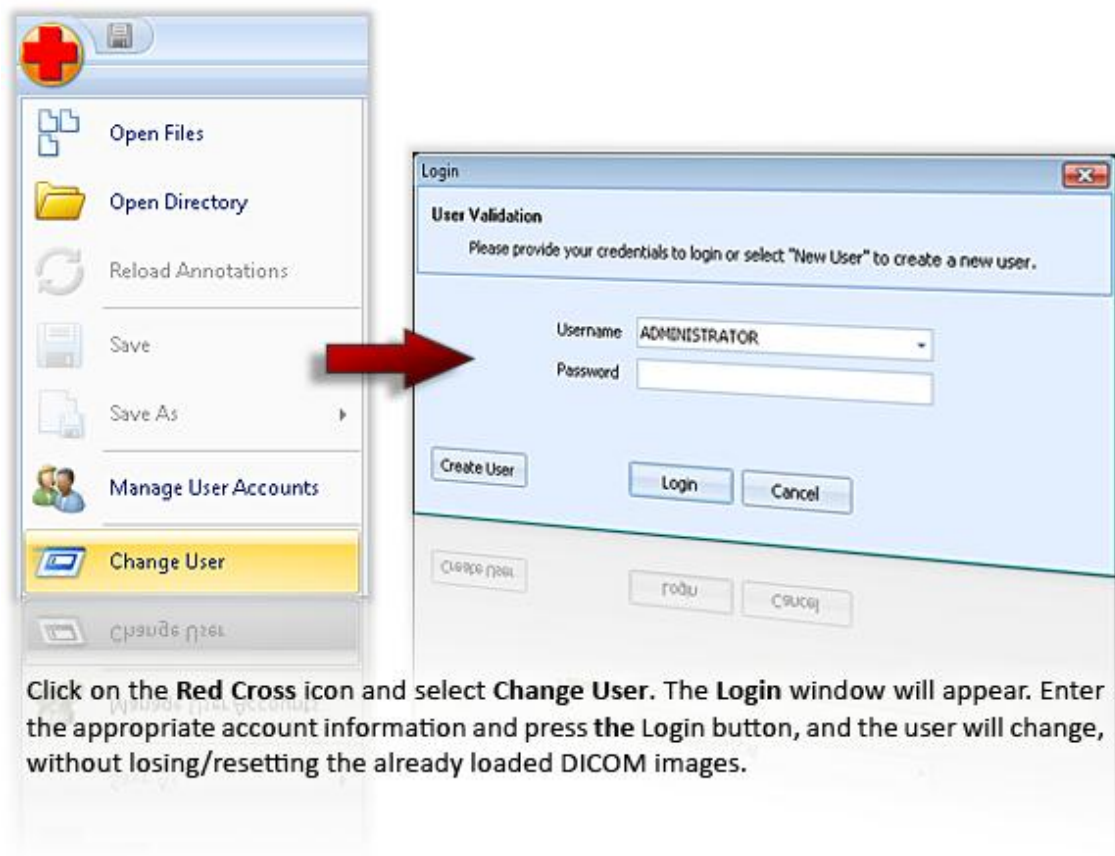


The **Users Administration** window provides the Administrator with the following options:

1. To disable the access of a specific user (by ticking the **User is disabled** option). The user whose account has been disabled cannot login, and therefore cannot use the program.
2. To allow other users to become Administrators as well (by ticking the **Administrator** option from the **Selected user's properties**).
3. To reset the password of a user (by clicking the **Reset Password** button, the **Reset Password Dialog** window will appear, and will guide you to create new one).

Change User

To change the operating user of the application, click on the Red Cross button and then select **Change User**.



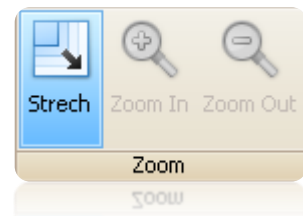
Click on the **Red Cross** icon and select **Change User**. The **Login** window will appear. Enter the appropriate account information and press the **Login** button, and the user will change, without losing/resetting the already loaded DICOM images.

Zoom Modes

There are 3 zoom modes in the application:

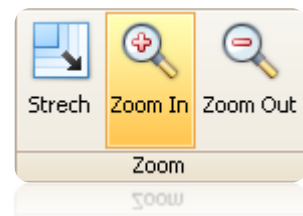
Stretch

The **Stretch** mode is by default enabled when the Doctor Eye application is loaded. The **Stretch** mode makes your current image fill as much of the screen as possible. This is frequently the optimal way to view a picture during editing. When the Stretch mode is enabled the **Zoom In** and **Zoom Out** modes are deactivated.



Zoom In

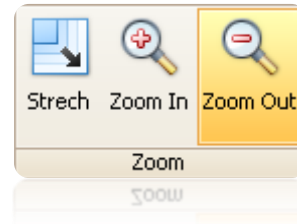
To zoom into an image, just click on the magnifying glass icon **with the plus sign** in the toolbar. If the **Zoom In** button is deactivated and is not possible to be pressed, that means that the Stretch mode is still activated. If that is the case, press on the Stretch



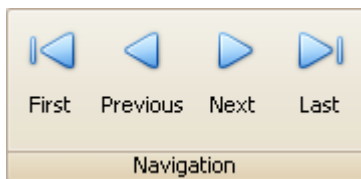
button (in order to deactivate it) and then the Zoom In and Zoom Out buttons will become active.

Zoom Out

To zoom out, just click on the magnifying glass icon **with the minus sign** in the toolbar. If the **Zoom Out** button is deactivated and is not possible to be pressed, that means that the Stretch mode is still activated. If that is the case, press on the Stretch button (in order to deactivate it) and then the Zoom In and Zoom Out buttons will become active.



