# Visualization of NIfTI Images

Processing math: 100%

## Again we read in the data

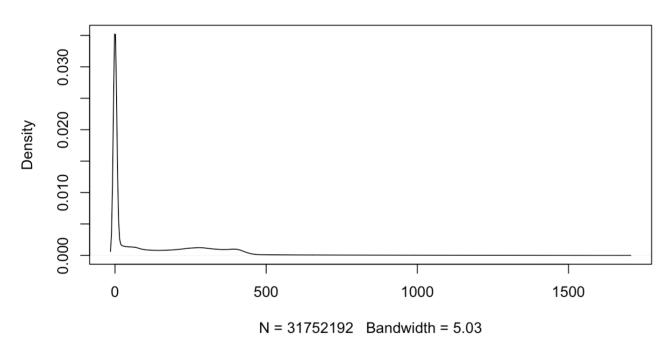
```
t1 = neurobase::readnii("training01_01_t1.nii.gz")
```

#### Density of an Image

Let's do a marginal density of the values:

plot(density(t1)) # large spike at 0

#### density.default(x = x)

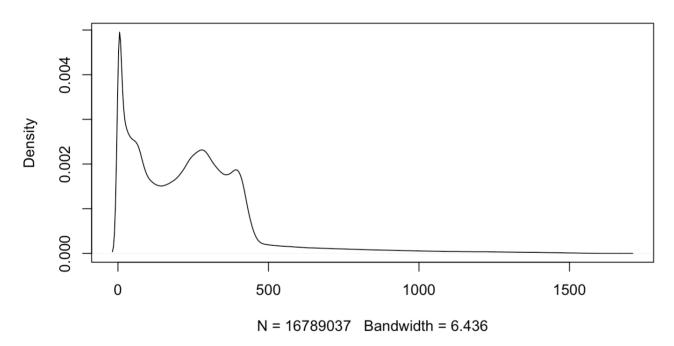


#### Density with a mask

You can also pass in a mask to most standard functions:

plot(density(t1, mask = t1 > 0))

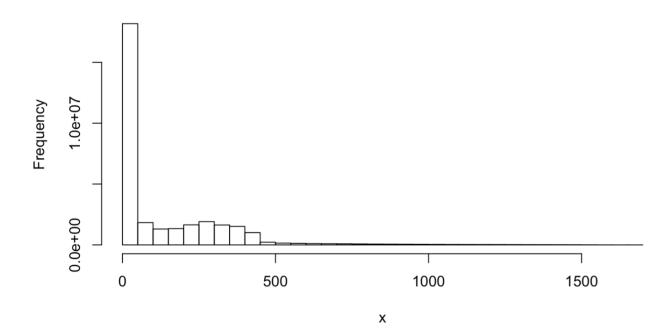
#### density.default(x = x)



# Similarly: a Histogram

Note the high intensities:

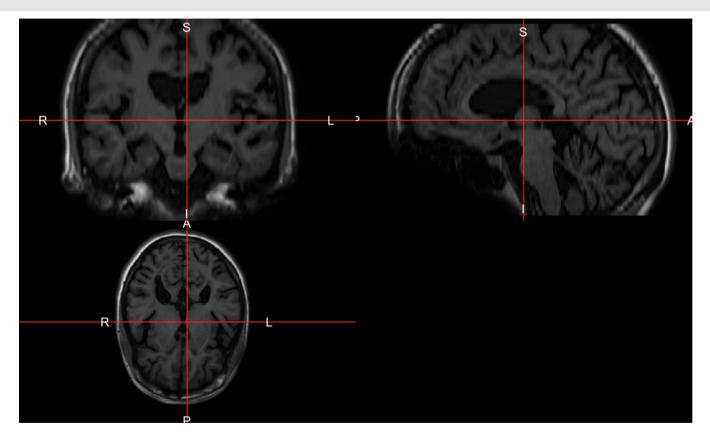




## Orthographic view with additions

The neurobase::ortho2 function displays nifti objects in 3 different planes.

