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Memory

How do I allocate more memory for MIPAV?

- 1 Select **Help > Memory Allocation** in the MIPAV window. The Change Java.Runtime Memory Allocation dialog box (Figure 1) opens.

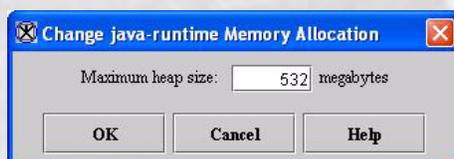


Figure 1. Change Java.Runtime Memory Allocation dialog box

- 2 Change the Maximum heap size so that it reflects the maximum amount of desired memory to be allocated.

If additional memory is needed, MIPAV allocates it until the memory reaches the maximum heap size you entered.

 **Note:** The maximum heap size should not exceed the amount of RAM installed on the computer. For example, if the computer has 512 Kb of RAM, a good number for the maximum heap size is 450 Kb, which leaves some space for the operating system and other applications.

The Changing Settings message (Figure 2) appears.

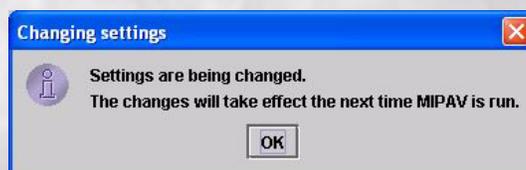


Figure 2. Changing Settings message

- 3 Click **OK**.

- 4 Close MIPAV by selecting **File > Exit - MIPAV**.
- 5 Restart MIPAV for the changes to take effect.



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How much memory does MIPAV require to run?

MIPAV requires a base of at least 10 Mb of random access memory (RAM). However, to correctly display image files and to quantify the data, you need to allocate more memory, disk swap space, or install additional memory beyond this base. Each time MIPAV is installed, it always defaults to 100 Mb.



Important: If you reinstall MIPAV, be sure to reset the memory allocation.



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What affects memory requirements?

Memory requirements fluctuate depending on the size and number of image files that are open at the same time. Factors affecting memory requirements are the following:

- **Size of image files:** The physical size of image files (i.e., 1.2 Mb)
- **Number of image files opened:** Working on more than one image file at the same time

Note: Java provides a method called Garbage Collector that clears all unnecessarily reserved memory. Generally, the software does this automatically, when free memory becomes very limited. However, you can run the Garbage Collector at any time to free memory (refer to "How do I free memory?").



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How do I determine the amount of additional memory needed?

To determine the amount of additional memory needed

- 1 Multiply the size of the largest image file that you want to process by 10.
- 2 Multiply the results by the number of image files that you want to display simultaneously.
- 3 Add this amount to the 10-Mb base memory to result in the total amount of memory typically needed.



Example 1

If an image file is 2 Mb and you only want to display one image file at a time, you must allocate an additional 20 Mb of RAM to the base memory of 10 Mb to result in a memory requirement of 30 Mb.

```
2 Mb Size of image file
x 10
-----
20 Mb Memory required for displaying and processing 1 image file
+10 Mb Base memory required for running MIPAV
-----
30 Mb Total memory required
```



Example 2

If the largest size image file is 2 Mb and you want to display 3 image files simultaneously, multiply 2 Mb by 10. Then multiply that sum by 3. Add that total to the base memory of 10 Mb to yield a memory requirement of 70 Mb.

```
2 Mb Largest size image file
x 10
-----
20 Mb Memory required for displaying 1 image file
x 3 Number of images to display and process simultaneously
-----
60 Mb Memory required to display 3 image files
+ 10 Mb Base memory required for running MIPAV
-----
70 Mb Total memory required
```



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How do I determine how much memory is currently being used?

In the MIPAV window, select **Help > Memory Usage**. The Memory Monitor dialog box (Figure 3) appears.