Navigation



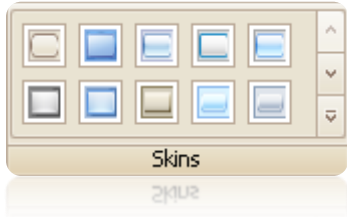
In order to navigate through the loaded DICOM images you can use the Navigation buttons of the toolbar. The **First** button, displays at the main window of the application the first image from the list of thumbnails. The **Previous** button and the **Next** button, display -respectively- the previous and the next image from the list of thumbnails. And finally the **Last** button, which displays the last image from the list of thumbnails at the main window of the application.

You can distinguish the currently displayed image by its red border (in the list of thumbnails).



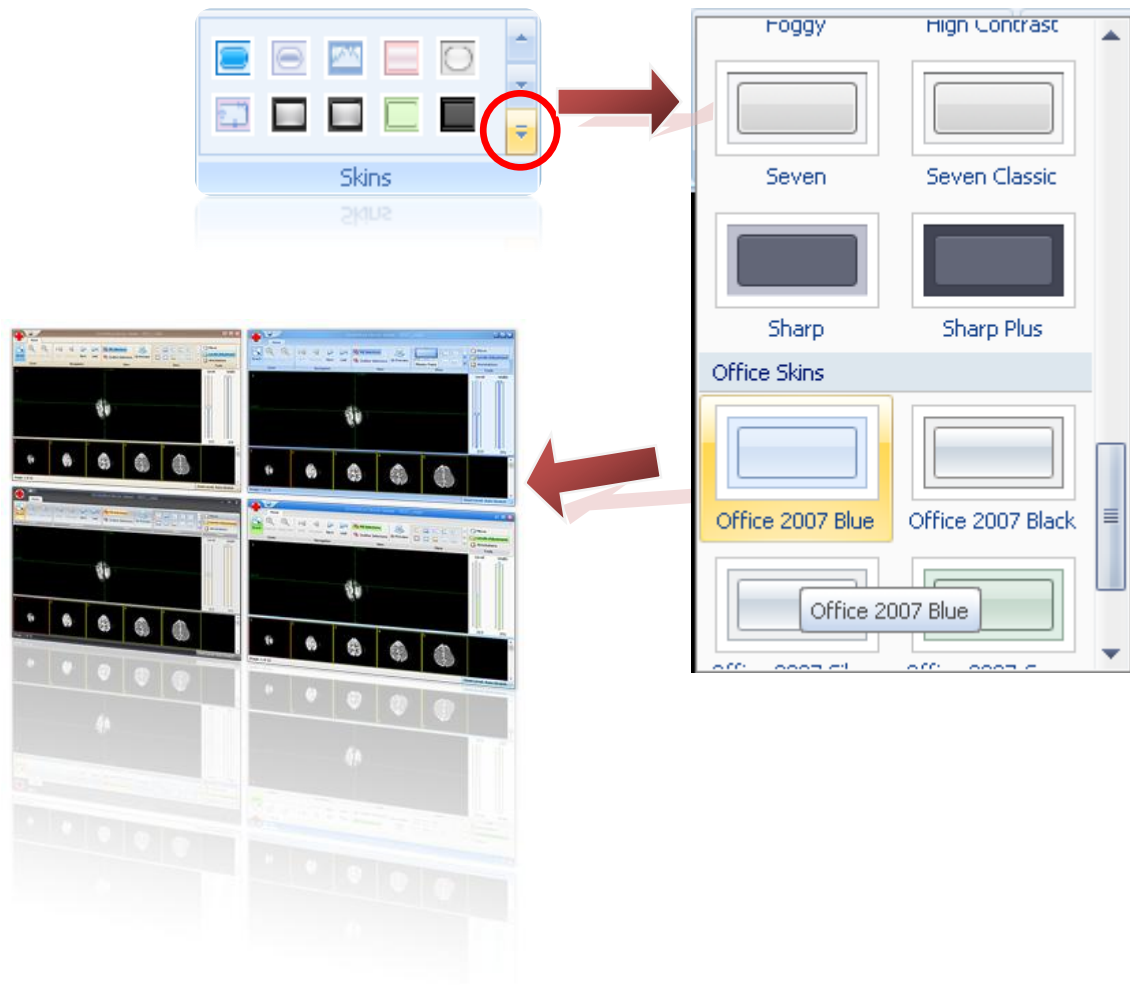
Quick Tip: The fastest way to move through the list of images, is by using the mouse wheel. Upwards movement of the wheel displays previous images, while downwards movement of the mouse wheel displays the following images.

Skins



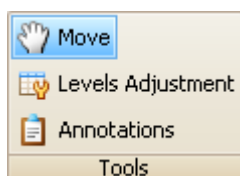
"Doctor Eye" gives you the option to change the colors and the appearance of the controls by choosing one of the color themes from the **Skins** toolbar.

By clicking the lower arrow button at the "Skin" toolbar, a list will appear, with larger thumbnails, in order to make the selection easier.



