

vol2roi

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1 Introduction

vol2roi is a program for combining a set of voxels from a volume into one average (possibly one for each frame). The set is specified in one of 3 ways: (1) volume mask, (2) label file, or (3) both. The volume mask is a volume of values. The user specifies the sign and threshold above which a voxel in the volume mask can be considered for inclusion. The user can also specify the frame in the mask volume to use in creating the mask. The field-of-view (FOV) of the volume mask does not need to coincide with that of the source volume; if it does not, then the user must specify a registration matrix. The label file is a set of XYZ coordinates and is typically generated by either tkmedit or tksurfer. If both label and mask volume are specified, then only those voxels that are in the intersection of the label and mask are included. The software automatically detects whether the input volume is an output of selxavg and, if so, automatically converts standard deviations into variances for averaging.

2 Usage

Typing vol2roi at the command-line without any options will give the following message:

```
USAGE: vol2roi
  --roifile    output path

  --srcvol    input volume path
  --srcfmt    input volume format
  --srcreg    source registration (SrcXYZ = R*AnatXYZ)
  --srcoldreg interpret srcreg as old-style reg.dat
  --srcwarp   source scanner warp table

  --label     path to label file
  --labelreg  label registration (LabelXYZ = L*AnatXYZ)

  --mskvol    mask volume path
  --mskfmt    mask volume format
  --mskreg    mask registration (MaskXYZ = M*AnatXYZ)
  --msksamesrc mask volume has same FOV as source

  --mskthresh threshold (0.5) mask threshold
  --msktail   <abs>, pos, or neg (mask tail)
  --mskframe  0-based mask frame <0>

  --finalmskvol path in which to save final mask

  --float2int float-to-int conversion method (<round>, floor, or tkreg )
```

3 Command-line Arguments

-roiavg roistem: stem of the output roi file. The file will have the name “roistem_000.bfloat”. The ROI average is stored in *bfile format*.

-srcvol: path of the volume from which to obtain the data to average.

-srcreg: file with registration information. The registration matrix will convert XYZ coordinates in the subject’s anatomical space to XYZ in the scanner space of the source volume. If no **-srcreg** file is specified, the matrix is assumed to be the identity. With the **-srcoldreg** flag, the registration matrix is interpreted to convert XYZ coordinates in the subject’s anatomical space to XYZ in the FOV space of the source volume.

-srcoldreg: flag to indicate that **-srcreg** is an old-style registration matrix.

-srcwarp: scanner warp file of the source volume. The warp file converts from scanner coordinates to warped scanner coordinates.

-label: file with label coordinates stored in label-file format.

-labelreg: file with label registration information. The registration matrix will convert XYZ coordinates in the label space to XYZ in the anatomical subject’s space. If not specified, the matrix is assumed to be the identity. For example, if the label was specified in talairach space, then the talairach.xfm file should be specified.

-mskvol: path of the volume from which to obtain a mask.

-mskreg: file with mask registration information. The registration matrix will convert XYZ coordinates in the subject’s anatomical space to XYZ in the space of the mask volume. If no **-mskreg** file is specified, the matrix is assumed to be the identity. For example, if the mask was specified in talairach space, then the talairach.xfm file should be specified. If the **-msksamesrc** flag is included, then the mask volume is assumed to have a voxel-by-voxel correspondence with the source volume.

-msksamesrc: flag to indicate that mask volume has a voxel-by-voxel correspondence with the source volume.

-mskthresh: threshold with which to choose which voxels in the mask volume should be included. Only those voxels that exceed the threshold can be considered for inclusion in the ROI. See also **-msktail**. Default: 0.5.

-msktail: this is used to specify whether include only positive or only negative or both types of voxels from the mask volume. Allowable values are: absolute, positive, and negative (or just the first 3 letters of each). Default: absolute.

-mskframe: specifies the frame inside the mask volume to use when creating the mask. The frame number is zero-based. Default: 0.

-finalmskvol: save the final masking volume in the specified location. This volume has a voxel-by-voxel correspondence with the source volume. It has a 1 at each voxel included in the final

ROI average and a zero everywhere else.