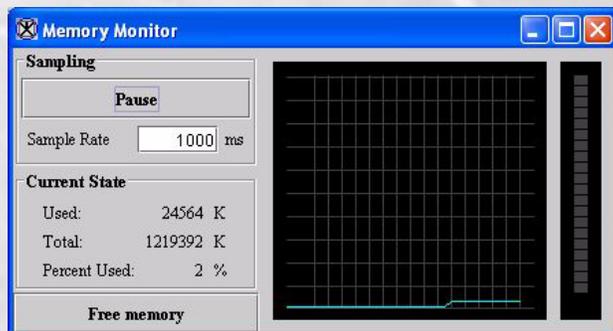


Figure 3. Memory Monitor dialog box

The Memory Monitor dialog box shows how much memory is allocated and the amount of memory that is being used. The graph displays a pictorial representation of the ratio of allocated memory and amount of memory used. It shows the memory usage during the past 3 minutes and 45 seconds.



Note: You can leave this window open if you want to constantly monitor your memory resources.



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How do I free memory?

The Garbage Collector allows you to delete unnecessarily reserved memory. To free memory, do the following procedure periodically:

- 1 Select **Help > Memory Usage** in the MIPAV window. The Memory Monitor dialog box (Figure 3) appears.
- 2 Click **Free Memory**. The system clears all unnecessarily reserved memory.



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Customizing MIPAV

How do I show or hide the splash screen?

The splash screen is the screen (Figure 4) that first appears when you start MIPAV. It displays the name of the product.

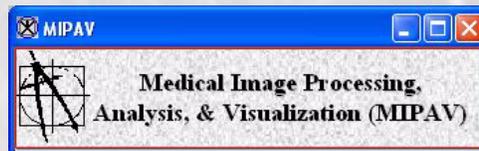


Figure 4. MIPAV Splash Screen

To hide the splash screen

- 1** Select **Help > Program Options** in the MIPAV window. The MIPAV Options dialog box (Figure 5) opens.
- 2** Clear **Display Splash Screen**.
- 3** Click **Apply** and then close the dialog box. The next time you start MIPAV, the splash screen does not appear.

Figure 5. MIPAV Options dialog box

To show the splash screen

- 1** Select **Help > MIPAV options** in the MIPAV window. The MIPAV Options dialog box (Figure 5) appears.
- 2** Mark **Display Splash Screen**.
- 3** Click **Apply** and then close the dialog box. The splash screen appears the next time you start MIPAV.



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How do I show or hide toolbars?

MIPAV has four toolbars, which you can choose to display or hide at any time an image is open. The toolbars are:

- **VOI**—Volume of interest. The VOI toolbar (Figure 6) contains tools that help you in selecting the specific area of interest on the image.

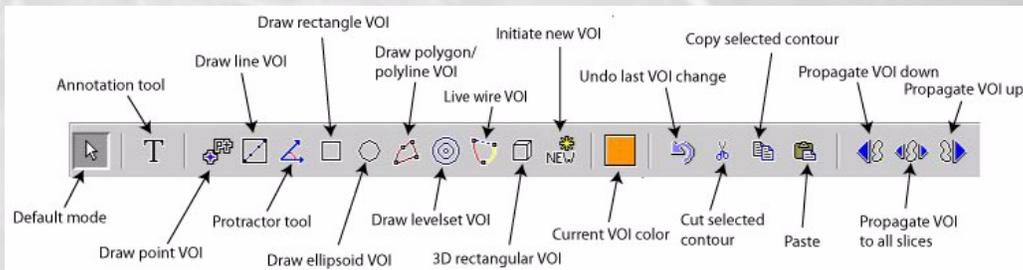


Figure 6. VOI toolbar

- **Paint**—The paint toolbar (Figure 7) includes tools that allow you to add, adjust, or remove colors and color intensity, to erase paint, and adjust the opacity level of the paint.