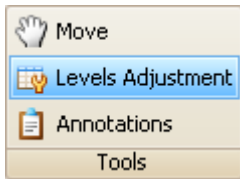
Tools

Move

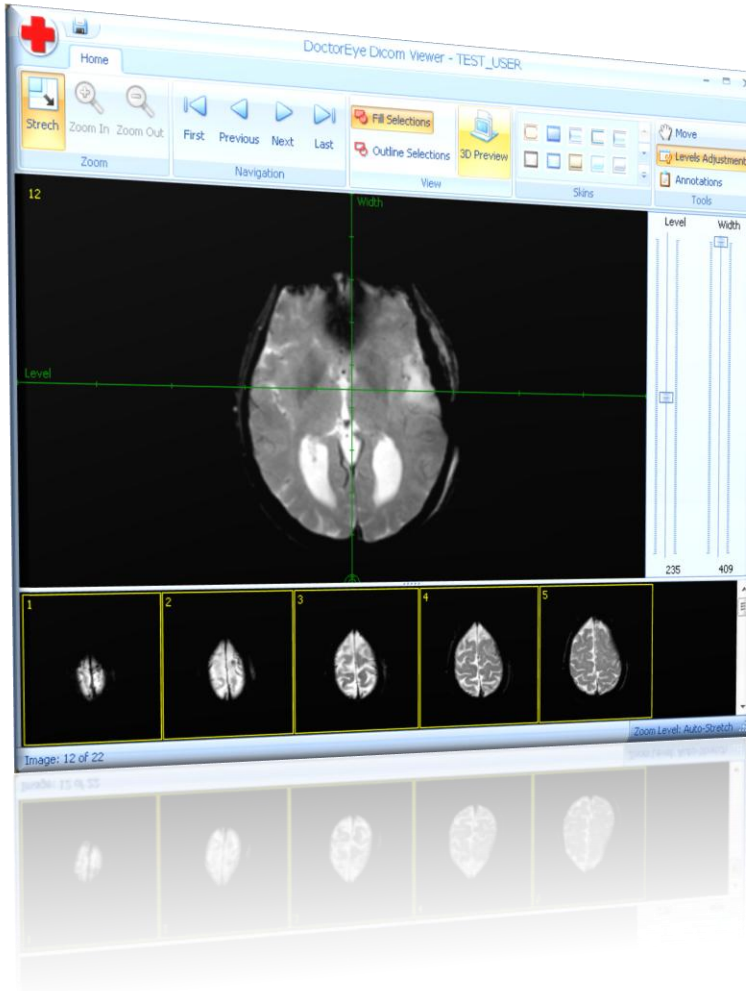
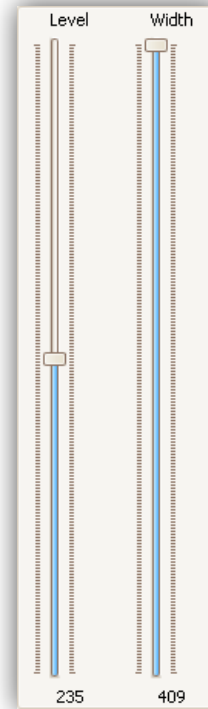


The **Move** tool allows you to move the entire image by dragging it with your mouse. When the **Move** tool is selected, click and drag anywhere in the image. If the **Stretch Zoom** mode is enabled the **Move** tool will not function.


Levels Adjustment



The **Levels Adjustment** tool allows you to adjust the *Window Width* and the *Window Level/Height* of the DICOM image. When the **Levels Adjustment** button is clicked, one green cross with tick marks appears on the main window (image below) while also appears an adjustment panel at the right side of the application window (image on the right).




Adjusting the Window Width of the DICOM image

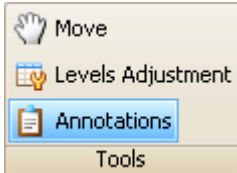
There are two ways to adjust the image's **Width**. The first one is to use the **Width** slider at the adjustment panel, located at the right of the main window. The second one is by clicking anywhere in the main window. The vertical axis of the green cross, in the main window, represents the **Width** of the Dicom image. So the vertical coordinate of the point where the mouse button was pressed, is converted to the corresponding **Width** value. A green crosshair appears at the last clicked point (), in order to remind to the user the current value of the **Width**.

Adjusting the Window Level/Height of the DICOM image

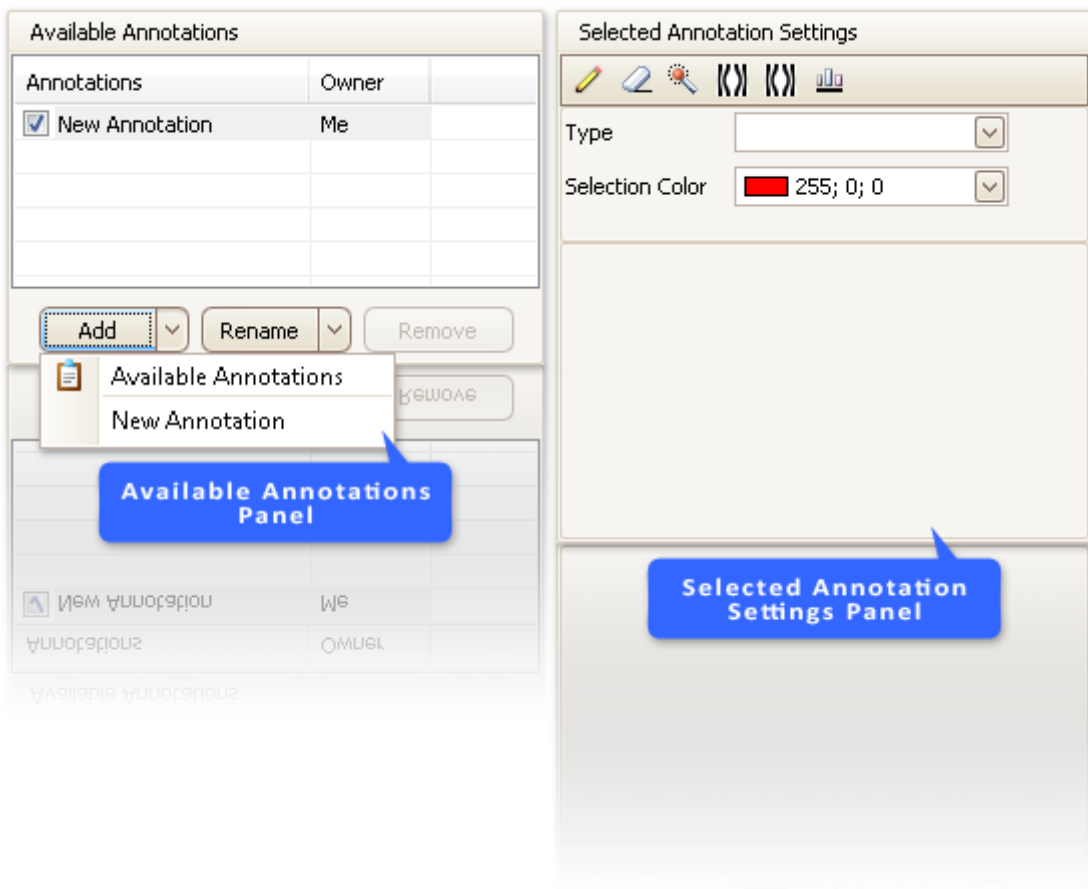
There are also two ways to adjust the image's **Level**. The first one is to use the **Level** slider at the adjustment panel, located at the right of the main window. The second one is by clicking

