

MINC meeting 2003

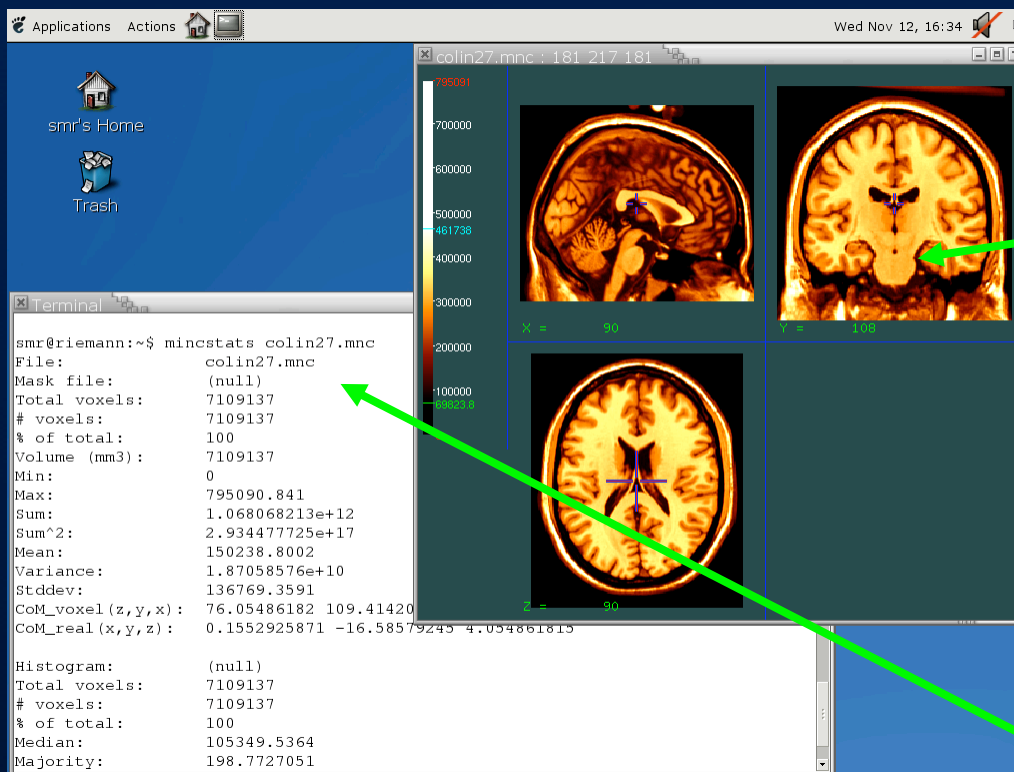
A Short Tour of the MINC Toolset

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MINC-aware Programs



Visualization:

- Display
- register
- jiv

Command-line Tools

Outline

- **Inside a MINC file**
- **Example tools**
 - information
 - resampling
 - reshaping
 - arbitrary math
- **Getting more info**

Inside a MINC File

- **Image data**
 - n-dimensional array
 - real-valued
 - sometimes interpreted as “labels”
 - e.g. 0=background, 1=CSF, 2=Gray, 3=White
- **Shape of image array**
 - order of array axes
 - length of array along each axis
- **Location of image array in world space**

mincinfo

- **mincinfo mri_001.mnc**

- input: file mri_001.mnc
- output (text on terminal):

