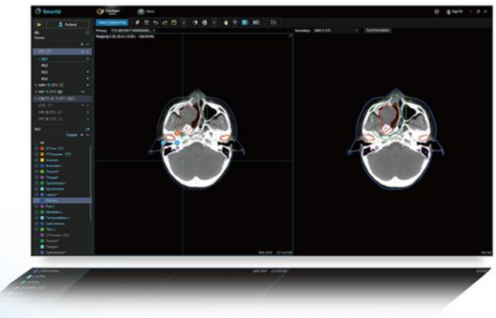
RAYDOSE®

SmartU

Software for Radiotherapy Contouring

User Manual



Version 2.0

Contents

1. Preface

1.1 Safety instructions

1.1.1 Scope of application

It is used to contour tumors and related organs and tissues when making radiotherapy plans.

1.1.2 Composition

SmartU consists of setting module, patient management module, contour module and dose module.

1.1.3 Operating environment

The operating environment of the computer used for software installation is: temperature 0-40 ℃; Humidity: 10%-60%, and keep the room clean. Avoid vibration, noise, strong current and other interference sources, and be sure to avoid direct sunlight. The power supply must be turned off for all plug-in work. The power supply requires AV220-230V and the system is grounded.

The storage and use environment of the installed computer is: stored in a dry and ventilated place at a temperature of 0-40 ℃, try to avoid dust and away from magnetic field, avoid sunlight, and avoid contact with chemicals.

1.2 After sales

1.2.1 Maintenance

Raydose believes that it shall be responsible for the safety, reliability and performance of the software under the following conditions:

◆ Assemble, upgrade or maintain by personnel authorized by the company.

◆ Operate the software according to the user manual.

The company will not be responsible for software damage caused by the following circumstances, which is not within the scope of free maintenance of the company:

◆ Damage due to improper operations.

◆ Software amendment without authorization.

2. About software

2.1 Product introduction

SmartU is a system applied in the Radiotherapy Department of hospitals. Its main task is to provide radiotherapy doctors with functions such as image preview, image registration, contouring of tumor target volume and related tissues and planned dose evaluation when formulating radiotherapy plans.

2.2 Operation environment

2.2.1 Hardware

Client host:
CPU: Intel I3 or AMD R3 or above
RAM: 3.7GB or above
Hard disk: 500GB or above mechanical
Display: at least 1920*1080 resolution
Cloud server host: 4-core or above CPU, 16GB or above memory, 500GB or above hard disk
LAN server host: 4-core or above CPU, 16GB or above memory, 500GB or above hard disk

2.2.2 Software environment

Client: Windows 7 64bit(or above)
Server: Ubuntu16.04 64bit(or above)

2.2.3 Network conditions

Wired or wireless network connection, with a bandwidth of more than 1000Mbps.

2.2.4 Requirements for installing software

The minimum disk space required for installing software is 100G or above.

2.2.5 Software terminology

Terms / abbreviations	Original phrase / meaning
CT image	Images generated by computed tomography
MR image	Images generated by magnetic resonance imaging machine scanning
DICOM	Digital imaging and communication standards
Planning system	Radiotherapy planning system. It uses one or more algorithms to calculate absorbed dose distribution in patients, and the results are used by radiotherapy planners.
Plan file	DICOM file of radiotherapy plan
Dose file	DICOM file of result from calculation of the absorbed dose distribution in patients by planning system using one or more algorithms
Structure file	DICOM file of contour of a patient's organ or target volume

2.3 Security

The software operation has malicious code protection for anti-virus software and firewall with high usage rate. Intrusion detection and malicious code protection in the software mechanism are used to ensure network security, and the update of security software will not affect the software.

2.4 Acquisition of software input data

The software accepts DICOM files exported from CT, MR, doctor workstation, planning system, etc. The terminal takes the file path with DICOM file as the data input source.

2.5 User access control mechanism

2.5.1 User identification method

The manufacturer provides username and password.

2.5.2 User type and authority

The end users are doctors, physicists and administrators. All functions of the software can be used, and all users have the permission to use the software.

Administrators have administrative authority over other users.

2.5.3 Password strength setting

Log in with a password. The password length is no more than 30 characters. The manufacturer only provides administrator account and password. Ordinary users can modify password by themselves.

2.5.4 Software upgrade authorization

The software provides online automatic update. If it is in LAN, the manufacturer's professional personnel are required to authorize, upgrade and maintain it.

2.6 Maximum concurrent end users

SmartU terminal runs on a PC, and a computer can only run one terminal at most.

3. Operations

SmartU includes a server and a client. The server is on cloud or private LAN, and the client runs on a computer. The client software is run by a terminal, hereinafter referred to as "software"). Take raw data[CT images, MR images] collected by a medical image system or data[CT images, MR images, Plan files, Dose files, Structure files] from a planning system as input, and upload it to the server database. After downloading the uploaded data, the terminal processes, registers and contours the images to obtain DICOM files of Structure, and then exports them locally or sends them to a planning system.

3.1 Modules

The software includes: setting module, patient management module, contouring module and dose evaluation module.

3.2 Functions

3.2.1 Login

Double click the client icon "" to enter the login interface(as shown in Figure 3-1).

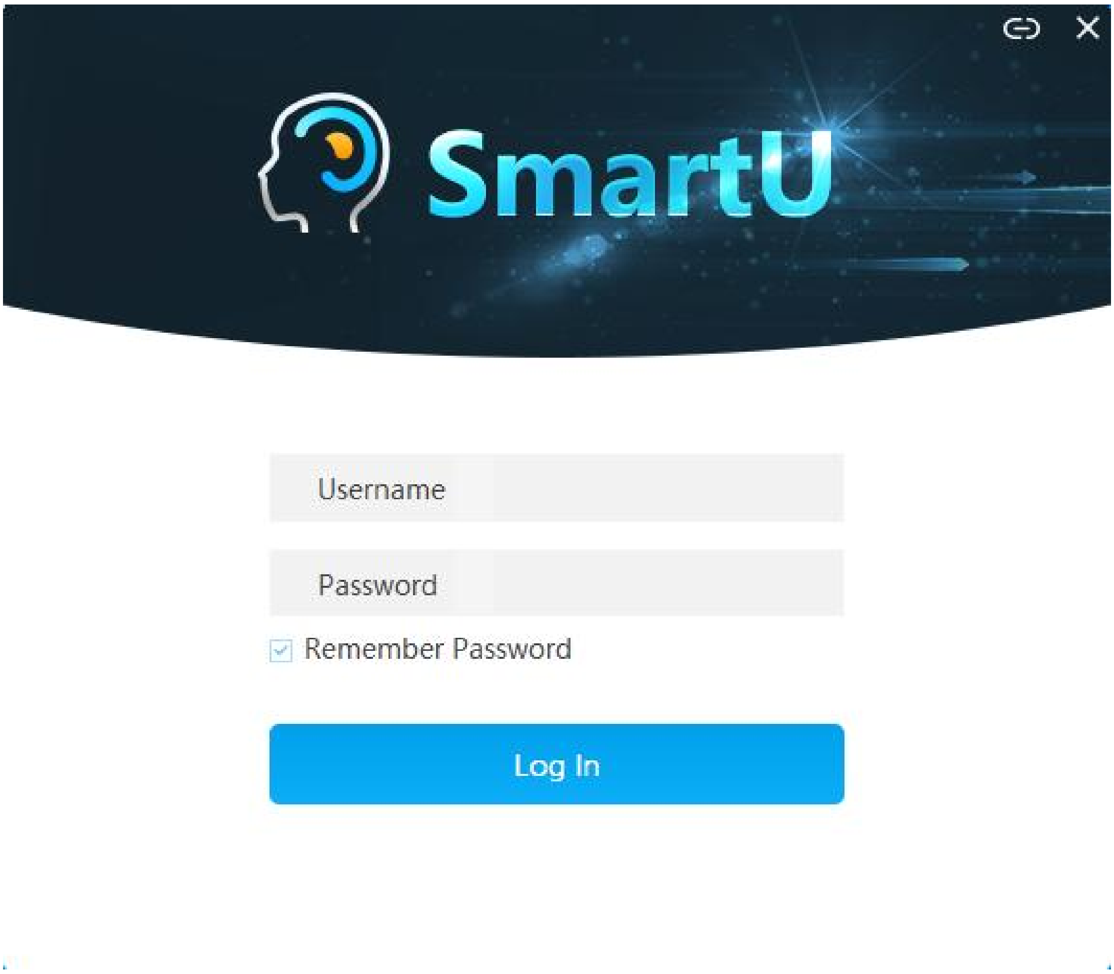


Figure 3-1 login interface

Fill in username and password and click the "Log in" button to log in.

Click the " " settings button on the upper right corner of the login interface to change server IP and port.