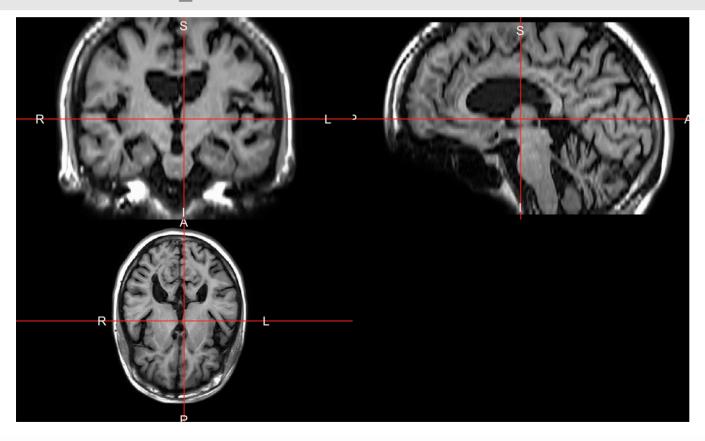
neurobase::ortho2(t1)



#### Brightening up the image

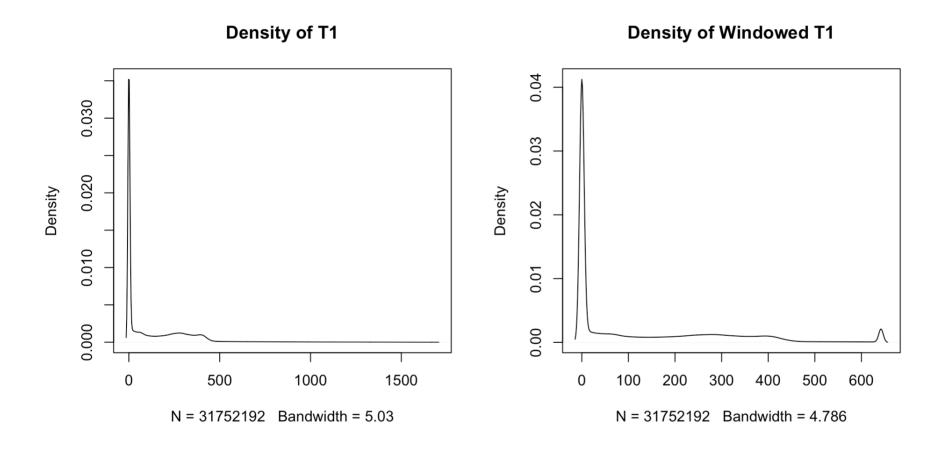
We see a faint outline of the image, but this single large value affects how we view the image. The function robust\_window calculates quantiles of an image, by default the 0 (min) and 99.9th quantile, and sets values outside of this range to that quantile (we use 97.5th here).

ortho2(robust window(t1, probs = c(0, 0.975)))



### **Robust Density**

Note the x-axis

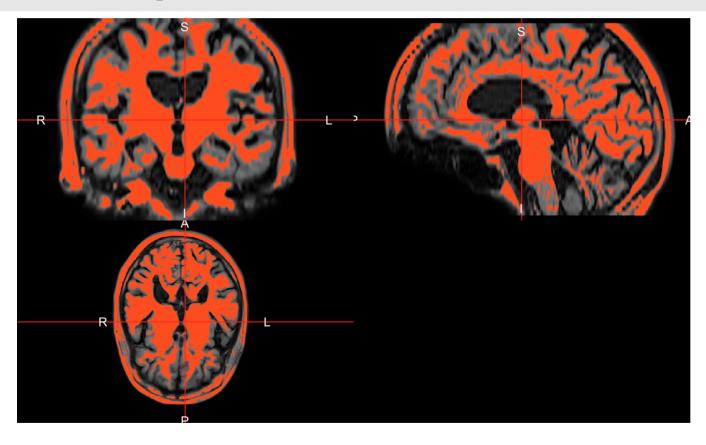


#### Overlaying images in ortho2

For the rest of the slides we will use the robust t1 for plotting

Here we plot the T1 and a mask of values over 300:

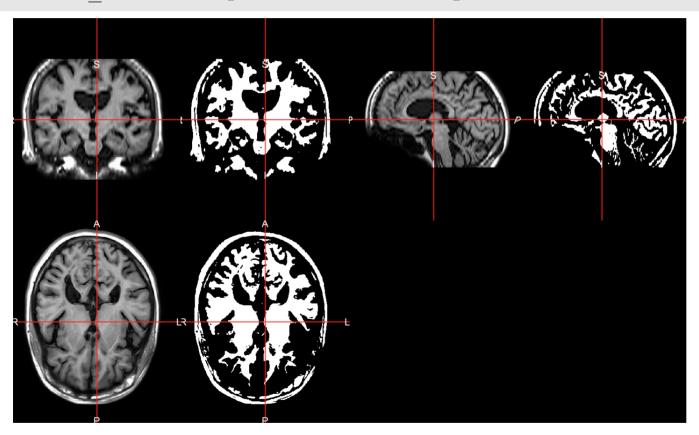
ortho2(t1, 
$$y = t1 > 300$$
)



#### Double orthographic view

Sometimes you would like to represent 2 images side by side, of the same dimensions and orientation of course (useful for checking registration), use double\_ortho

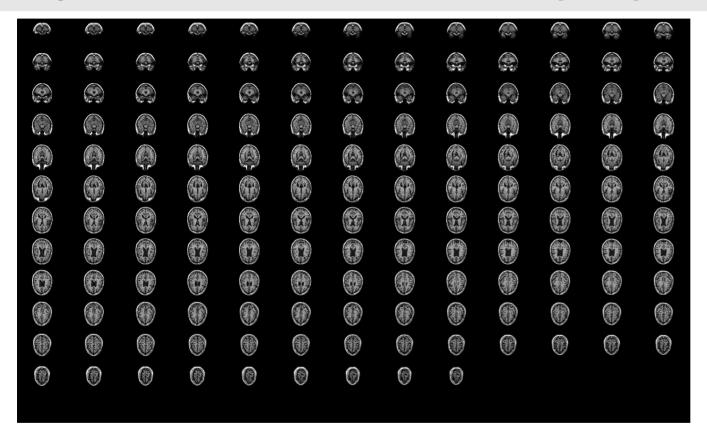
double ortho(t1, 
$$y = t1 > 300$$
, col. $y = "white"$ )



#### Lightbox: view all slices

The oro.nifti::image function shows a lightbox view, all slices of an image:

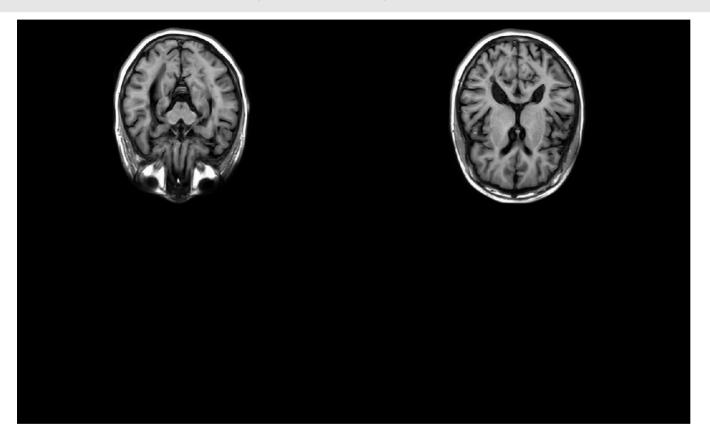
image(t1, useRaster = TRUE) # look at average brightness over each slice



# Viewing specific slices

The slice function can plot individual slices:

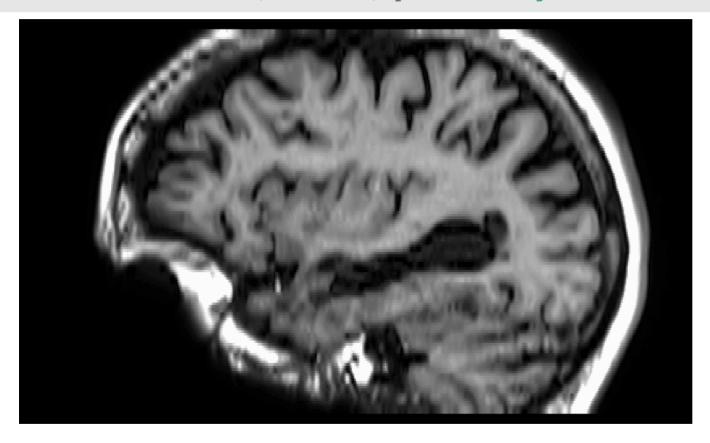
```
oro.nifti::slice(t1, z = c(60, 80))
```



#### **Different Planes**

We can specify z the same way but change the plane to be different to get a different slice of the brain (could also do coronal):

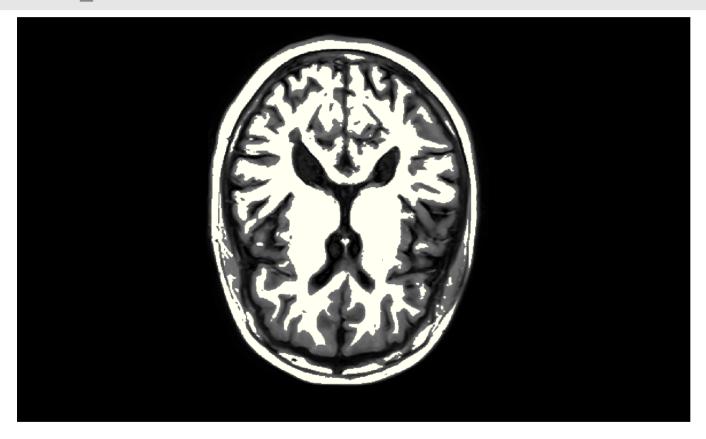
oro.nifti::slice(t1, z = 125, plane = "sagittal")



#### Overlaying slices

We can also overlay one slice of an image upon another using the oro.nifti::slice\_overlay function.

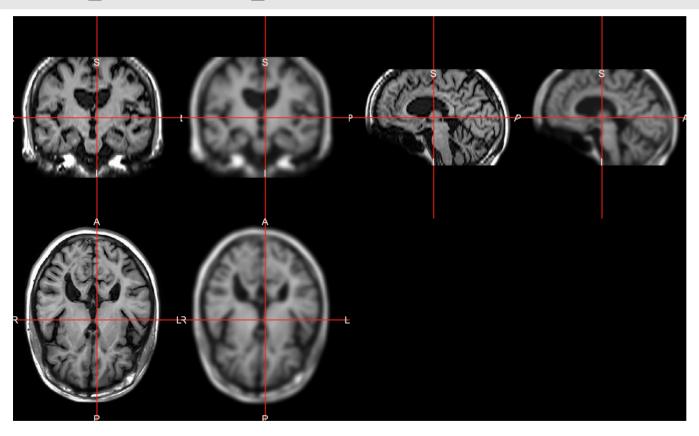
slice\_overlay(t1, y = t1 > 300, z = 80)



#### Smoothing an Image (not extensively covered)

If you want to do 3D Gaussian smoothing, the extrantsr::smooth\_image is helpful:

```
library(extrantsr)
sm_img = smooth_image(t1, sigma = 2)
double_ortho(t1, sm_img)
```



#### **Conclusions**

- ortho2 show orthographic images (and with overlays)
- image shows multiple slices of an image
- slice shows only specified slices
- slice overlay similar to image but with an overlay
- double\_ortho similar to ortho2 but side-by-side
- robust window good for setting high values to not so high

#### Website

http://johnmuschelli.com/imaging\_in\_r