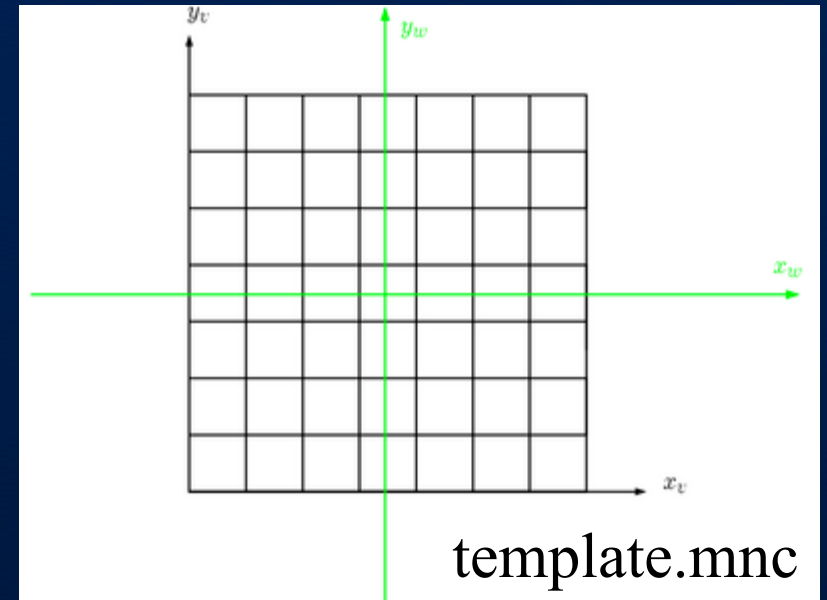
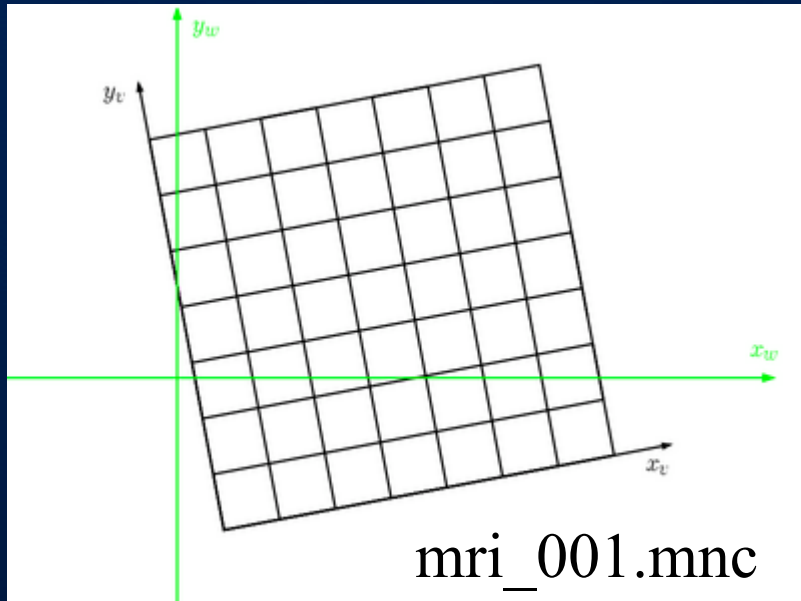
```
> mincinfo mri_001.mnc
file: mri_001.mnc
image: signed__ short 0 to 4095
image dimensions: zspace yspace xspace
  dimension name      length      step      start
  -----
zspace                181         1        -72
yspace                217         1       -126
xspace                181         1        -90
```

mincstats

- **mincstats mri_001.mnc**
 - input: file mri_001.mnc
 - output: text on terminal, histogram file

```
> mincstats mri_001.mnc
...
Volume (mm3): 7109137
Min: 0
Max: 1115712.374
Sum: 1.221982704e+12
Sum^2: 4.347383143e+17
Mean: 171889.0357
Variance: 3.160621567e+10
Stddev: 177781.3704
...
```