3.2.2 Main interface

After logging in, enter the main interface of the software, as shown in Figure 3-2. The menu bar buttons on the top from left to right are: Contour, Dose, Connection status icon, Setting and User management. The buttons are explained as follows:

Contour: switch to the contour interface

Dose: switch to the dose interface

Connection status icon: " " indicates that the server is disconnected and reconnecting.

Settings: opens the settings interface.

User management: account can be set here.

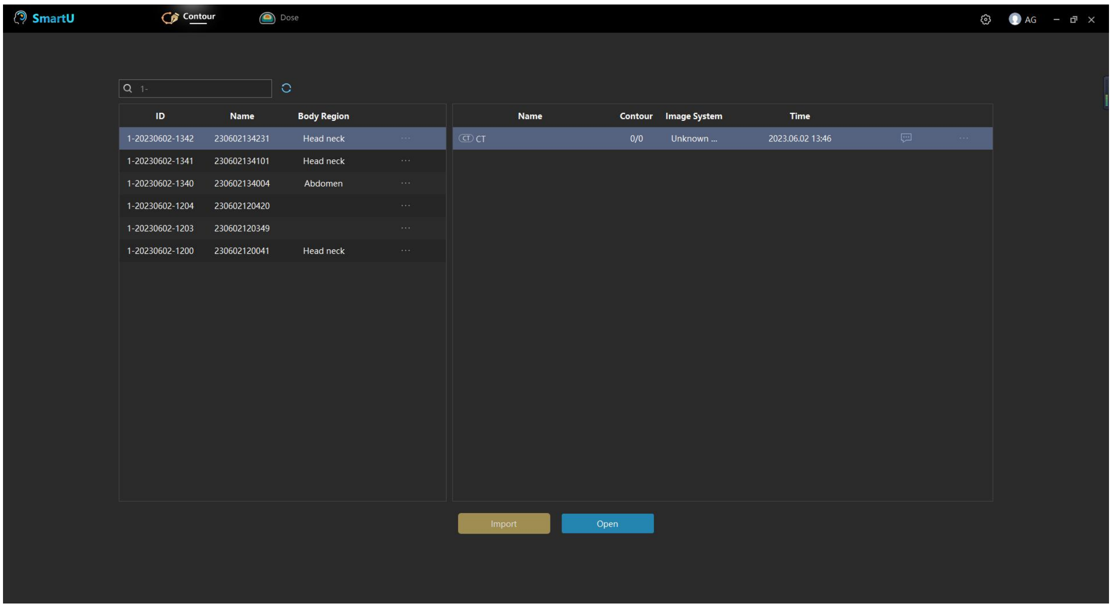
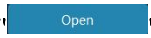


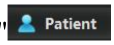
Figure 3-2 main interface

Click "Import" to import local data, such as plan, dose, image and structure in Dicom.

Enter patient number or name in the upper left search box to search for patients, and click the refresh icon " " to refresh the patient list. The left side of the interface displays basic information of patients: ID, name and tumor location. Right click an item of patient information or click "···" on the right side to select "Edit" to edit tumor location of the patient, and select "Delete" to delete the item. The right side of the interface displays the patient's image names, contours(number of contoured structures / number of all structures), image systems and time in turn. Right click an item of image information or click "···" on the right to edit, delete or export it. Click "" to add remarks to the image. The remarks can be saved up to 50 characters.

Select the patient and image to be opened and click "

" to jump to the contour interface. If the image has already been opened by another user, figure 3-4 occupancy prompt will pop up, where you can choose to just view the image, open anyway or cancel.

After the image has been opened, you can click "

" to open the Contouring patient management interface(as shown in Figure 3-3), and select other images to open.

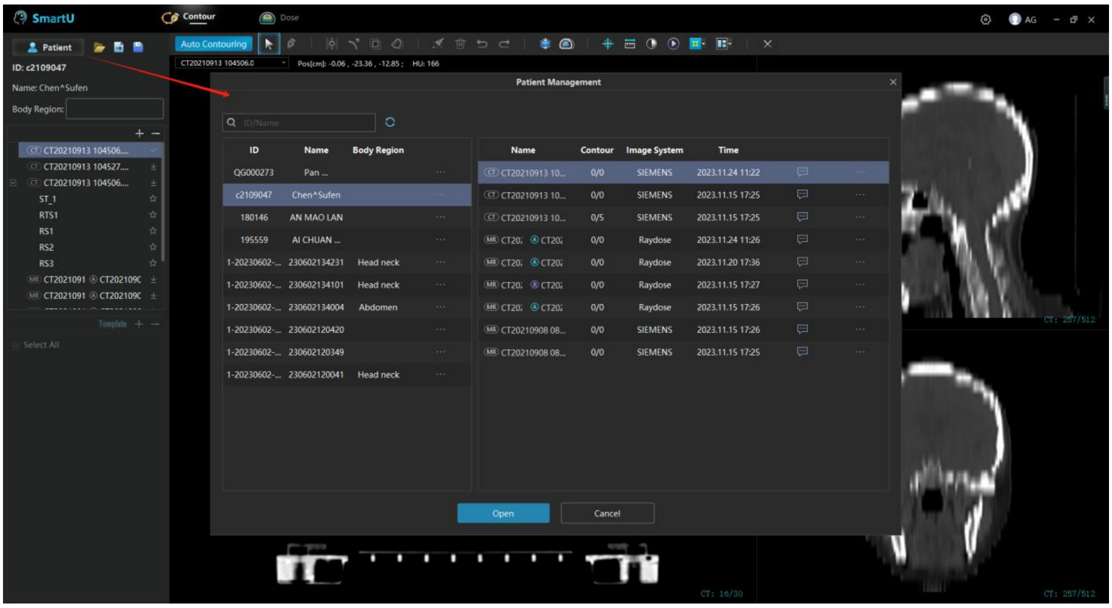


Figure 3-3 contouring patient management interface

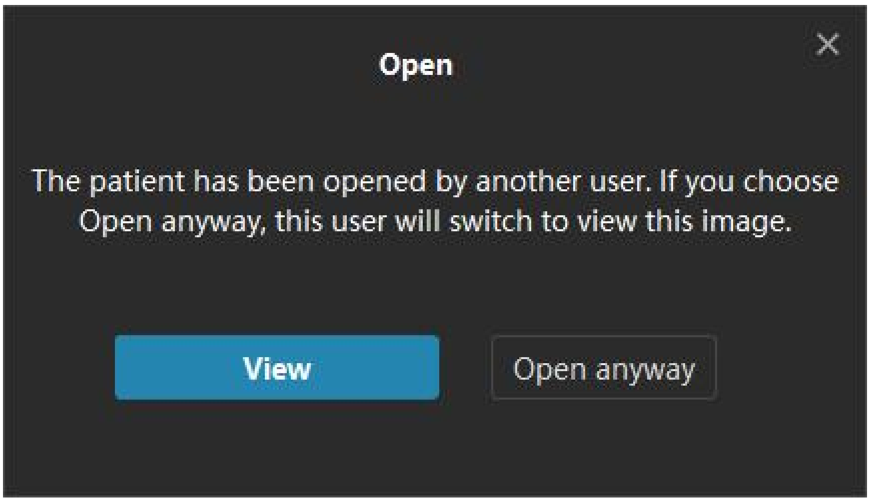


Figure 3-4 occupancy prompt

3.2.3 Contour

The contour interface is shown in Figure 3-5, which consists of import and patient management, patient information, image information, ROI list, toolbar, and image viewing and contouring. Users can view images, contour target volumes and OARs, edit images and register images in this interface.

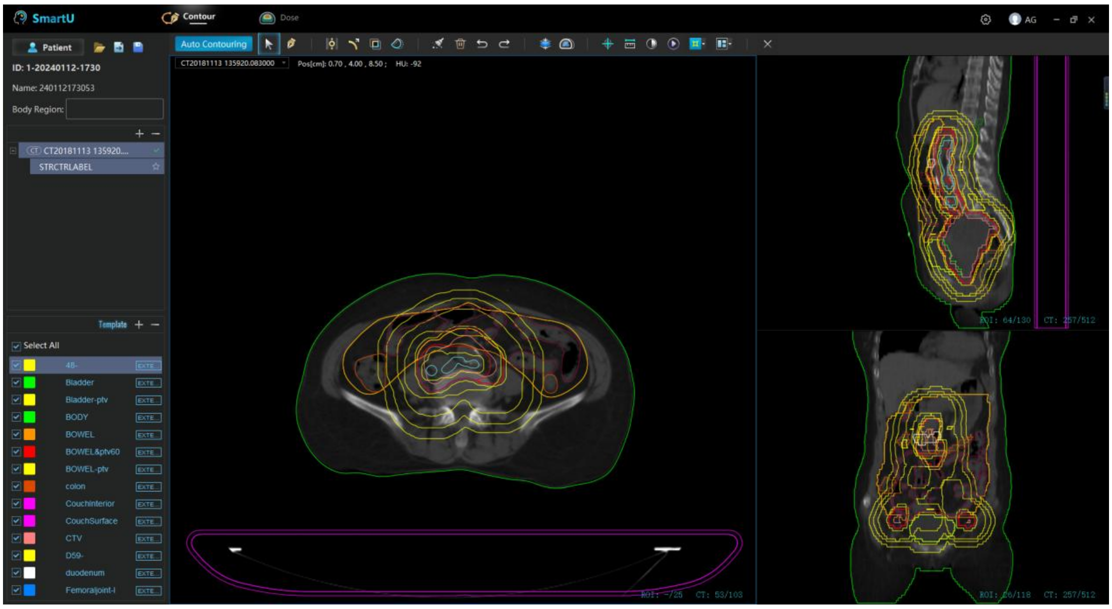


Figure 3-5 contour interface

3.2.3.1 Import and patient management

In the upper left corner of the contour interface, refer to 3.2.2. for operations.