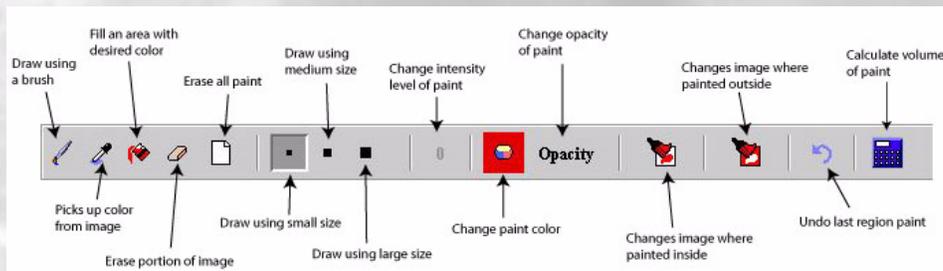


Figure 7. Paint toolbar

- **Scripting**—The scripting toolbar (Figure 8) allows you to run, record, and store scripts.

Figure 8. Scripting toolbar as it initially appears

After you create and run your first script, the scripting toolbar changes to display the script in Current Script (Figure 9).



Figure 9. Scripting toolbar after running the first script

- **Image**—The image toolbar (Figure 10) includes tools for opening, printing, saving, maximizing, and minimizing an image; converting an image from gray to color or from color to gray; and adding to and removing slices from an image or changing their order, rotating, cropping and flipping an image.

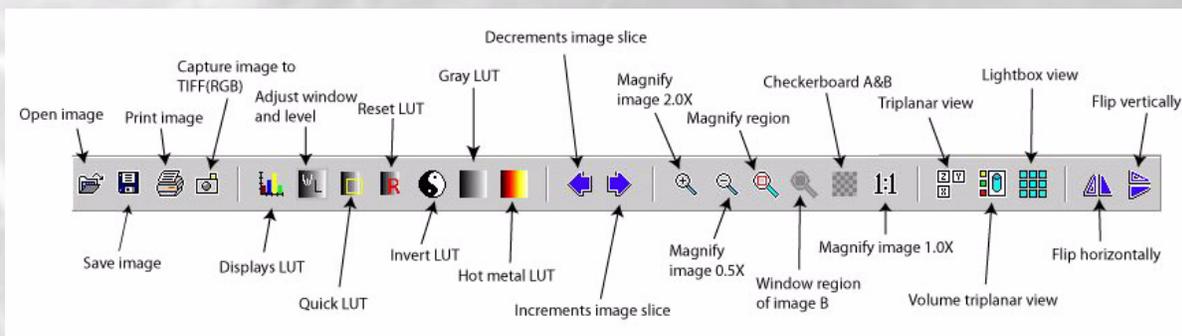


Figure 10. Image toolbar

To show or hide a toolbar

- 1 Start MIPAV. The initial MIPAV window (Figure 11) and the Output window (Figure 11) open.

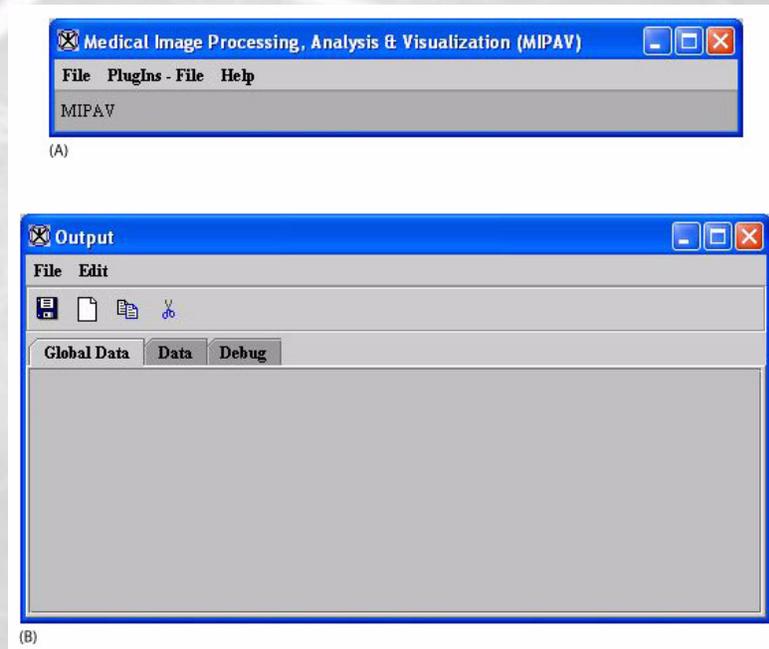


Figure 11. Initial MIPAV window (top) and Output window (bottom)

- 2 Open an image file to display all of the menus in the MIPAV window. The expanded MIPAV window appears showing all of the menus.