anywhere in the main window. The horizontal axis of the green cross, in the main window, represents the **Level** of the Dicom image. So the horizontal coordinate of the point where the mouse button was pressed, is converted to the corresponding **Level** value. A green crosshair appears at the last clicked point (), in order to remind to the user the current value of the **Level**.

Annotations




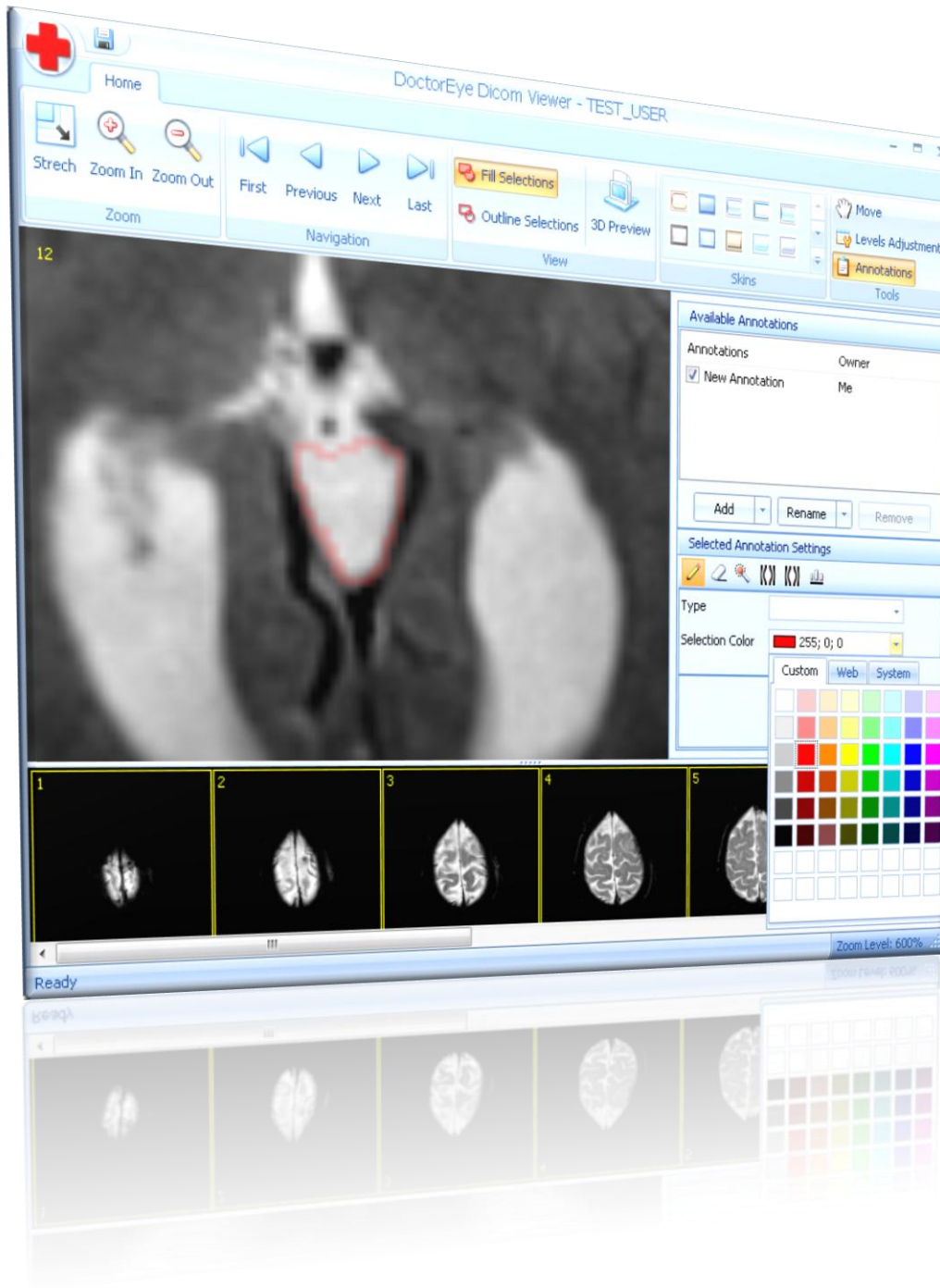
By clicking the **Annotations** button of the Tools toolbar, two panels appear at the right side of the main window. The **Available Annotations** panel & the **Selected Annotation Settings** panel.




At the Available Annotations panel we can see the list of annotations for the current DICOM image in display. As we can see from the image above, at the current DICOM image, the application expects the user to create a New Annotation.

Creating a New Annotation using the Pencil tool.