3.2.3.2 Patient information

This part, as shown in Figure 3-6, displays the basic information of the opened patient, including the patient's ID, name and body region where tumor is at. Click the drop-down box to edit the patient's body region.

Figure 3-6 patient information

3.2.3.3 Image information

As shown in Figure 3-7, this part displays the names of all images of the opened patient saved in SmartU. Click a name to view the images and contours. The structure files corresponding to an image are displayed under the image name. Click "+" on the upper right to add a structure file and click "-" to delete the selected structure file. If the star sign on the right side of a structure file is highlighted, the structure is confirmed. After confirmation, it is not allowed to make any changes to the ROI. The ROI list below and the contouring tools on the right are disabled. If you need to edit again, you need to cancel the confirmation. The registered image itself has no RS structure. When the registered image is opened, both the main image and the registered image will be displayed, but only the RS of the main image can be operated.

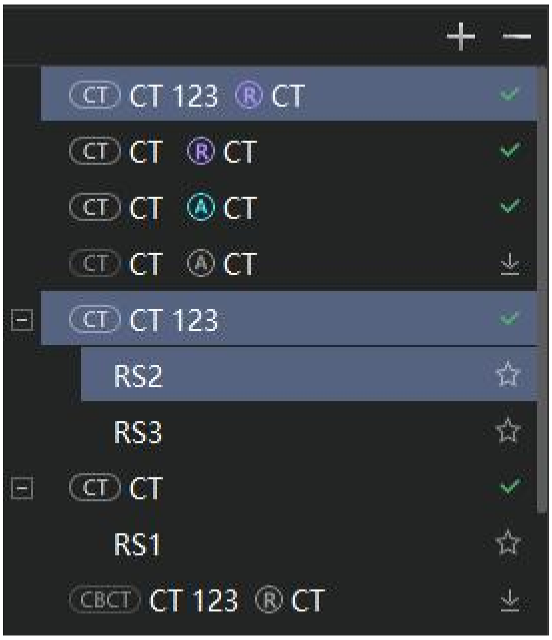


Figure 3-7 image information

3.2.3.4 ROI list

As shown in Figure 3-8, this part displays all the ROI names in the opened structure file. Here, you can edit the name, color and type of the ROI.

Figure 3-8 ROI list

The "

" icon at the top allows you to create ROI in batches according to the preset templates. Click this icon and check the ROIs in one of the templates to complete the batch creation. This function is to allow users to build custom ROI templates and quickly create the corresponding ROIs when using the system. Click the "+" on the upper right to pop up the interface as shown in Figure 3-9. You can edit the ROI name in the pop-up interface and select ROI, type(see 3.2.3.5.1 for the description of closure type) and color.

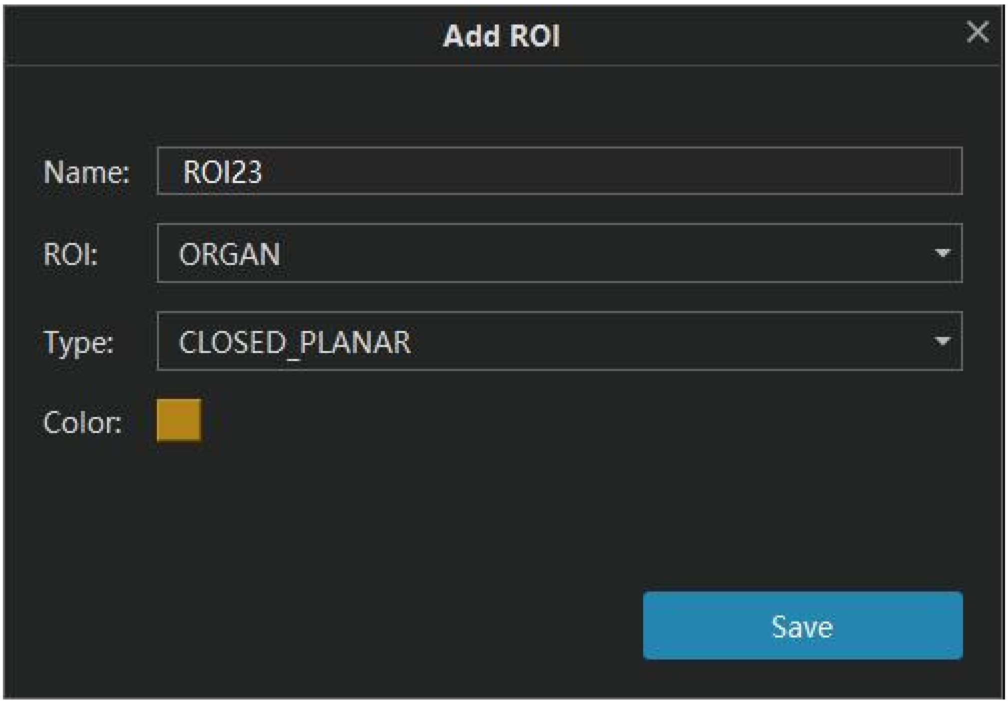


Figure 3-9 ROI editing interface

Right click the ROI in the list to perform more operations, as shown in the table below:

Item	Explanation
New ROI	Create a new ROI, same operations as Figure 3-9
Edit	Edit the ROI information, same operations as Figure 3-9
Clone	Clone the selected ROI in the current list
Copy	Copy selected ROI
Copy selected	Copy all selected ROIs in the current list
Paste	Paste the copied ROI, which can be between different lists
Delete	Delete the selected ROI
Delete empty ROI	Delete all empty ROIs not contoured in the list

In addition, there are some shortcuts: select the check icon on the left side of the ROI name, and the ROI contour will be displayed. Double click the color box on the left of the ROI name to change the ROI color. Double click the ROI name to edit the ROI name. After editing, press enter or lose focus to save the edited information.

3.2.3.5 Toolbar

This part includes tools such as contouring, image processing and image display, which can be divided into four parts: contouring toolbar, image processing toolbar, image display toolbar and other tools, which will be introduced one by one below.

3.2.3.5.1 Contouring toolbar

The icon and functions of each tool are introduced as follows:

- Auto contouring

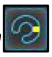
The auto contouring icon is "

". Select body region, model(models of different regions have been built in the software) and structure file where the generated contouring is located in the pop-up window, and click confirm. After the calculation, you can view the auto contouring results.

- Select

The icon of this function is "" and when this icon is selected, the mouse is in the normal selection state, which can be used to cancel the contouring state to prevent operations by mistake. You can also switch ROI directly on the image, which is similar to selecting ROI on the left.

- Manual contouring tools

The icon of this function is "". After selecting this icon, the mouse switches to the contouring state. There are three of them: draw points "", draw line "", and draw circle "" (you can enter a value in the right box

 to adjust the pen size. The value represents circle radius, and the default is 8mm).

The results are different in different closure types when drawing points, lines or circles. The description is as follows:

Closure type	Manual contouring tool	Results
CLOSED_PLANAR	Draw points	Connect the points selected by the mouse one by one. The first point and the last point are connected to form a closed contour
	Draw line	Connect the line drawn by the mouse end to end to form a closed contour
	Draw circle	The pen outlines an area
OPEN_PLANAR	Draw points	Connect the points selected by the mouse one by one
	Draw line	Draw a line
	Draw circle	Not available
POINT	Draw points	Draw a point
	Draw line	Not available
	Draw circle	Not available

- 2D seed point

The function icon is "", select ROI, click the icon and draw a point or a line, and automatically calculate the planar contour according to the HU value of the drawn point or line.

- 3D seed point

The function icon is "", first select ROI, click the icon and draw a point or a line, and the upper and lower 3 layers will be automatically generated according to the HU value of the point or line.