Figure 12. Expanded MIPAV window

- 3 Select **Toolbars**.

Figure 13. Toolbars menu

- 4 Select the name of the toolbar in the Toolbar menu that you want to hide or show.

Note: Blank check boxes indicate that the toolbar is hidden. Marked check boxes mean that the toolbar is currently displayed.

Depending on whether the toolbar is displayed, in a few moments, MIPAV refreshes the MIPAV window with the changes you made.



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How do I save a history of actions on images?

MIPAV allows you to keep a history of all of the actions—the algorithms and utilities—that you perform on images. The history includes the specific parameters that were set for the action. In addition, if you save the images as XML files, the history of actions and their parameters appears in the dataset attributes section near the beginning of the MIPAV header file (the XML file). Each action appears between the <HISTORY> and </HISTORY> tags.

By default, MIPAV does *not* record a history of actions unless you specifically select the Record history check box in the MIPAV Options dialog box.

To record a history of actions taken on images

- 1 Select **Help > Program Options** in the MIPAV window. The MIPAV Options dialog box (Figure 14) appears.
- 2 Mark **Record history**. A check mark appears in the check box (Figure 14).

- 3 Click **Apply**. From this point on, MIPAV records the actions performed on all images until you clear the **Record history** check box.

To view the history of actions as they are performed

The History page in the Image Attributes dialog box allows you to view the list of actions *immediately* after they are performed. The following example illustrates how to do this:

- 1 Make sure that the **Record history** check box (Figure 14 on page 13) was selected in the MIPAV Options dialog box.
- 2 Open a sample image.
- 3 Select **Image > Attributes > Edit attributes**. The Image Attributes dialog box opens.

- 4 Select **History**. The History page appears.
- 5 Click the image to make it the active window.
- 6 Select **Utilities > Flip > Horizontal**.

The image is flipped horizontally, and the words “Flip(Y_AXIS)” appear on the History page in the Image Attributes dialog box.

- 7 Perform other actions on the image, such as algorithms or other utilities. Notice that these actions appear on the History page (Figure 15).

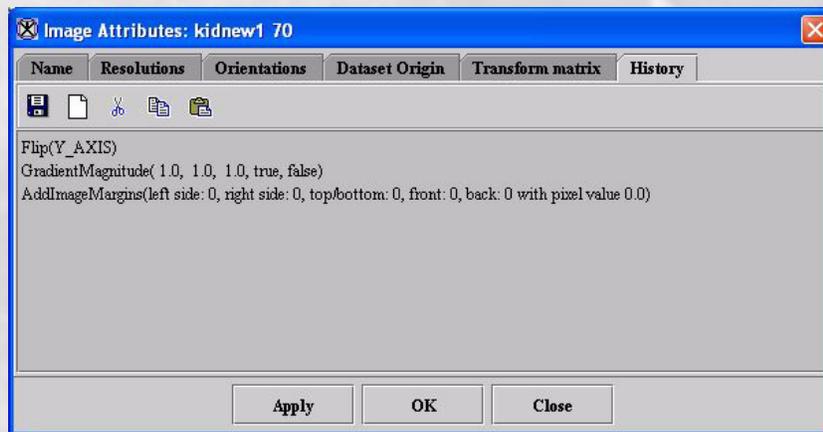


Figure 15. History page showing actions performed on an image

If MIPAV is fully operational, actions performed on an image always appear on the History page of the Image Attributes dialog box and in the XML file for that image. However, it's important to know whether the actions were performed on the *original image* or on the *replacement image*.