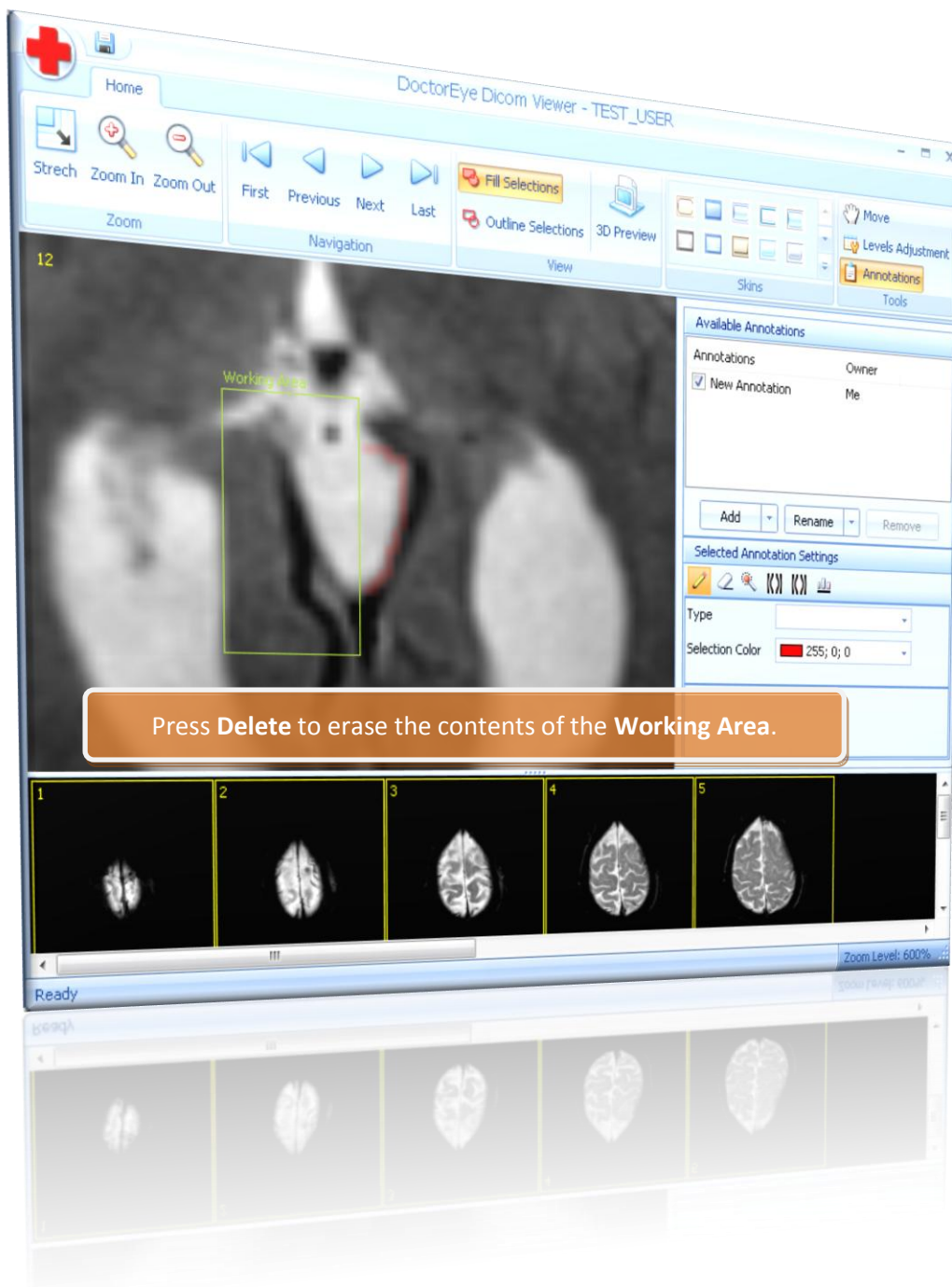
 If you have not already done so, click on the **Annotations** tool. Enable the **Pencil** tool by clicking the corresponding icon. You will notice that the cursor of the mouse has changed into a cross. Hold down the left mouse button and drag the mouse, a line will be drawn. The drawn line has the color defined at the **Selection Color** box. If you prefer to use another color click the **Selection Color** box and pick your color, from one of the three available tabs.




Erasing Annotations using the Eraser tool.