- Interpolation

The icon of this function is "", and ROI interpolation can be performed. At present, it only supports interpolation between cross-sectional contours. It is mainly applied to ROIs with similar shapes and sizes of contours at different layers. You can draw two closed curves in different layers first, and then select this icon to automatically calculate and generate the contours of the layers in between.

- Expand/contract

The icon of this function is "", which can be used to expand or contract ROI. Select this icon, and the interface shown in Figure 3-10 will pop up. By default, the ROI currently displayed in the main interface will be selected. You can switch to other ROIs and choose to expand or contract. The buttons on the right indicates whether to expand or contract in six directions at the same distance. Below are the name, type and color of the newly generated ROI. After calculation, ROI on the main interface will automatically switch to the newly calculated one.

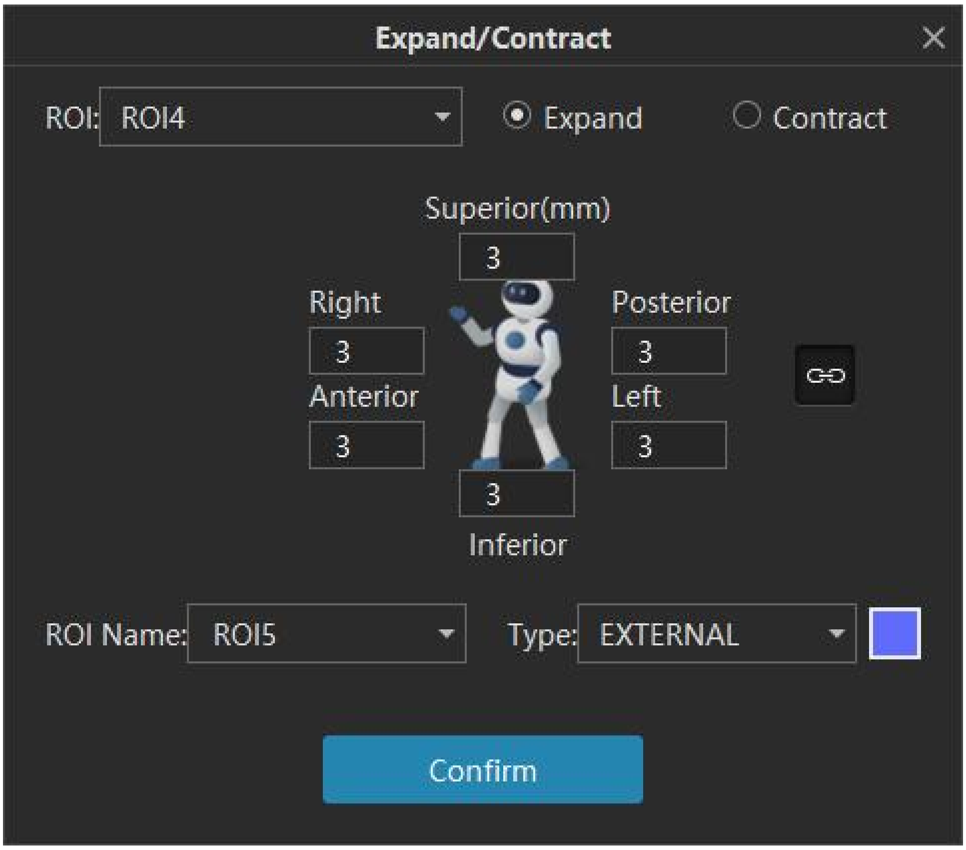


Figure 3-10 Expan/contract interface

- Boolean operation

The function icon is "". Select this icon, and the interface shown in Figure 3-11 will pop up. The interface is composed of expression A on the left, expression B on the right and operation method in the middle. Not only the simplest operation of two ROIs, but also more complex Boolean operations and the combinatorial operation of expanding and contracting can be realized. The final ROI can be generated by one calculation.

Expression A on the left: check the ROIs to be calculated on the left(at most two), and select union or intersection calculation to get the result. If it is necessary to expand or contract the obtained result, activate Expand/Contract at the bottom right of the interface, and select expand or contract in the expression A area on the left, and calculate to obtain the result.

Expression B on the right: check the ROIs to be calculated on the right(at most two), and select union or intersection calculation to get the result. If it is necessary to expand and contract the obtained result, activate Expand/Contract at the bottom right of the interface, and select expand or contract in the expression B area on the right, and calculate to obtain the result.

Expression A and expression B operation: select union, intersection or difference to operate expression A and expression B. The operation result can be saved as a new ROI or in an existing ROI, and the type and color of the newly generated ROI can be modified.

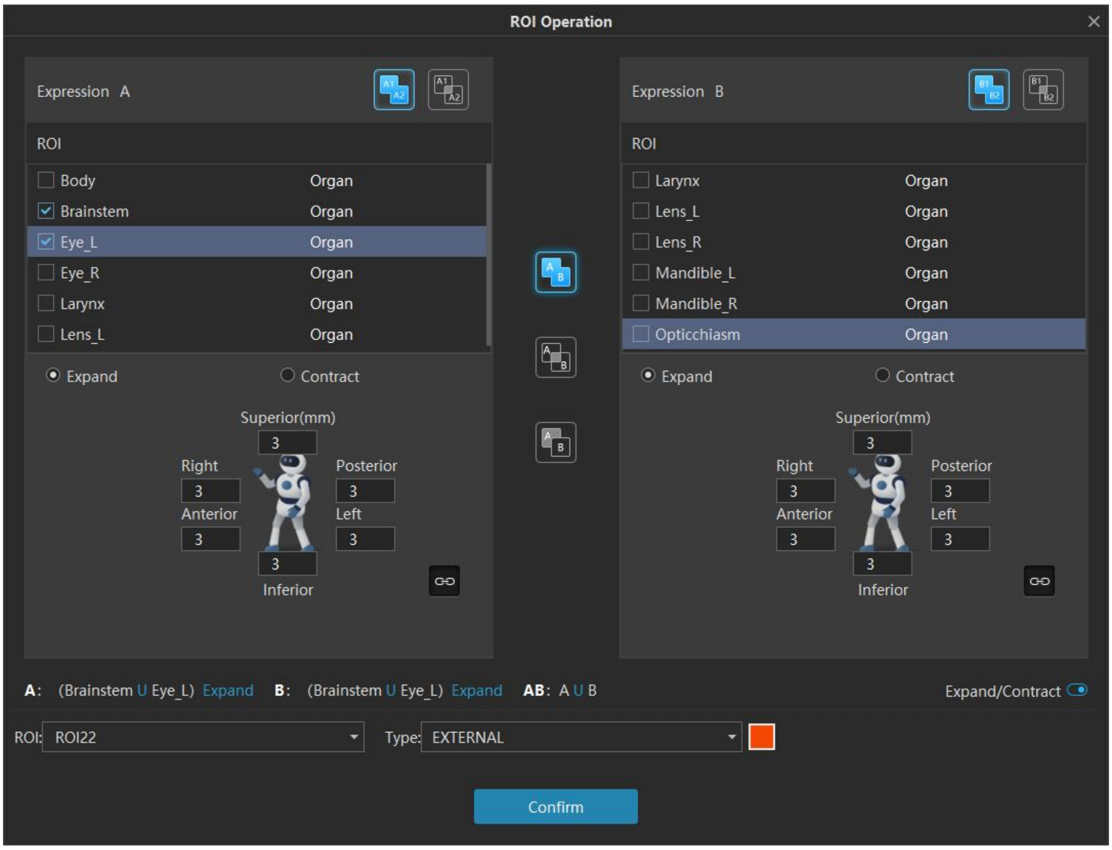


Figure 3-11 Boolean operation interface

- Contour comparison

The icon of this function is "", which can compare the ROI contours of two structures under the same image. Select this icon, and the interface shown in Figure 3-12 will pop up. Select the two structure file names to compare, and check the ROIs to be compared one by one below.

Click "Confirm", and return the calculation results of each ROI and average, as shown in Figure 3-13.