Several algorithms and utilities offer a choice of either generating a new image (**New image** check box) or replacing the original image (**Replace image** check box). If you choose **New image** and want to see the actions performed on that image, you must select **Image > Attributes > Edit Attributes** to open an Image Attributes dialog box for the new image. If, however, you select **Replace image**, the History page on the Image Attributes dialog box for the original image displays the actions.

To illustrate this point, open a sample image; select **Image > Attributes > Edit Attributes** to display the Image Attributes dialog box; and select **History** to display the History page. Perform an action such as **Utilities > Image Margins**, mark **New image** in the dialog box, and then click **OK**. Notice that the action does not appear on the History page. Click on the new image; select **Image > Attributes > Edit Attributes**; and select **History**. The History page shows the AddImageMargins action for the new image.

To view the history of actions recorded in the XML file

- 1 Save the sample image as an XML file by selecting **File > Save Image as**. The Save Image as dialog box opens.
- 2 Select the directory where you want to save the file in the **Save in** box.
- 3 Type the name of the file—use “SampleImage” as the file name—and type an *.xml* file extension in the File Name box so that the complete file name is “SampleImage.xml.”
- 4 Click **Save**.
- 5 Open Windows Explorer by right-clicking on **Start** and then selecting **Explore**. The Windows Explorer window opens.
- 6 Navigate to the directory where you stored the XML file. This directory should have two files named “SampleImage”: “SampleImage.raw” and “SampleImage.xml.”
- 7 Double-click “SampleImage.xml.” An internet browser page, such as Internet Explorer or Netscape Communicator, appears displaying an XML page (Figure 16).

8 Notice that, immediately after the <Dataset-attributes> tag, the following line appears:

```
<History>Flip(Y_AXIS)</History>
```

Each action that you perform on the image appears between its own <History> and </History> tags.

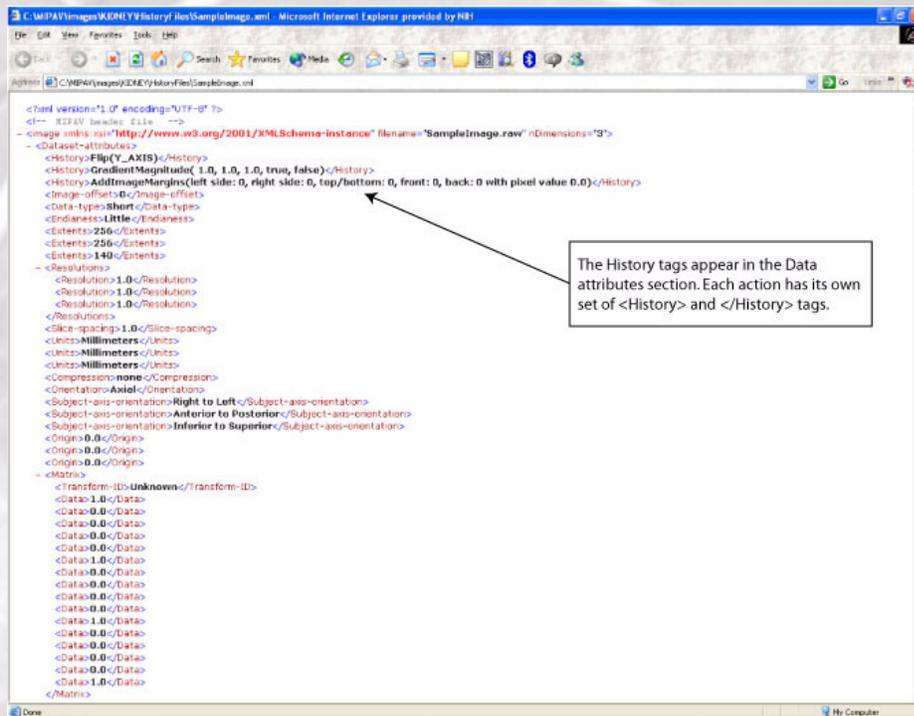


Figure 16. Actions recorded in an XML file



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How can I load images from a CD on my Mac?