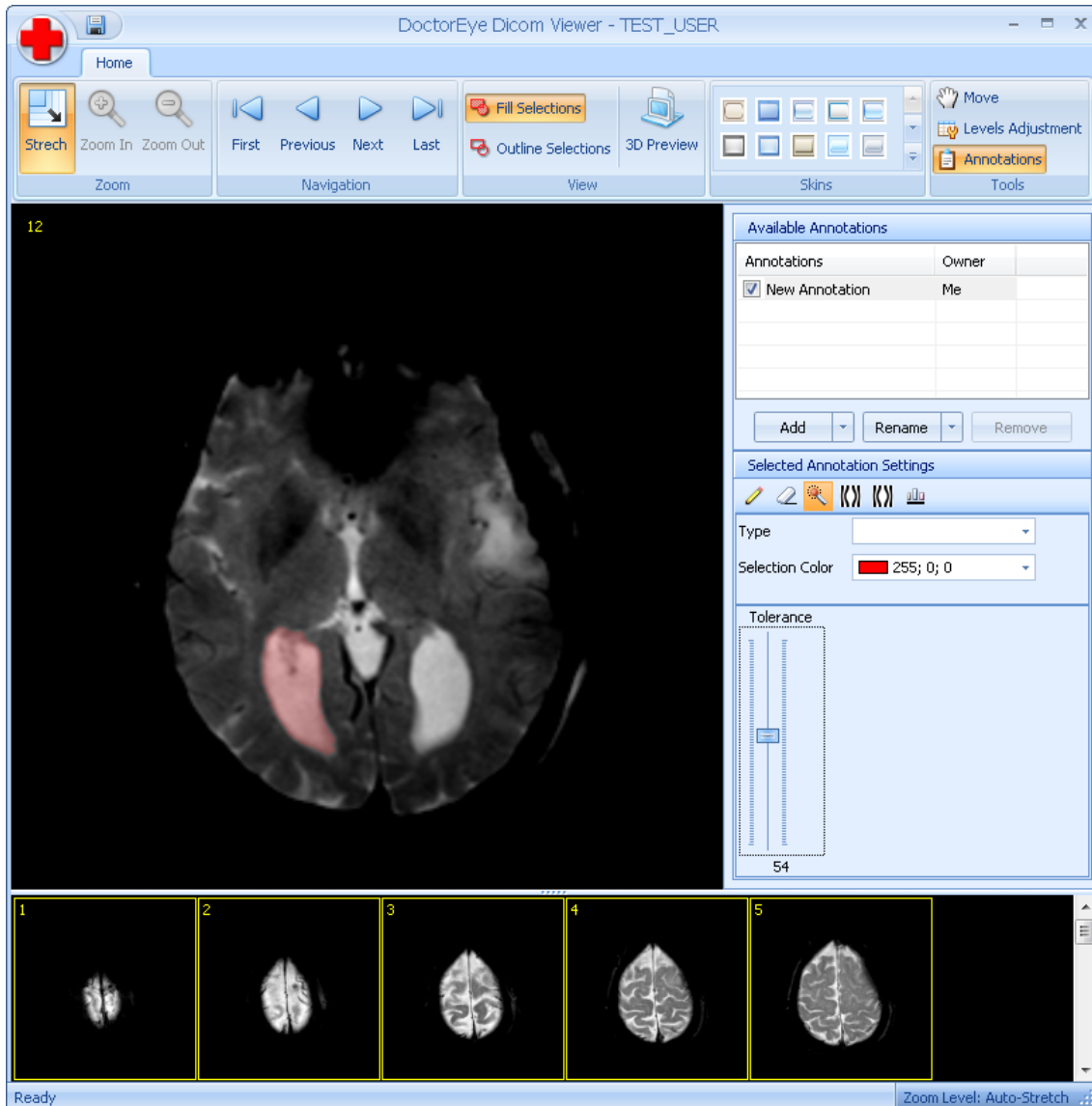
 If you want to delete a part of an annotation you can use the **Eraser** tool. Click on the tool, press down the mouse button where you want to start erasing and drag the mouse over the area you want to delete.

Quick Tip: The fastest way to delete a portion of an annotation, is by pressing the **Right** mouse button and **dragging** the mouse. A yellow rectangular, with "**Working Area**" text written at the left top corner of it, is displayed. Release the right mouse button and press the **Delete** key. Any annotation part inside the "**Working Area**" rectangle is deleted.



Annotating using the Magic Wand tool

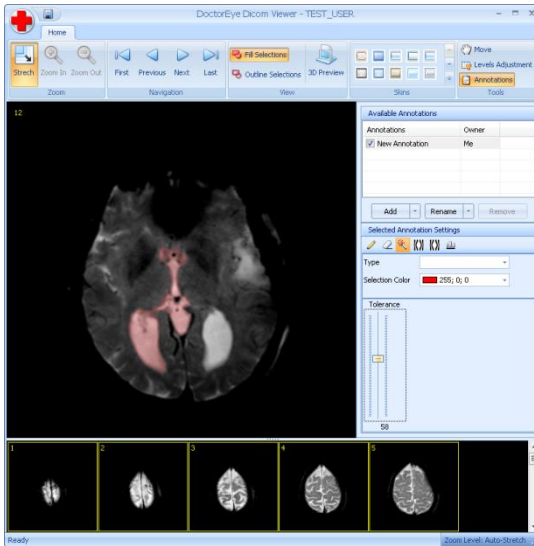
 The **Magic Wand** tool allows you to select an area of an image based on color similarities between pixels. Select the tool and click the image in an area which you want to select. To well define the selection, adjust the **Tolerance** slider, located at the bottom right of the application window. The **Tolerance** value ranges between 1 and 100. A lower value selects fewer colors similar to the pixel you click with the **Magic Wand** tool (smaller selection). A higher value selects a broader range of colors (larger selection).



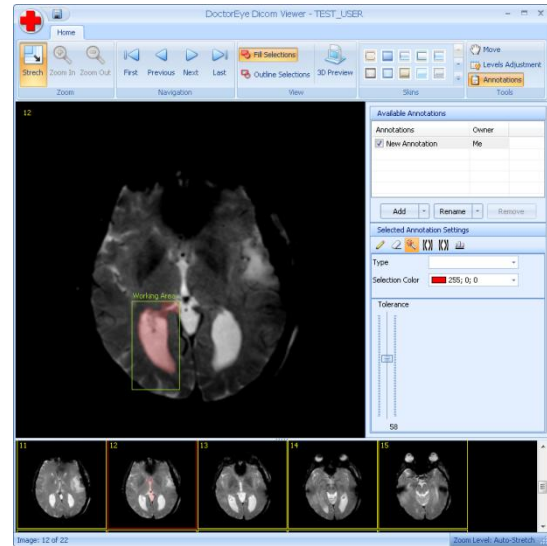
*Selected part of a DICOM image using the **Magic Wand** tool.*

The **Magic Wand** tool has a probability to choose a larger area than desired. In this case, you may want to limit the area that the tool works. Set a **Working Area** holding the right mouse button down and try again. T

The Magic Wand selects the area of pixels defined by the Tolerance value, but this time is restricted inside the Working Area, as shown in the following images.