Figure 3-12 Contour comparison interface

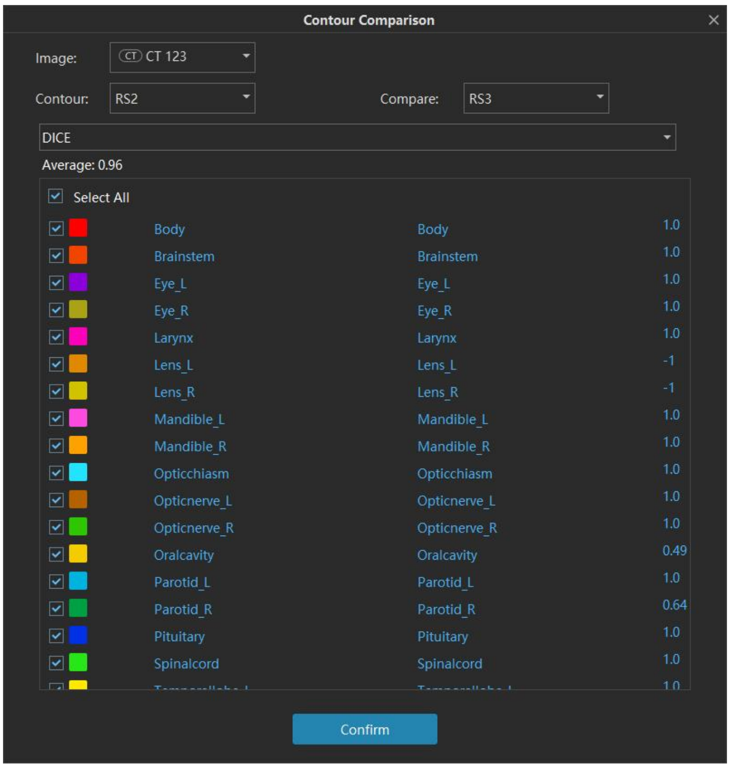


Figure 3-13 Contour comparison result interface

This function provides the calculation of DICE, HD95, ASSD and MSSD, as follows:

Item	Formula
DICE	$DICE = DSE(A,B) = \frac{2\|A \cap B\|}{\|A\|+\|B\|}$
HD95	$d_H(X,Y) = \max\{d_{XY}, d_{YX}\} = \max\{\max\limits_{x\in X}\min\limits_{y\in Y}(x,y), \max\limits_{y\in Y}\min\limits_{x\in X}(x,y)\}$ $0.95*d_H(X,Y)$
ASSD	$ASD(X,Y) = \frac{\sum_{x\in X}\min_{y\in Y} d(x,y)}{\|X\|}$ $ASSD(X,Y) = \frac{\{ASD(X,Y)+ASD(Y,X)\}}{2}$
MSSD	$MSSD(X,Y) = \max\{ASD(X,Y), ASD(Y,X)\}$

- Cleanup

The function icon is "". Click this icon, and the cleanup interface shown in Figure 3-14 will appear. Select the ROI that needs to be cleaned up. Subject to the cross-section, clean all contours whose areas on each surface of the ROI are less than the set area. After cleaning, the current ROI will be displayed.

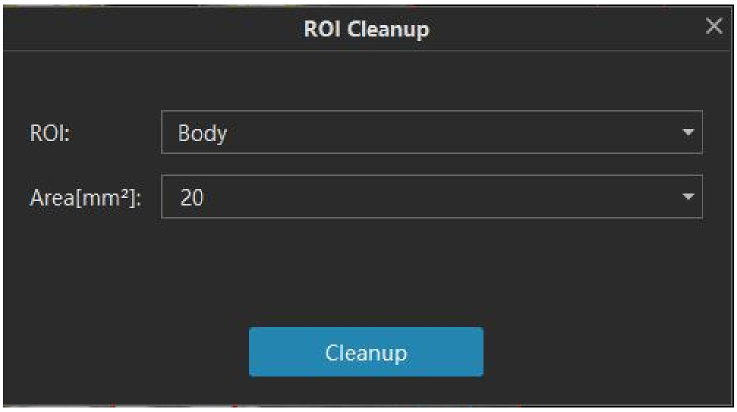


Figure 3-14 Cleanup interface

- Delete

The icon of this function is "" and is only valid for the currently selected ROI. Frame the contour or its interior of the ROI to delete the contour of the current layer.

- Undo

The icon of this function is "" and all operations related to contouring can be undone, up to 30 steps. The shortcut is Ctrl + Z.

- Restore

The icon of this function is "" and all operations related to contouring can be restored, up to 30 steps. The shortcut is Ctrl + y.

- Save

The icon of this function is "" to save contours.

3.2.3.5.2 Image processing toolbar

The icons and functions of each tool are described as follows:

- Crosshair

The icon of this function is "", which can quickly locate a point in an image. Select the icon and click any point on an image to quickly switch to the cross section, sagittal plane and coronal plane where the point is located. The coordinates and HU value of the point can also be displayed above the image.

- Ruler

The icon of this function is "", which can measure the physical distance between any two points on an image. Select the icon, press and drag the mouse to select the start point and end point to measure distance.

- Window width and window level

The icon of this function is "" and the window width and level of image display can be adjusted. Click this icon to pop up the interface shown in Figure 3-15, where you can enter window width and window level values, drag the window width and window level scale lines, or select one from the preset window width and window level templates.

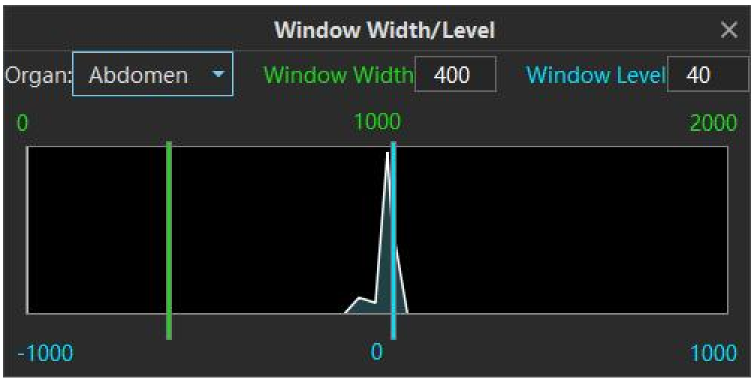


Figure 3-15 window width and window level interface

- Image merging

The icon of this function is "" and the resolution in the Z direction is reduced according to the cross section to reduce the size of an image. Click this icon to pop up an interface, as shown in Figure 3-16. Select the image and the number of layers for image merging, and click "Confirm" to merge several adjacent images into one.

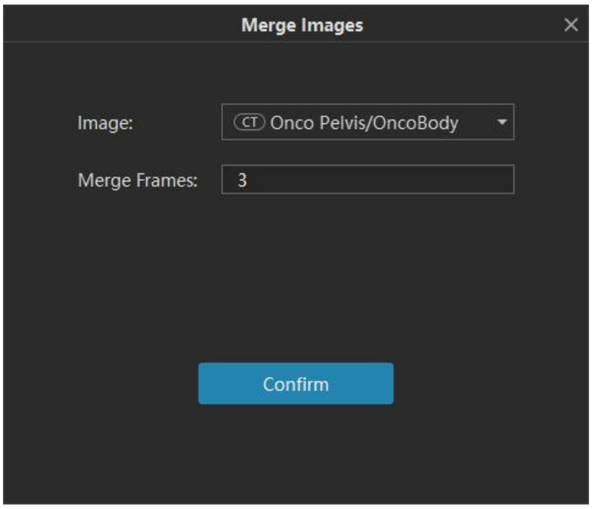


Figure 3-16 image merging interface

- Image registration

The icon of this function is "", which can be used for single-modal or multi-modal image registration. Click this icon to pop up the interface shown in Figure 3-17. Select the primary and secondary images to be registered, and select the registration method. Currently, the supported registration methods include automatic elastic registration and rigid registration. The registration will generate a new image. The name rule of the new image is: secondary image name + registration method + primary image name. After registration, both the registered image and the primary image will be displayed, and the RS of the primary image can be operated.

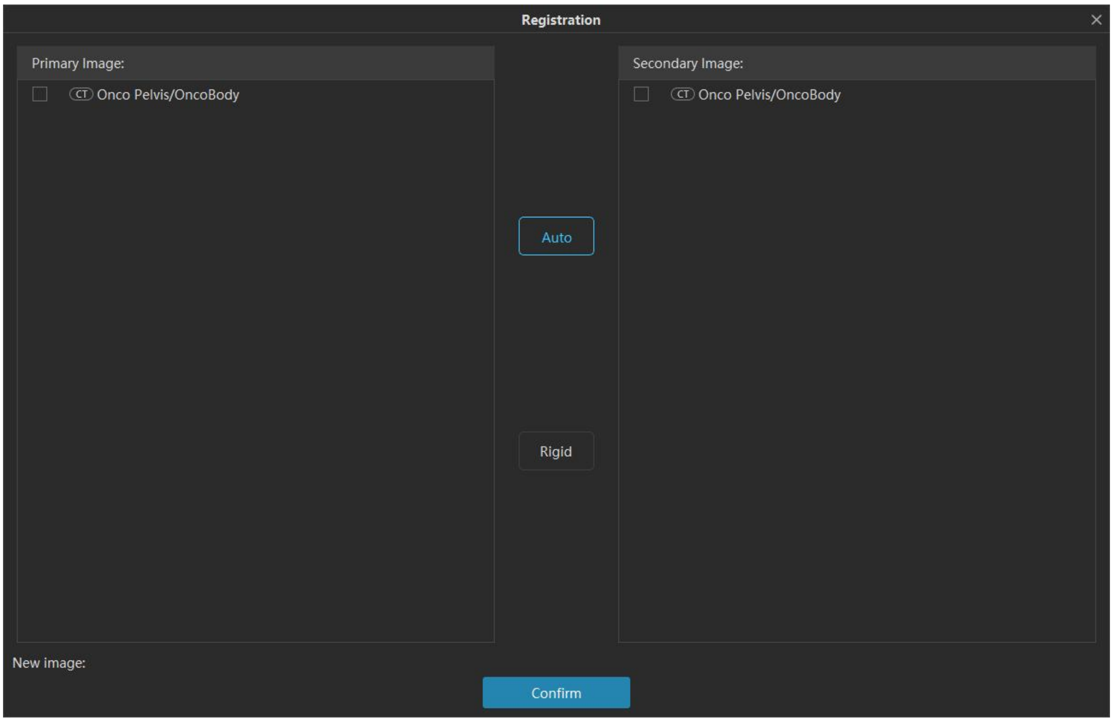


Figure 3-17 image registration interface

The toolbar above the registered image is explained as follows:

Item	Explanation
	Vertical strips. Primary image and registered image are compared and displayed. This function can split them to the left and right.
	Blended. Back to the normal display of registered image(overlapping primary image and secondary image), and remove vertical strips, pan and checkerboard effects.
	Pan. Primary image and registered image are compared and displayed. This function can display registered image in a circular area, while primary image is displayed outside the area.
	Checkerboard. Primary image and registered image are compared and displayed. This function can cross segment them.
	Transparency adjustment. To adjust the transparency level of secondary image. When dragging to the most left, secondary image is completely transparent, and when dragging to the most right, secondary image is not transparent at all.
	Coloring. To adjust the color of secondary image. You can choose colorless or with different colors.
	Move. When vertical strips, pan or checkerboard are effective, you can use this function to move boundary of comparison.
	Display registration. This icon shows the status of the registered image. Click this icon to switch between current and registered image.

- Image smoothing

  The icon of this function is "" to smooth the image.
- Image enhancement
  The function icon is "" to enhance the image.
- Image denoising

  The icon of this function is "" to denoise the image.

3.2.3.5.3 Image display toolbar

Tools for adjusting image display are in the image display toolbar. The icons and functions of each tool are as follows:

- Play

  The icon of this function is "". At a certain speed, the currently activated image can start or stop automatic plane rolling, and the sliding bar can be dragged to manually roll planes. The playing speed(ms/plane) can be customized to facilitate image viewing and contour review.
- ROI display

  The icon of this function is "", which can adjust the display state of ROI and provide two display states: line and fill.
- View

  The icon of this function is "", which can adjust the view of image display and provide views of two, three, six and nine panels.

3.2.3.5.4 Other tools

There are two tools in this section, which are described as follows:

- Export

  The icon of this function is "" and data export can be completed here. Click this icon to display a pop-up interface, as shown in Figure 3-18. Select the files to export, and the confirmed contours will be automatically selected. Support exporting to local or sending to a specified third-party DICOM node.

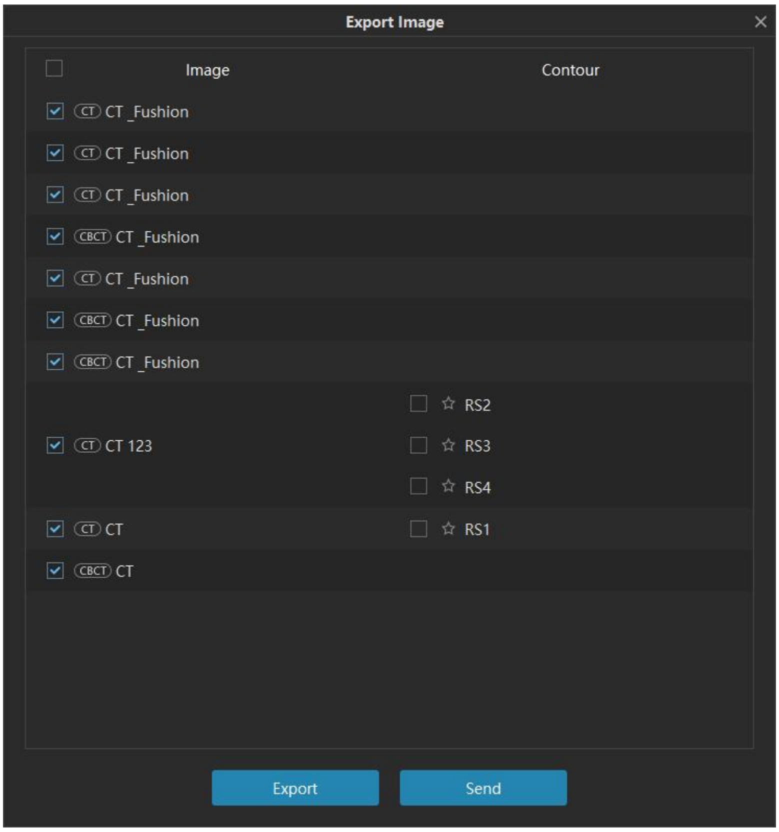


Figure 3-18 export interface

- Close

The icon of this function is "", to close all data of the opened patient.

3.2.3.6 Image viewing and contouring

This is used to display a patient's images, and the tools introduced above are applied to the images to change the display and complete the contouring of target volumes and OARs.

On the top of the cross-sectional image, CT image name, point coordinates and HU value are displayed. On the lower right side, the number of currently displayed layer of the selected ROI / total number of layers, and the number of currently displayed CT layer / total number of CT layers are displayed.

3.2.4 Dose

The dose interface, as shown in Figure 3-19, consists of import and patient management, patient information, plan information, toolbar, and image and dose viewing. Image view and planned dose review can be performed on this interface.

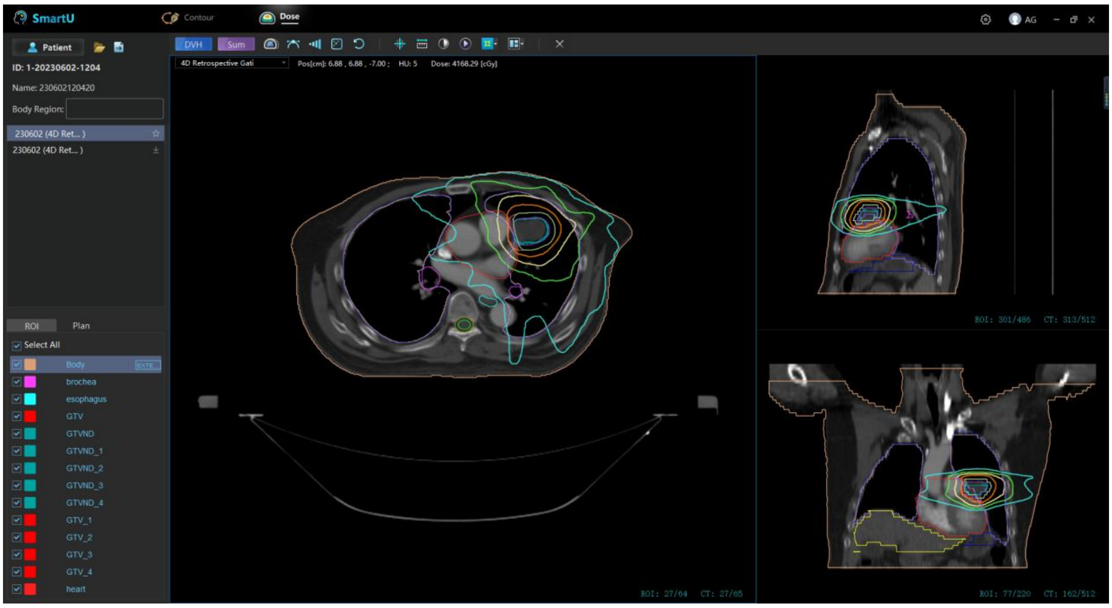


Figure 3-19 dose interface

3.2.4.1 Import and patient management

The import and patient management functions are in the upper left corner of the dose interface. Refer to 3.2.2 for the import button.

Click "Patient" to open the patient management interface(as shown in Figure 3-20). Enter patient ID or name in the upper left box to search for patients, and click the refresh icon "" to refresh the list. The basic information of patients is displayed on the left side of the interface: patient ID, patient name and body region. Right click an item of patient information or click "" on the right side to select "Edit" to edit the tumor location of the patient, or select "Delete" to delete the item. The right side of the interface displays plan name, LINAC, energy and time in turn. Right click an item or click "" on the right to delete or export the item. Click "" to add comments to it. Click open to open the plan in the dose interface.

