# 2017_11_AllenBrain_vox2mm

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In [5]:
```
import nibabel as nb
import numpy as np
import pandas as pd
from os.path import join
import glob as glob
import re
```

In [7]:
```
def natural_sort(l):
    convert = lambda text: int(text) if text.isdigit() else text.lower()
    alphanum_key = lambda key: [ convert(c) for c in re.split('([0-9]+)', key) ]
    return sorted(l, key = alphanum_key)

def mm2vox(aff,pts):
    import nibabel as nb
    import numpy as np
    #convert xyz coords from mm to voxel space coords
    return (nb.affines.apply_affine(np.linalg.inv(aff),pts)).astype(int)

def vox2mm(aff,pts):
    import nibabel as nb
    #convert from voxel coords space back to mm space xyz
    return nb.affines.apply_affine(aff,pts)
```

In [12]:
```
csv_root_dir = '/data/chamal/projects/gabriel/allen-mri/microarray'
nii_root_dir = '/data/chamal/projects/gabriel/allen-mri/nifti'
sampAnnots = natural_sort(glob.glob(join(csv_root_dir,'*/SampleAnnot.csv')))
niis = natural_sort(glob.glob(join(nii_root_dir,'*_t1.nii.gz')))
sampAnnots
```

Out [12]:
```
['/data/chamal/projects/gabriel/allen-
mri/microarray/H0351.1009/SampleAnnot.csv',
 '/data/chamal/projects/gabriel/allen-
mri/microarray/H0351.1012/SampleAnnot.csv',
 '/data/chamal/projects/gabriel/allen-
mri/microarray/H0351.1015/SampleAnnot.csv',
 '/data/chamal/projects/gabriel/allen-
mri/microarray/H0351.1016/SampleAnnot.csv',
 '/data/chamal/projects/gabriel/allen-
mri/microarray/H0351.2001/SampleAnnot.csv',
 '/data/chamal/projects/gabriel/allen-
mri/microarray/H0351.2002/SampleAnnot.csv']
```

In [14]:
```
niis
```

Out [14]:
```
['/data/chamal/projects/gabriel/allen-mri/nifti/H0351.1009_t1.nii.gz',
 '/data/chamal/projects/gabriel/allen-mri/nifti/H0351.1012_t1.nii.gz',
 '/data/chamal/projects/gabriel/allen-mri/nifti/H0351.1015_t1.nii.gz',
 '/data/chamal/projects/gabriel/allen-mri/nifti/H0351.1016_t1.nii.gz',
 '/data/chamal/projects/gabriel/allen-mri/nifti/H0351.2001_t1.nii.gz',
```

```
 '/data/chamal/projects/gabriel/allen-mri/nifti/H0351.2002_t1.nii.gz',
 '/data/chamal/projects/gabriel/allen-mri/nifti/H0351.2003_t1.nii.gz',
 '/data/chamal/projects/gabriel/allen-mri/nifti/H372.0006_t1.nii.gz']
```

In [40]:
```
idx=0
for idx,fname in enumerate(sampAnnots): #loop over annots, since there are more .nii f
    sampAnnot=sampAnnots[idx]
    nii=niis[idx]
    print(sampAnnot.split('/')[-2])
    print(nii.split('/')[-1])
    aff = nb.load(nii).get_affine()
    df=pd.read_csv(sampAnnot)
    v_xyz=df[['mri_voxel_x','mri_voxel_y','mri_voxel_z']].as_matrix()
    xyz=vox2mm(aff,v_xyz)
    df['mri_mm_x']=xyz[:,0]
    df['mri_mm_y']=xyz[:,1]
    df['mri_mm_z']=xyz[:,2]
    out_name = sampAnnot.split('/')[-2]+"_"+fname.split('/')[-1].split('.')[0]+"_mm_co
    print(out_name)
    print("")
    df.to_csv(out_name,index=False)
    del xyz
```

```
H0351.1009
H0351.1009_t1.nii.gz
H0351.1009_SampleAnnot_mm_coord.csv

H0351.1012
H0351.1012_t1.nii.gz
H0351.1012_SampleAnnot_mm_coord.csv

H0351.1015
H0351.1015_t1.nii.gz
H0351.1015_SampleAnnot_mm_coord.csv

H0351.1016
H0351.1016_t1.nii.gz
H0351.1016_SampleAnnot_mm_coord.csv

H0351.2001
H0351.2001_t1.nii.gz
H0351.2001_SampleAnnot_mm_coord.csv

H0351.2002
H0351.2002_t1.nii.gz
H0351.2002_SampleAnnot_mm_coord.csv
```

In [31]:
```
df.head()
```

Out [31]:

| | structure_id | slab_num | well_id | slab_type | structure_acronym | structure_name | polygon_id | mri_voxel_x |
|---|---|---|---|---|---|---|---|---|
| 0 | 4143 | 9 | 11281 | CX | MTG-i | middle temporal gyrus, left, inferior bank of ... | 1283581 | |
| 1 | 4151 | 9 | 11305 | CX | ITG-mts | | | |
| 2 | 4149 | 9 | 11289 | CX | ITG-its | | | |
| 3 | 4142 | 8 | 11335 | CX | MTG-s | | | |
| 4 | 4135 | 8 | 11319 | CX | STG-l | | | |

149
1 inferior temporal gyrus, left, bank of mts 1283601
152
2 inferior temporal gyrus, left, bank of the its 1283603
143
3 middle temporal gyrus, left, superior bank of ... 1279507
151
4 superior temporal gyrus, left, lateral bank of... 1283331
160

| | mri_voxel_y | mri_voxel_z | mni_x | mni_y | mni_z | mri_mm_x | mri_mm_y | mri_mm_z |
|---|---|---|---|---|---|---|---|---|
| 0 | 106 | 137 | -58 | -46 | 3 | 149 | 106 | 137 |
| 1 | 128 | 137 | -61 | -46 | -19 | 152 | 128 | 137 |
| 2 | 126 | 137 | -52 | -46 | -17 | 143 | 126 | 137 |
| 3 | 108 | 127 | -60 | -36 | 1 | 151 | 108 | 127 |
| 4 | 100 | 127 | -69 | -36 | 9 | 160 | 100 | 127 |