mincresample: Change Sampling Grid



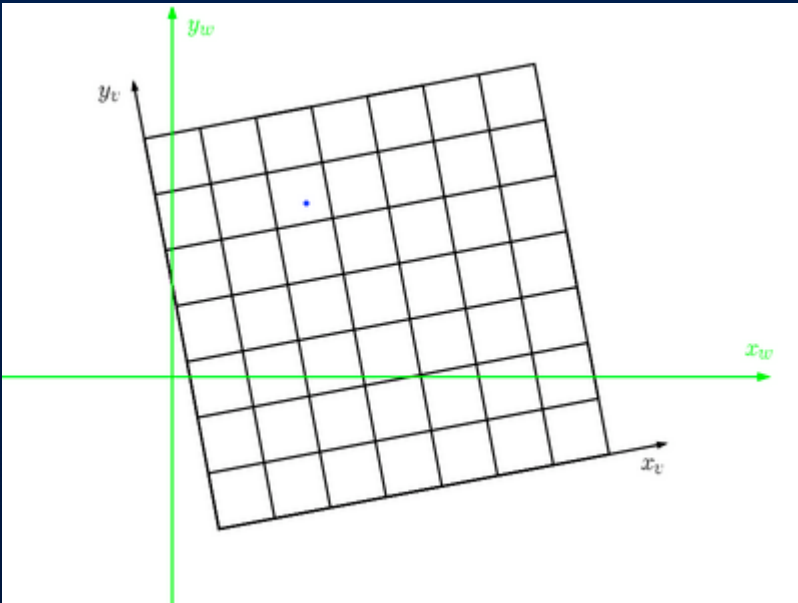
- **mincresample -like template.mnc**

mri_001.mnc res_001.mnc

- input: `mri_001.mnc`, `template.mnc`

- output: `res_001.mnc`

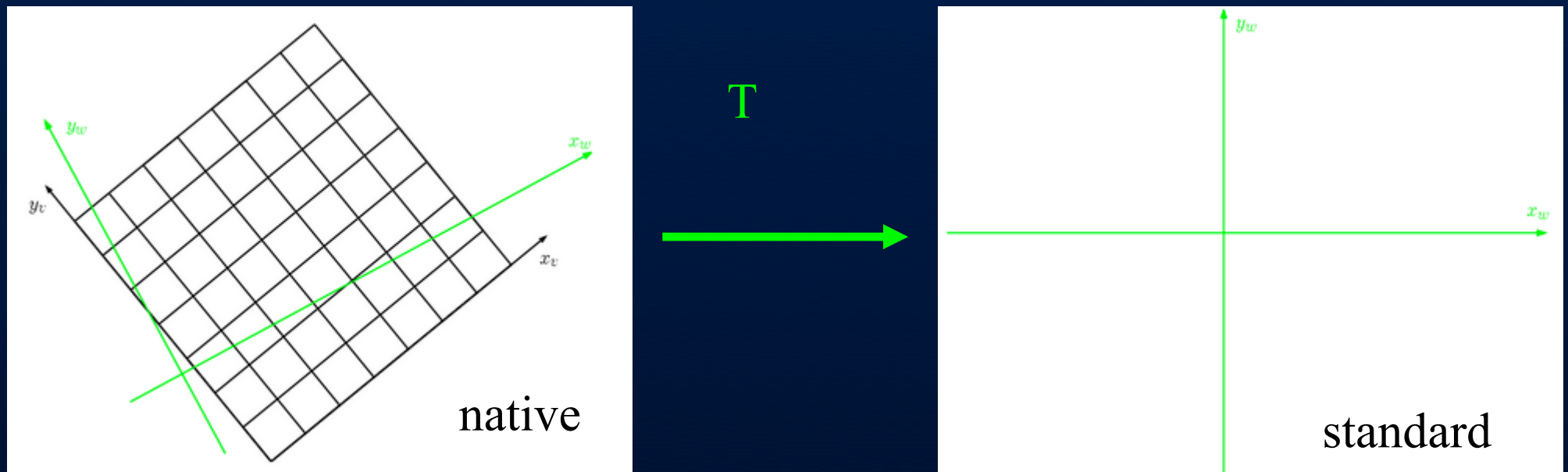
mincresample: interpolation



- **trilinear**
 - default, fast
- **tricubic**
 - smoother, slower
- **nearest_neighbour**
 - useful for label volumes