4 Examples

4.1 Mask Volume Only (same FOV as Source)

If the name of the source volume is “fsrc”, and the name of the mask volume is “allvfix”. The user want to use those voxels in the third frame of the mask volume that are positive and exceed a value of 5. The command line would be:

```
vol2roi --roiavg avfroi
        --srcvol fsrc
        --mskvol allvfix --msksamesrc
        --msktail positive --mskthresh 5 --mskframe 2
```

This will create a file called “avfroi_000.bfloat”. Note that “-mskframe 2” is used to specify the third frame because -mskframe is expecting the frame number to be zero-based.

4.2 Mask Volume Only (different FOV than source)

Consider the case where a group of data has been averaged in talairach space the results of which are going to be used to create ROIs back in the original functional space of each subject. The mask volume is specified in talairach space and has a different FOV than the original functionals. Two registrations need to be specified in this case: the source registration and the mask registration. The source registration converts XYZ coordinates in the individual’s anatomical space to XYZ coordinates in the functional space. The mask registration converts XYZ coordinates in the mask’s FOV space to XYZ coordinates in the individual’s anatomical. When the two are concatenated, the result is the registration between the mask and the functional.

Let the name of the source volume be “fsrc” and the name of the mask volume be “talallvfix”. Assume the source registration file to be register.dat and the mask registration file to be talairach.xfm. The user want to use all voxels in the first frame of the mask volume that exceed a value of 7 (regardless of sign). The command line would be:

```
vol2roi --roiavg tal_avf_roi
        --srcvol fsrc
        --srcreg register.dat
        --mskvol allvfix --mskreg talairach.xfm
        --mskthresh 7 --msktail absolute
```

This will create a file called “tal_avf_roi_000.bfloat”. Note that “-mskframe 0” is not specified explicitly because 0 is the default. Also note that “-msktail absolute” instructs vol2roi to ignore the mask sign; this could have been excluded because vol2roi uses “absolute” by default.

4.3 Label Only (Label Coords in Subject’s Anatomical Space)

Let the name of the source volume be “fsrc” and the name of the label file be “hippo.label”. Assume the source registration file is named “register.dat”. The user want to average the voxels corresponding to the coordinates in the label. These coordinates are in the subject’s anatomical space. The command line would be:

```
vol2roi --roiavg src_hippo
        --srcvol fsrc
        --srcreg register.dat
        --label hippo.label
```

This will create a file called “src_hippo_000.bfloat”.

4.4 Label Only (Label Coords NOT in Subject’s Anatomical Space)

Let the name of the source volume be “fsrc” and the name of the label file be “hippo.label”. Assume the source registration file is named “register.dat”. The user want to average the voxels corresponding to the coordinates in the label. These coordinates are in some space other than the subject’s anatomical. For example, the label could be in talairach space, and the label registration could be talairach.xfm. The command line would be:

```
vol2roi --roiavg src_tal_hippo
        --srcvol fsrc
        --srcreg register.dat
        --label hippo.label
        --labelreg talairach.xfm
```

This will create a file called “src_tal_hippo_000.bfloat”.

4.5 Label and Mask

Let the name of the source volume be “fsrc” and the name of the label file be “hippo.label”. Assume the source registration file is named “register.dat”. The user want to average the voxels corresponding to the coordinates in the label. These coordinates are in some space other than the subject’s anatomical. For example, the label could be in talairach space, and the label registration could be talairach.xfm. There is also a mask called “talavf,” also in talairach space.

```
vol2roi --roiavg src_tal_hippo_msk
        --srcvol fsrc
        --srcreg register.dat
        --label hippo.label
        --labelreg talairach.xfm
        --mskvol talavf --mskreg talairach.xfm
        --finalmsk mask_tal_hippo
```

This will create a file called “src_tal_hippo_msk_000.bfloat”. It will also create a volume called “mask_tal_hippo.” This volume will have a voxel-by-voxel correspondence with the source volume, and the values in this volume will be 1 if that voxel was included in the ROI or 0 if it was excluded.