Masking Tool for Drishti

This manual describes paint uility for Drishti. Paint utility is helpful in generating/modifying the masking information for volumes. Users can load (or drag and drop) volume files (.pvl.nc) or project files (.xml) into DrishtiPaint.

Masking information is stored in a separate file having the same name as the **.pvl.nc** file, but with **.mask** extension. For e.g. test.pvl.nc file will have mask information in test.mask. Mask file format is as follows :
single byte (value is 0)
followed by 12 bytes containing grid size as three 4-byte integers - [nX][nY][nZ]
followed by the tag data which is 1-byte per voxel.

Paint operates in the following way :

- User creates transfer function(s) to be used as a guide for painting slices.
- Only visible regions (i.e. voxels that have non-zero opacity according to the transfer functions) can be (masked) painted.
- When mouse is over visible part of region, a green/red blob is painted at the location. Size and shape of the blob is dictated by **Area Tool** and radius parameters.
- Left clicks mark regions to be tagged.
- Right clicks clear parts of marked regions.
- Apply appropriate masking operation.

Users can paint on any of the X/Y/Z slices. The transfer functions generated in the tool can be saved to project file.

When **Area Tool** is selected the size and shape of green blob under mouse is dictated by **DeltaV** and **DeltaG** parameters along with the blob radius. **DeltaV** is maximum allowable difference between value of voxel under mouse and voxel under consideration. **DeltaG** is maximum allowable difference between gradient magnitude of voxel under mouse and voxel under consideration. Only those voxels that are visible, lie within the bounds defined by radius parameter, satisfy **DeltaV** and **DeltaG** constraints and those that are connected to the central voxel are considered for marking. Use left click to mark and right click to clear parts of marked region.

When **Area Tool** is not selected users can paint with paint ball. Paint ball is shown as red circle. The size of circle is dictated by radius parameter. All visible voxels lying within the bounds of paint ball are considered for marking. Use left click to mark and right click to clear parts of marked region.

Radius parameter can be changed by Up/Down arrow keys. There is no widget for radius parameter like **DeltaV** or **DeltaG** parameters. **DeltaV** can also be changed using Left/Right arrow keys. **DeltaG** can also be changed using Shift + Left/Right arrow keys.

User can change current tag value using **Tag**. This value is used in all tagging operations.

Masking operations can be restricted to subvolumes by changing the boundary limits.

Key(s)	Description
Left click	Mark region.
Right click	Clear parts of marked region.
Shift + Left mouse drag	Readjust slice boundaries for subvolume definition.
Left/Right arrow	Decrease/increase DeltaV
Shift + Left/Right arrow	Decrease/increase DeltaG
Up/Down arrow	Increase/decrease radius
Ctrl + 0	Set image magnification to 1
Ctrl + +/-	Increase/decrease image magnification
ESC	Clear all marked region
t	Tag marked voxels with current tag value. This operation works on current slice.
f	Fill with current tag value using marked voxels as seeds for flood fill operation. This operation works on the selected subvolume.
d	Dilate region tagged with current tag value. This operation works on current slice.
Shift + d	Dilate region tagged with current tag value. This operation works on selected subvolume.
e	Erode region tagged with current tag value. This operation works on current slice.
Shift + e	Erode region tagged with current tag value. This operation works on selected subvolume.
v	Tag all visible voxels with current tag value. This operation works on the selected subvolume.
s	Save project.
Alt + s	Save image of current slice.