mincresample: Spatial Transformation

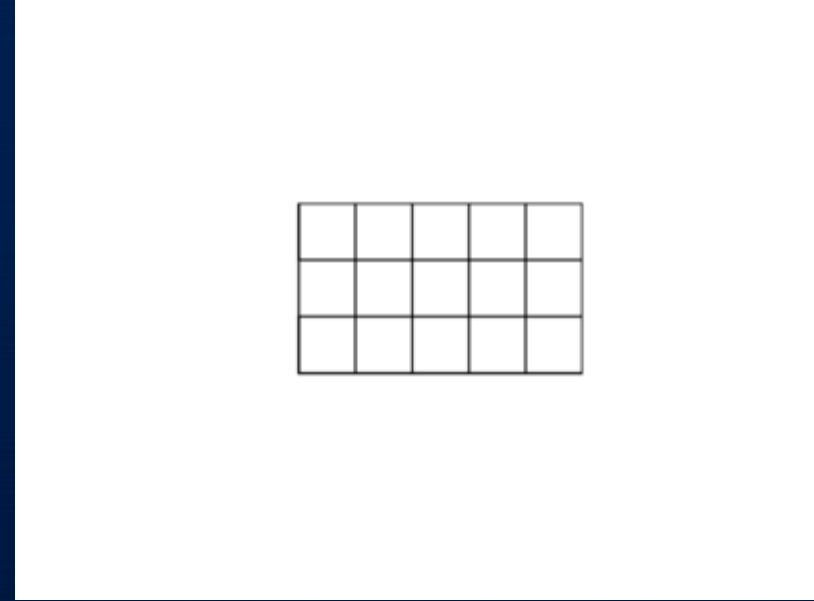
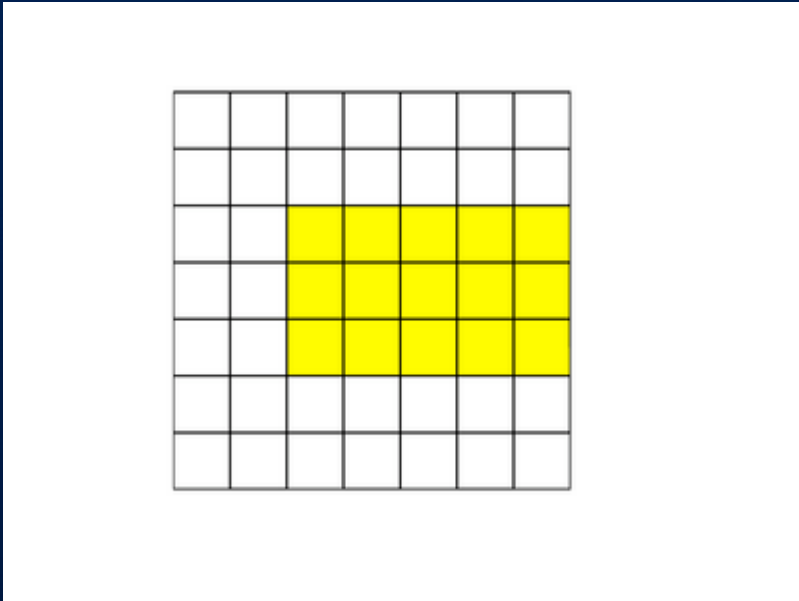
- **T describes transformation from scanner (native) space to standard space**
 - standard space could be Talairach, MNI_305, ...



mincresample: Spatial Transformation

- **mincresample -transformation T.xfm -like
template.mnc mri_001.mnc res_001.mnc**
 - input: mri_001.mnc, T.xfm (T_grid_0.mnc), template.mnc
 - output: res_001.mnc

mincreshape: change image array



- **extract a sub-block (“hyperslab”)**
 - extract 2D slice of 3D file
 - extract 3D time point of 4D (x,y,z,t) file
- **enlarge by zero-padding**
 - useful with label file created using “Display”

mincreshape (2)

- **re-order dimensions**
 - e.g. transverse to coronal
- **no interpolation: new grid coincident with old**
 - unlike mincresample

mincaverage (1)

- **mincaverage mri_*.mnc average.mnc**
 - input: mri_*.mnc files (all of same shape!)
 - output: average.mnc
 - optionally normalize intensity before averaging

mincaverage (2)

- **mincaverage -binarize -binvalue 2
seg_*.mnc gray_prob.mnc**
 - each input is “binarized”
 - result at each voxel: probability of gray matter

mincmath: Simple Math

- **mincmath -sub mri_001.mnc mri_002.mnc diff.mnc**
 - input: mri_001.mnc, mri_002.mnc
 - output: diff.mnc

minccalc: Complex Math

- **minccalc -expr 'A[0] == 3 && A[1] != 3'**
seg_001.mnc seg_002.mnc discrep.mnc
 - input: seg_001.mnc, seg_002.mnc
 - output: discrep.mnc
 - rich set of operations
 - expression may contain multiple statements
 - any number of input files
 - multiple output files

Common Options

- **clobber**
 - overwrite existing file
- **quiet, verbose, debug**
 - default is -verbose
- **image storage**
 - byte, short, int, etc

Getting Help

- **mincmath -help**
 - terse reminder of options
- **man mincmath**
 - manual page
- **minc-users @ bic.mni.mcgill.ca**
 - friendly, helpful humans