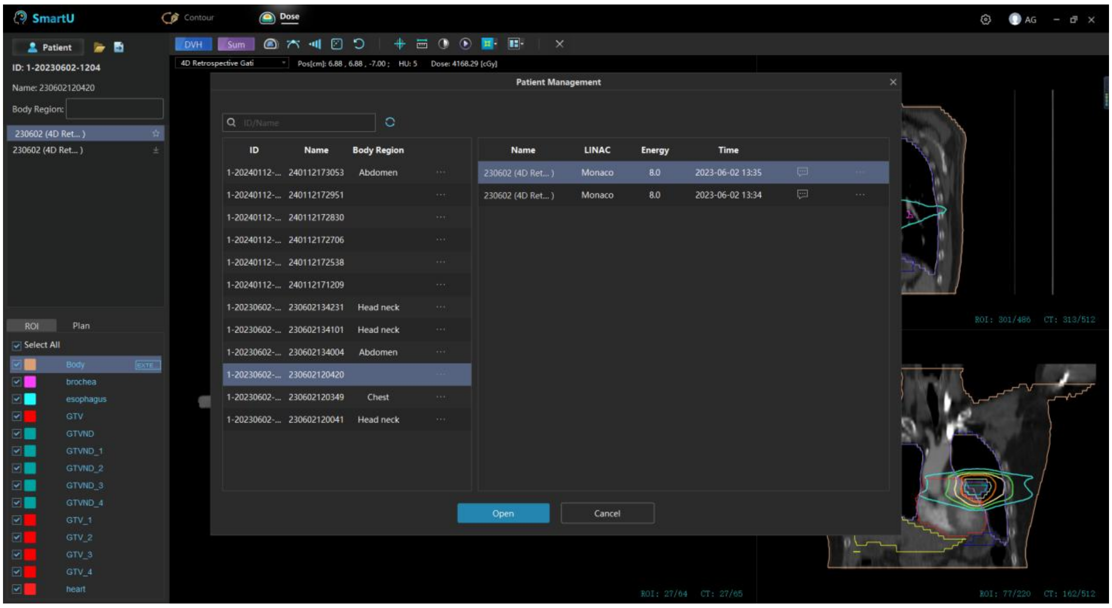


Figure 3-20 patient management interface

3.2.4.2 Patient information

Refer to 3.2.3.2.

3.2.4.3 Plan information

This part is shown in Figure 3-21. All the plan names of the patient are displayed in the plan list above. After selecting a plan, information such as energy, ISO coordinates, machine and prescription dose is displayed below. The planned dose information is displayed in the image and dose viewing part.

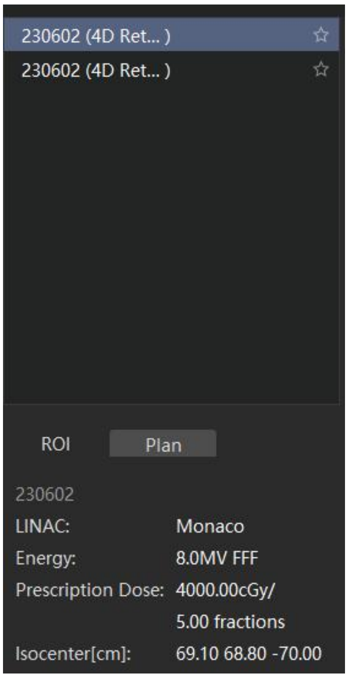


Figure 3-21 plan information

3.2.4.3 Toolbar

This section summarizes the image display and image processing tools required for dose viewing. The icons and functions of each tool are described as follows:

- Play

The icon of this function is "". At a certain speed, the currently activated image can start or stop automatic plane rolling, and the sliding bar can be dragged to manually roll planes. The playing speed(ms/plane) can be customized to facilitate image viewing and contour review.

- ROI display

The icon of this function is "" which can adjust the display state of isodose, and provide three display states of line, plane and gradient.

- View

The icon of this function is "", which can adjust the view of image display and provide views of two, three, six and nine panels.

- Crosshair

The icon of this function is "", which can quickly locate a point in an image. Select the icon and click any point on an image to quickly switch to the cross section, sagittal plane and coronal plane where the point is located. The coordinates and HU value of the point can also be displayed above the image.

- Ruler

The icon of this function is "", which can measure the physical distance between any two points on an image. Select the icon, press and drag the mouse to select the start point and end point to measure distance.

- Window width and window level

The icon of this function is "" and the window width and level of image display can be adjusted. Click this icon, there are several ways to adjust the window width and window level. The pop-up interface mainly includes selecting a template, dragging a slider and manually filling in. In addition, it can also be adjusted by pressing and holding "Ctrl" + left mouse button in the image window.

- Export

The icon of this function is "" and data export can be completed here. Click this icon and select the file to export in the pop-up interface. Support exporting to local or sending to a specified third-party DICOM node.

- Close

The icon of this function is "", and an opened plan can be closed here.

3.2.4.4 Image and dose viewing

This is used to display a patient's images and planned dose, and use the above tools on the images to change the display of images and doses.

On the top of the cross-sectional display, CT image name, point coordinates and HU value are displayed. The number of CT layers / total number of CT layers is displayed at the bottom right.

3.2.5 Settings

Click the settings icon "" in the upper right corner of the interface to open the settings interface, where you can complete template setting, model setting, DICOM node setting and window width and level setting. You can also find Help and other information about SmartU.

3.2.5.1 Template setting

The templates here can be used to create ROI in batch in the ROI list of the contour interface.

Switch to template setting in the settings interface, as shown in Figure 3-22. SmartU has three built-in templates. The left side of the interface displays the preset template names and the right side displays the ROI names in the selected template. Click "+" on the left, fill in the patient's body region, cancer and template name in the pop-up interface, and click Save to complete the template setting. Click "-" on the left to delete the selected template. Click "+" on the right, fill in ROI name, ROI label and geometry type, and click Save to finish adding ROI. Click "-" on the left to delete the selected ROI.

Figure 3-22 template setting interface

3.2.5.2 Model setting

SmartU has three built-in models for automatically contouring normal tissues and organs. The models are divided into head and neck, chest and abdomen according to human body parts. Here you can choose the ROIs generated by the model calculation according to the habits and requirements of the Department.

The model setting interface is shown in Figure 3-23. The left side of the interface is the preset models, and the right side displays the ROI names that can be calculated and generated in the selected model. Check the required ROIs, and then click save in the upper right corner to complete the setting.

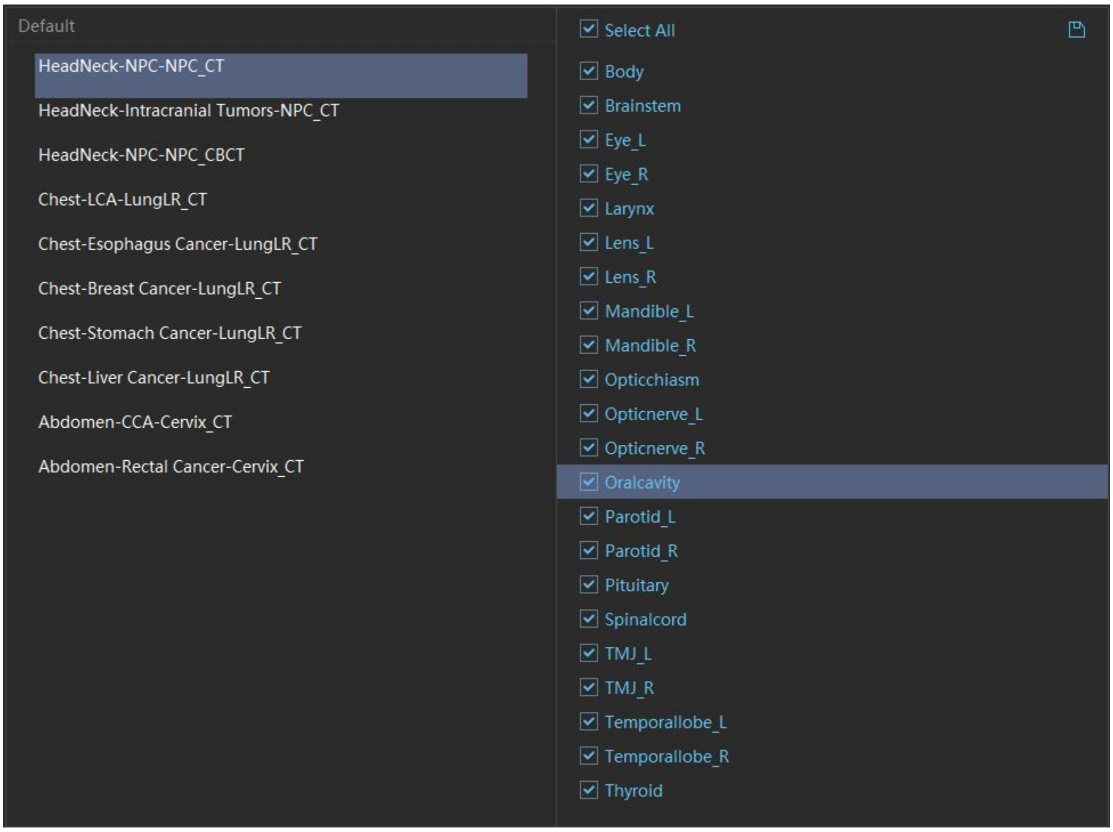


Figure 3-23 model setting interface

3.2.5.3 DICOM port setting

The DICOM ports set here can be used for data transmission in the contour interface and dose interface.