MIPAV ordinarily does not use the Macintosh standard file selector; instead, it shows a more traditionally UNIX way of looking at the file system on the Apple Macintosh.

To view the CD that is loaded into the Mac's disk drive using the MIPAV file selector

- 1 Select the name of the drive from the directory bar.
- 2 Select the Volumes directory.
- 3 Select the name of the loaded CD. Selecting the CD lets you browse its contents.

To make MIPAV use the Macintosh standard file selector

- 1 Select Help > Program Options in the MIPAV main window. The Program Options dialog box opens.
- 2 Select Use Platform-style File dialog boxes. MIPAV then uses the Macintosh default file chooser.

Why is MIPAV's default file selector not standard on the platform?

The MIPAV default file selector allows you to save shortcuts to directories where you keep image files. These shortcuts can save time in finding image sets that are kept in different directories.



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How do I set up default file types to display or save?

When you using MIPAV, chances are that you are working with the same type of files every day or perhaps for a certain period of time. For example, suppose you normally work with medical files (files whose extensions are *.dcm*, *.xml*, *.ima*, *.img*, *.mnc*, *.sig*, *.head*). In this situation, when opening or saving images, you want to see only the medical files, not other file types. One of the ways of customizing MIPAV is the ability to show only specific types of files by default.

The **File filter default** box on the MIPAV Options dialog box allows you to choose which types of files should be shown in the Files of type box in the Open Image and Save Image as dialog boxes.

To choose the default file types to display or save

1 Select **Help > Program Options**. The MIPAV Options dialog box (Figure 17) opens.

2 Click **File filter default**. The Choose File Filter dialog box (Figure 18) appears.

3 Select on the file filters. You can choose one of the following collections of file types:

- All (*.*)
- AVI (*.avi)
- Class files (*.class)
- FreeSurfer (*.asc)
- General (*.gif, *.jpeg, *.jpg, *.pict, *.psd, *.tif, *.tiff)
- Graphs (*.plt)
- Look-up tables files (*.lut)
- Matrix files (*.mtx, *.mat)
- Medical (*.dcm, *.xml, *.ima, *.img, *.mnc, *.sig, *.head)
- Microscopy (*.avi, *.ics, *.lsm, *.pic, *.stk, *.tif, *.tiff, *.xml)
- Misc. (*.avi, *.bmp, *.pcx, *.png, *.tga, *.xbm, *.xpm)
- Optical (*.avi, *.bmp, *.img, *.jpg, *.pict, *.psd, *.tif, *.tiff, *.xml)
- Project (*.xml)
- Script files (*.sct)
- Surface files (*.sur, *.wrl)
- Transfer function files (*.fun)
- VOI files (*.voi)
- Nonlinear transformation files (*.nlt)

1 Click **OK**. The Choose File Type dialog box closes.

2 Click **Apply** in the MIPAV Options dialog box. This change takes effect immediately.

To verify that the filters you chose are used as the default filters

1 Select **File > Open > Image(A)**. The Open Image dialog box (Figure 19) appears. The **Files of type** box should show the filters you chose.

2 Select **File > Save Image as**. The Save Image as dialog box (Figure 19) opens with the **Files of type** box listing the file filters you chose.



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Image Basics

How do I save images in a different format?

Since MIPAV supports read and write access in a number of different file formats and can read still others. There are some MIPAV-only features, for example, allowing users to recover particular volumes of interest. MIPAV can save and later restore important data. Not only does MIPAV support a number of medical image data formats, but it also supports some general purpose formats, which are very help in making presentations.

When you save an image after working on it in MIPAV, **be sure to type the correct extension** at the end of the file name to save the image in the correct format.

 **Example.** If you are saving a DICOM image named Head101, type **.dcm** or **.ima** as the extension so that the name of the file is *Head101.dcm*.