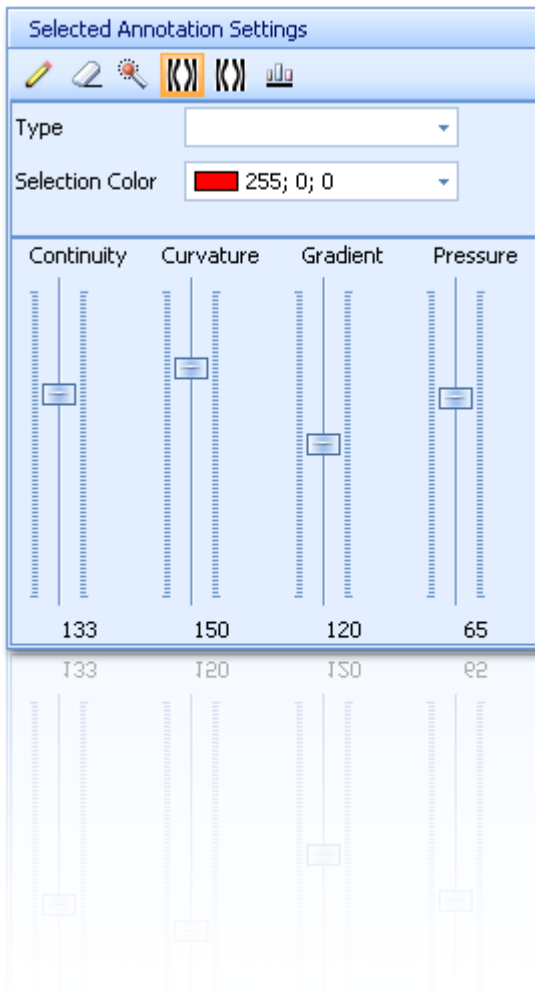


Selected region: Working Area is not defined.



Selected region: Working Area is defined.

Annotating using the Contour 1 tool



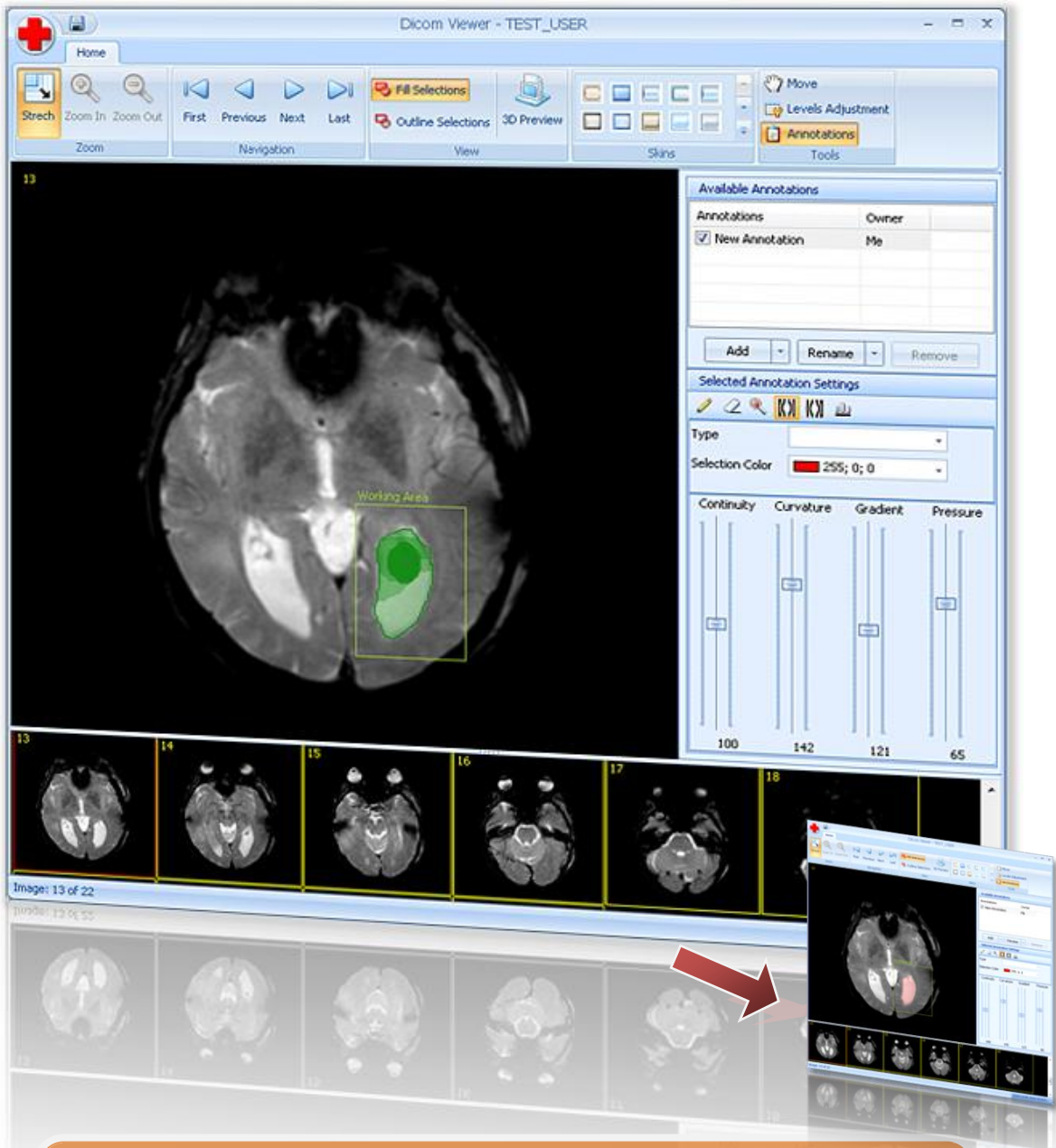
The **Contour 1** tool has four basic parameters. **Continuity** (varies from 0 to 200), **Curvature** (varies from 0 to 200), **Gradient** (varies from 0 to 240) and **Pressure** (varies from 0 to 100).

In order to annotate an area using the tool, press the left mouse button, while the mouse cursor is located inside the area of interest, and drag it. This creates an ellipse with a green border, which must be well located inside the area of interest. Release the mouse and press the space key. **Every time the space key is pressed, the ellipse expands in order to include a larger area of interest.** The tool usually requires multiple keystrokes of the space key, in order to provide an adequate annotated area.