The DICOM port setting interface is shown in Figure 3-24. The upper part displays the sending DICOM ports, and the lower part displays the receiving ports of SmartU. Click the "+" above, and fill in IP address, AE title and port number to complete the setting. Click "-" above to delete the selected port settings.

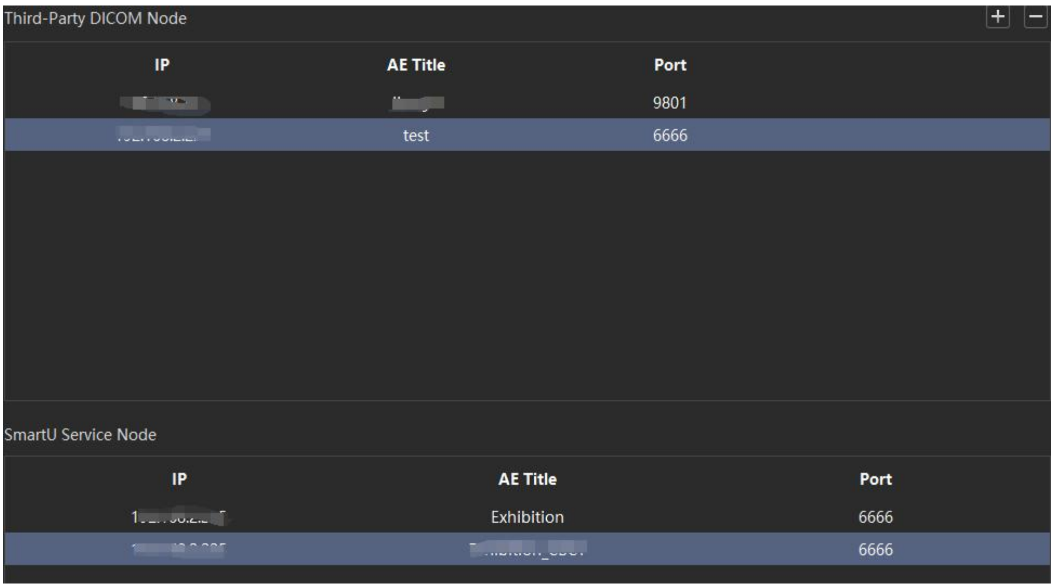
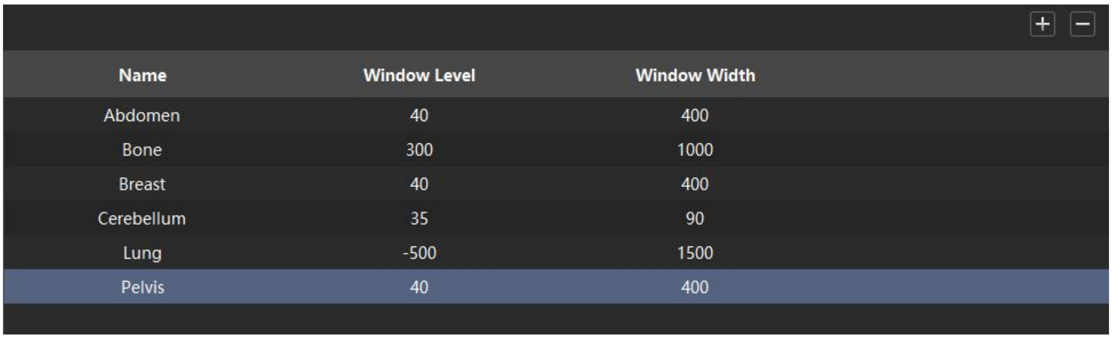


Figure 3-24 DICOM port setting interface

3.2.5.4 Window width and window level setting

The preset templates of window width and level setting here can be used to quickly adjust window width and level to the values in the templates in the contour interface and dose interface.

The window width and level setting interface is shown in Figure 3-25. Click "+" above and fill in template name, window level and window width values to complete the setting. Click "-" above to delete the selected window width and level.



Name	Window Level	Window Width
Abdomen	40	400
Bone	300	1000
Breast	40	400
Cerebellum	35	90
Lung	-500	1500
Pelvis	40	400

Figure 3-25 window width and window level setting interface

3.2.5.5 Shortcuts

Some shortcut keys for image viewing and adjustment are built in the software, which can be viewed in the shortcuts interface. The shortcut keys are described in the table below:

Shortcut	Explanation
	Page turning: scroll the mouse wheel up or down, or use the up and down keys on the keyboard.
	Adjusting window width and window level: press and hold "Ctrl", and press and hold the left mouse button to move left or right to adjust window width. Press and hold "Ctrl", and press and hold the left mouse button to move up or down to adjust window level.
	Zoom in: press and hold "Ctrl", and scroll the mouse wheel up, or keypad "+".
	Zoom out: press and hold "Ctrl" and scroll the mouse wheel down, or keypad "-".
	Cancel zooming: press and hold Ctrl and double click the left mouse button.

3.2.5.6 Help

Help can be opened in this interface.

3.2.5.7 About

In this interface, you can view software version and other information.

3.2.6 User management

Click the "" icon in the upper right corner of the interface to enter the user management interface or log out.

The user management interface displays user's account information. The software presets an administrator account. You can log in to this account to create an account for a doctor or physicist and manage these accounts. A doctor or physicist can only change password of his/her own account, and cannot manage other accounts.

4. Instructions

4.1 Preparations before use

4.1.1 Confirm connection between server and client

First, the server computer and the client computer are assembled and connected to the local area network of the hospital, and the specified IP addresses are changed for the server and the client respectively, and then the network connection is tested(such as connection between the server and the client, connection between the server and the TPS).

4.1.2 Configure DICOM

View the SmartU port information displayed in the software, configure it in the system that needs to send image data to SmartU, and test whether data can be received normally. According to the port information of TPS and other systems in the Department, add the port information needed for data transmission in the DICOM port setting interface of the software.

4.1.3 Setting

Open the setting part of the software, and set template, model, window width and window level according to the image viewing requirements and contouring habits.

4.2 Registration

If image registration is required, click the "" icon, select the primary image(usually positioning CT image) and the secondary image(diagnostic image) in the pop-up interface, select a registration method, and view the registration results after calculation. You can use the tools in the toolbar above the registered image to process the display of the registered image. The contouring results can be displayed in the primary image, the secondary image and the registered image synchronously, so after the image registration, you can draw on any set of images.

4.3 Contour

In the patient management part of the main interface, open a patient, create a new structure file under the positioning CT, select the appropriate display settings according to the contour(such as adjusting the view, window width, window level and other functions), contour the target volume, and expand it according to the needs(you can use the "Expand/contract" tool and "Boolean operation" tool in the toolbar to expand or add or subtract).

You can use the "Automatic Contouring" tool to generate OARs at the corresponding body regions. Click "

" and select region, model and structure in the pop-up interface(if a target volume has been contoured, the structure name where the target volume is contoured must be selected), then OAR contour can be automatically generated. View the results, especially some dose sensitive small organs and serial organs, and make a few modifications. Other tools can also be used to process the results.

After the contour is completed, carefully check whether it is correct, then confirm and send it to TPS port for physicist to make a plan.

4.4 Dose review

After a plan is made, it can be sent to SmartU for dose review in the dose interface. Dose distribution at each part on the image can be viewed.

5. Avoidance

The computer where the software is installed should avoid static electricity, dust and humidity. Voltage should be stable during use. Power-off before switching off the computer should be avoided. Power supply should be connected with a ground wire.

Do not install games and other programs unrelated to the software in the system. Check and kill viruses before using floppy disks or CDs.

When shutting down, please exit the software first.

6. Fault analysis and maintenance

The corresponding prompt messages will pop up during false operations. Please handle accordingly. If there are abnormal situations that cannot be handled, please contact your local distributors.

7. Signs and symbols

⚠	Warning

8. Storage and transportation

The storage and transportation environment of the computer is: dry and ventilated, temperature 0-40 ℃. Try to avoid dust, magnetic field, sunlight, and contact with chemicals.

9. Technical support

If you need technical support, please contact your local distributor.

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