The following tables list the image file types that MIPAV supports. For your convenience, you can search for image file types by either of the following:

- Manufacturer or application in [Table 1 on page 22](#)
- File extension in [Table 2 on page 23](#)

Table 1. Graphics file formats supported by MIPAV listed by manufacturer

Manufacturer or Application	File Extension	Open	Save
Adobe Photoshop	PSD	Yes	Yes
AFNI	BRIK, HEAD	Yes	Yes*
Analyze	IMG	Yes	Yes
Apple Macintosh PICT	PICT	Yes	Yes
Apple QuickTime	MOV, QT	Yes	Yes
Audio/Video Interleave	AVI	Yes	Yes [†]
BIORAD	PIC	Yes	No
Bruker	2dseq	Yes	No
Cheshire	IMC, IMG	Yes	Yes
DICOM 3.0	DCM, IMA	Yes	Yes
FITS	FTS	Yes	Yes
FreeSurfer Image	COR	Yes	No
FreeSurfer Surface	ASC	Yes	No
GE – Genesis 5X and LX	SIG	Yes	No
Graphics Interchange File	GIF	Yes	No
Image Cytometry Standard (ICS)	ICS	Yes	Yes
InterFile	HDR	Yes	Yes
Joint Photographics Experts Group	JFI, JFIF, JPG, JPEG	Yes	Yes
Laser Scanning Microscope (Zeiss)	LSM	Yes	Yes
Medical Image Network Common Data Form (including ROIs)	MNC	Yes	Yes
Medical Research Council	MRC	Yes	Yes
MICRO-CAT	LOG	Yes	Yes
Microsoft Windows Bitmap	BMP, DIB	Yes	Yes
MIPAV Image	XML	Yes	Yes
MIPAV Lookup Table	LUT	Yes	Yes
MIPAV Transformation Matrix	MTX	Yes	Yes
MIPAV Graph	PLT	Yes	Yes
MIPAV Volume of Interest	VOI, XML	Yes	Yes

Table 1. Graphics file formats supported by MIPAV listed by manufacturer

Manufacturer or Application	File Extension	Open	Save
netCDF and masks	CDF	Yes	Yes
PC Paintbrush	PCX, DCX, PCC	Yes	Yes
Portable Network Graphic	PNG	Yes	Yes
Raw	RAW	Yes	Yes
Siemens – Magnetom Vision	IMA	Yes	Yes
Sun Raster	RS, RAS	Yes	Yes
Tagged Image File Format	TIF, TIFF	Yes	Yes
Truevision Graphics Adapter	ICB, TGA, TPIC, VDA, VST	Yes	Yes
XBitMap	XBM	Yes	Yes
XPixMap	XPM	Yes	Yes
Zeiss-TIFF Topography (LSM 510/LSM 5)	LSM	Yes	No

*. MIPAV does not save extra information with the AFNI file. It only does the “bare minimum.”

†. AVIs are saved with encoding options: run-length, MPEG, MPEG-4, QuickTime. However, MIPAV requires the Java Media Framework, which is installed with MIPAV.

Table 2. Graphics file formats supported by MIPAV listed by file extension

File extension	Manufacturer or Application	Open	Save
2dseq	Bruker	Yes	No
ASC	FreeSurfer Surface	Yes	No
AVI	Audio/Video Interleave	Yes	Yes*
BMP	Microsoft Windows Bitmap	Yes	Yes
BRIK	AFNI	Yes	Yes†
CDF	netCDF and masks	Yes	Yes
COR	FreeSurfer Image	Yes	No
DCM	DICOM 3.0	Yes	Yes
DCX	PC Paintbrush	Yes	Yes
DIB	Microsoft Windows Bitmap	Yes	Yes
FTS	FITS	Yes	Yes
GIF	Graphics Interchange File	Yes	No
HDR	InterFile	Yes	Yes

Table 2. Graphics file formats supported by MIPAV listed by file extension (continued)