If a part of the ellipse is outside of the area of interest, the tool will not function appropriately.

In order to deselect the semi-automatic annotated area just click once with the mouse.

If the selected area is satisfactory, press the **Enter** key in order to accept the selection as annotation (in that case the ellipse with the green border transforms to a red selected area).



In the above image is displayed the evolution of the annotated area for several keystrokes of the space key. The area of initialization is the dark green ellipse in the center, while the light green area is the result of the annotation process using the Contour 1 tool.

Annotating using the Contour 2 tool

The tool implements the active contours algorithm. This algorithm requires from the user to draw an ellipse inside the tumor area. This user-defined ellipse forms an elastic contour, on which a force is applied from inside out and forces the contour to expand towards the tumor boundaries. The contour is formed to be attracted by significant edges, thus, as it expands it fits the tumor boundaries.

The user can adjust three parameters, in order to change the snake's behavior during its evolution, and control the result.

The tool has three basic parameters. **Alpha/Beta** (varies from 0.00 to 1.00), **Kappa** (varies from 0.00 to 1.00) and **Force** (varies from 0.00 to 1.00).

Alpha/Beta: This is actually two parameters, properly combined into one, and it affects the contour's shape. More specifically, when it is set close to 1.0 the contour is rigid and tends to be more like a circle. When it is set close to 0.0 the contour becomes very flexible and it can form sharp corners and, generally, be "scratchy".

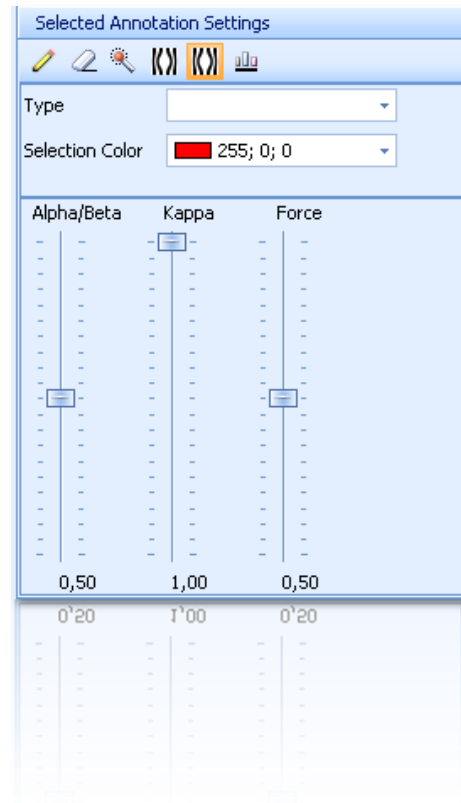
Kappa: This parameter indicates how much the contour is attracted by the edges. When it is set near to 1.0 it is attracted a lot by them, but when it is set to 0.0, the edges do not really affect the contour's expansion. For example, when kappa is set to 0.0, but alpha/beta is set near to 1.0, the contour will grow like a circle, regardless the shape of the edges, but when kappa is set near 1.0 and alpha/beta near 0.0, then the contour is allowed to form a more flexible shape and fit the tumor boundaries, to which it is attracted in a great extent. Since our goal is to detect boundaries, it is suggested to keep this parameter above 0.6.

Force: This parameter is the force that pushes the snake to expand outwards. The larger its value, the greater the force that is applied on the snake. **Be careful:** if this parameter is set to a very low value, the contour might not be able to reach the tumor boundaries. On the contrary, if its value is too large, it might overpass the tumor and expand out of it.

In order to annotate an area using the tool, press the left mouse button, while the mouse cursor is located inside the area of interest, and drag it. This creates an ellipse with a green border, which must be well located inside the area of interest. Release the mouse and press the space key **once**. **Every time the space key is pressed, the ellipse expands in order to include the entire area of interest.** The tool usually requires one press of the space key, in order to provide an adequate annotated area.

If a part of the ellipse is outside of the area of interest, the tool will not function appropriately.

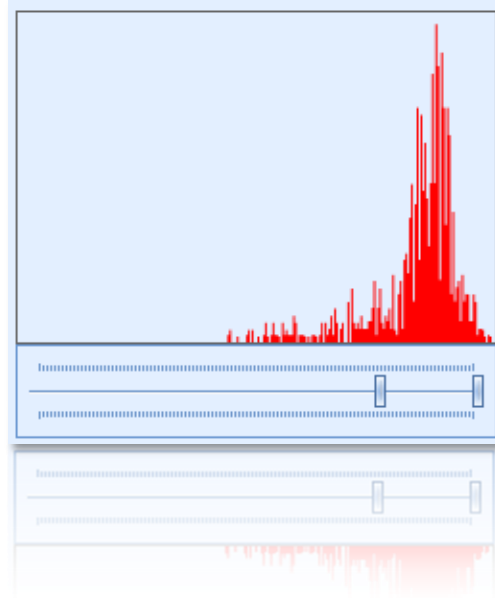
In order to deselect the semi-automatic annotated area just click once with the mouse.



If the selected area is satisfactory, press the **Enter** key in order to accept the selection as annotation (in that case the ellipse with the green border transforms to a red selected area).

Using the Histogram tool

The last tool of the group Selected Annotation Settings is the **Histogram** tool. The Histogram tool has two slider controls. By moving the right slider, the brighter areas of the image are deselected. By moving the left slider of the histogram, the darker areas of the annotated region are deselected.



Using the histogram tool we manage to deselect undesired parts of the annotated area, thus improving the quality and the precision of the annotation.

By moving the right slider of the histogram, the brighter areas of the image are deselected.

By moving the left slider of the histogram, the darker areas of the annotated region are deselected.

Using the histogram tool we manage to deselect undesired parts of the annotated area, thus improving the quality and precision of the annotation.