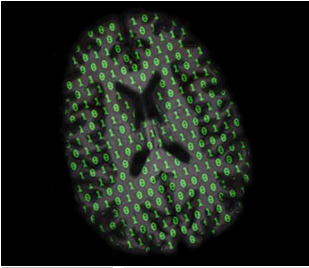


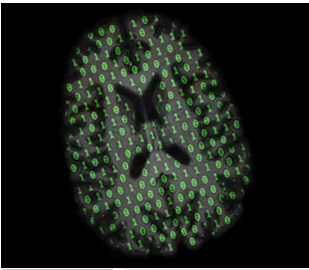


THEME 3 / LECTURE 3: REQUIREMENTS



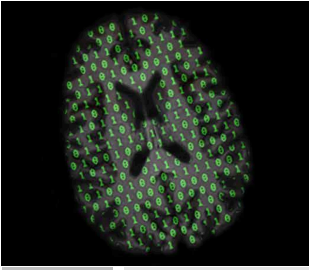
Requirements

- Virtual machine: Linux for Windows
- R and fsl installation
- fslr



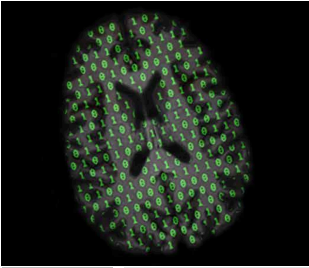
FSL Installation and Windows Virtual Machine

- **Install FSL:** <http://fsl.fmrib.ox.ac.uk/fsl/fslwiki/FslInstallation>
- **Linux/Mac:** follow instructions, you will need to add R packages
- **Windows:** <https://smart-stats-tools.org/mooc-2015>
 - Recommended approach for Windows
 - Download [VirtualBox](#) a free x86 and AMD64/Intel64 virtualization product.
 - The Virtual Machine compressed image (~3.7GB) can be downloaded from [here](#). Make sure you move the archive to a folder of your choice and then decompress it
 - Install the VirtualBox and once that's complete add the virtual machine using the VirtualBox main menu Machine->Add or simply press the CTRL+A combination. A file browser window will open and you need to navigate to the folder created in step 2 and locate the virtual machine image file
 - Once the MOOC virtual machine is added to the VirtualBox start it up by pressing the green Start arrow. The username is fsluser and the password is fsluser, change it if needed
 - This virtual machine comes with all necessary R packages pre-installed (including ANTsR)
 - MOOC sample images were provided and they are located on your virtual machine desktop under "MOOC 2015 data" folder.
 - The virtual machine already has installed the necessary tools for setting up a shared folder with the native operating system (WIN). Please check [this easy tutorial](#) that explains the process. Once the folder is set, a reboot of the virtual machine is required and you should be able to access the shared folder by opening the "shared" desktop folder.
 - Data are now loaded in
`"/home/fsluser/Desktop/MOOC-2015"`
- **Windows:** install FSLvm (FSLvm) and then R
http://fsl.fmrib.ox.ac.uk/fsl/fslwiki/FslInstallation/Windows#Installing_FSL



FSL and fslr

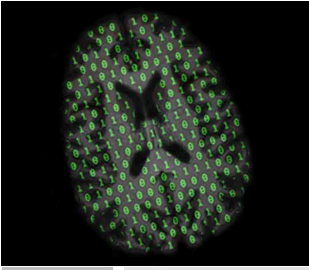
- FSL is a comprehensive library of analysis tools for fMRI, MRI and DTI brain imaging data
 - Collection of routines in C, C++
- fslr: port of FSL into R
- The three functions we focus on are:
 - image inhomogeneity correction (using FAST)
 - skull stripping (using BET)
 - image registration (using FLIRT and FNIRT)



fslr

- ❑ fslr is installed on CRAN
- ❑ best to install using the devtools package

```
if (!require(devtools)) {install.packages('devtools')}  
devtools::install_github("muschellij2/fslr")
```



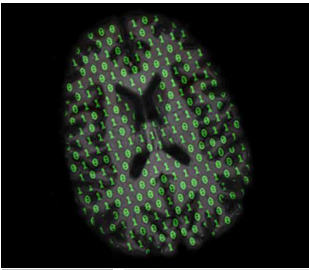
FSL/GUI vs. R Terminal

- GUI-based apps do not inherit the shell environment (if FSLDIR is defined in your terminal Rstudio does not see it)
- fslr requires R to know where the FSL directory was installed

```
Sys.getenv("FSLDIR")  
[] ""  
library(fslr)  
have.fsl()  
[] FALSE
```

If `have.fsl()=FALSE` then the fsl path must be specified

```
options(fsl.path= "/usr/local/fsl")
```



Some preliminaries

- Linux/Mac: set the working directory to where the data are
- Using the virtual machine: set the data directory and set the working directory accordingly for R

```
setwd("/home/fsluser/Desktop/MOOC-2015/kirby21/visit_1/113")  
library(oro.nifti)  
nim=readNIfTI("113-01-MPRAGE.nii.gz", reorient=FALSE)
```

- Some statistics using FSL

```
mean(nim)  
[1] 143789.2  
fslstats(nim, opts= "-m")  
fslstats "/tmp/Rtmp4VLZYR/file217f3a830f1a.nii.gz" -m  
[1] "143789.231769"  
fslstats("113-01-MPRAGE.nii.gz", opts="-m")  
fslstats "113-01-MPRAGE.nii.gz" -m  
[1] "143789.231769"  
fslstats.help()
```