File extension	Manufacturer or Application	Open	Save
HEAD	AFNI	Yes	Yes [‡]
ICB	Truevision Graphics Adapter	Yes	Yes
ICS	Image Cytometry Standard (ICS)	Yes	Yes
IMA	DICOM 3.0	Yes	Yes
IMA	Siemens – Magnetom Vision	Yes	Yes
IMC	Cheshire	Yes	Yes
IMG	Analyze	Yes	Yes
IMG	Cheshire	Yes	Yes
JFI	Joint Photographics Experts Group	Yes	Yes
JFIF	Joint Photographics Experts Group	Yes	Yes
JPEG	Joint Photographics Experts Group	Yes	Yes
JPG	Joint Photographics Experts Group	Yes	Yes
LOG	MICRO-CAT	Yes	Yes
LSM	Laser Scanning Microscope (Zeiss)	Yes	Yes
LSM	Zeiss-TIFF Topography (LSM 510/LSM 5)	Yes	No
LUT	MIPAV Lookup Table	Yes	Yes
MNC	Medical Image Network Common Data Form (including ROIs)	Yes	Yes
MOV	Apple QuickTime	Yes	Yes
MRC	Medical Research Council	Yes	Yes
MTX	MIPAV Transformation Matrix	Yes	Yes
PCX	PC Paintbrush	Yes	Yes
PIC	BIORAD	Yes	No
PICT	Apple Macintosh PICT	Yes	Yes
PLT	MIPAV Graph	Yes	Yes
PNG	Portable Network Graphic	Yes	Yes
PSD	Adobe Photoshop	Yes	Yes
QT	Apple QuickTime	Yes	Yes
RAW	Raw	Yes	Yes
RAS	Sun Raster	Yes	Yes

Table 2. Graphics file formats supported by MIPAV listed by file extension (continued)

File extension	Manufacturer or Application	Open	Save
RS	Sun Raster	Yes	Yes
SIG	GE – Genesis 5X and LX	Yes	No
TGA	Truevision Graphics Adapter	Yes	Yes
TIF	Tagged Image File Format	Yes	Yes
TIFF	Tagged Image File Format	Yes	Yes
TPIC	Truevision Graphics Adapter	Yes	Yes
VDA	Truevision Graphics Adapter	Yes	Yes
VOI	MIPAV volume of interest	Yes	Yes
VST	Truevision Graphics Adapter	Yes	Yes
XBM	XBitMap	Yes	Yes
XML	MIPAV volume of interest	Yes	Yes
XML	MIPAV image	Yes	Yes
XPM	XPixMap	Yes	Yes

*. AVIs are saved with encoding options: run-length, MPEG, MPEG-4, QuickTime. However, MIPAV requires the Java Media Framework, which is installed with MIPAV.

†. MIPAV does not save extra information with the AFNI file. It only does the "bare minimum."

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How do I combine two images for alphablending?

Alphablending is a technique that adds transparency information to translucent objects. When two images share a window, you can adjust the alphablending settings so that you can see a blend of both images and can compare overlapping regions in two datasets.

To use the alphablending function

- 1 Open one or more images.
- 2 Click the image you want to make the *active image*.

3 Click **File > Load**, and then click one of the following (refer to Figure 20):

- **Image(B) from Frame**—To load an already opened image
- **Image(B) from File**—To load an image from an image file
- **Multifile(B)**—To load more than one image
- **Blank image(B)**—To load a blank image

Figure 20. File > Load menu

The MIPAV window expands to include the Active Image and Alphablending slider (Figure 21), and the active image window contains all the images selected.

Figure 21. MIPAV window displaying the Active Image and Alphablending slider

- 4 Adjust the alphablending slider at the bottom of the MIPAV window to reveal all of the images.
- 5 Move the slider to select the best ratio for the datasets of interest.

The level of translucency for one image is inversely proportional to the other. Thus, if image A is 75 percent transparent (25 percent opaque), then image B is 75 percent opaque (25 percent transparent).



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Understanding Changes in MIPAV

Why doesn't MIPAV open my XML files?

Due to added functionality, MIPAV may not open XML files that it opened previously. However, the solution is easy.

If MIPAV fails to open a previously used XML file

- 1 Select **File > Convert Old XML**. The Choose Directory dialog box opens.
- 2 Navigate to the correct directory, and select the XML file.
- 3 Click **Open**. The file is immediately converted to the correct XML format.



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