AFNI & SUMA

Concepts, Principles, Demos

Analysis of Functional NeuroImages

by

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AFNI User

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AFNI is a research tool.

Clinical uses are not supported or advised.

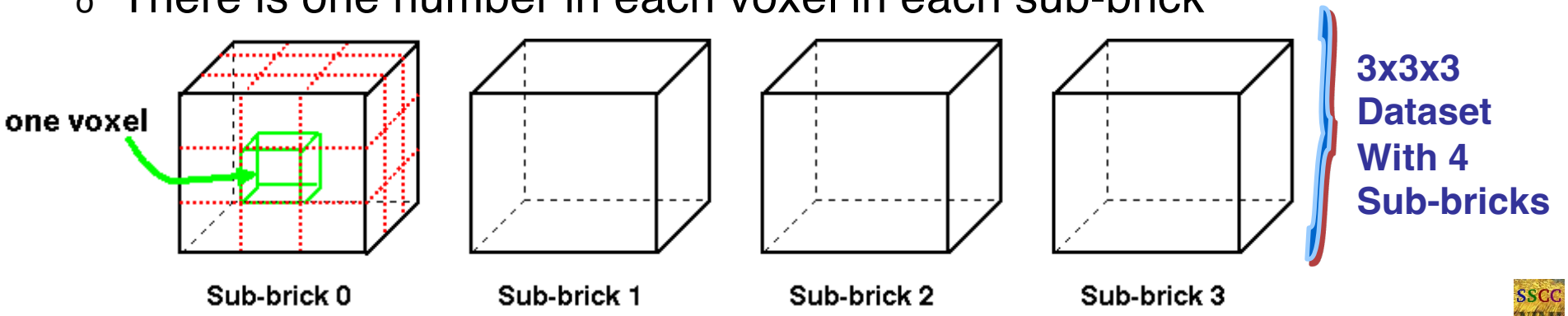
http://afni.nimh.nih.gov/afni

AFNI = Analysis of Functional NeuroImages

- Developed to provide an environment for FMRI data analyses
  - And a platform for development of new software tools
- **AFNI** refers to both the program of that name and the entire package of external programs and plugins (more than 200)
- The **Prime Directive** in the development of **AFNI**:
  - Allow users to stay close to their data and view/analyze it in many different ways
- **SSCC** = Scientific Computing and Statistical Core
  - Our mission is help NIH (and beyond) investigators carry out the analyses of their (F)MRI data
  - Development of data analysis methods and putting them into usable and (reasonably) reliable software
  - Consulting and question answering and hand-holding

Fundamental **AFNI** Concept

- Basic unit of data in **AFNI** is the **dataset**
  - A collection of 1 or more 3D arrays of numbers
    - Each entry in the array is in a particular spatial location in a 3D grid (a voxel = 3D pixel)
    - Image datasets: each array holds a collection of slices from the scanner
      - Each number is the signal intensity for that particular voxel
    - Derived datasets: each number is computed from other dataset(s)
      - e.g., each voxel value is a *t*-statistic reporting "activation" significance from an FMRI time series dataset, for that voxel
  - Each 3D array in a dataset is called a sub-brick
    - There is one number in each voxel in each sub-brick



Parts of **AFNI**

- Interactive visualization and analysis — **AFNI** and SUMA
  - For looking at data and results
  - **AFNI** is based on 3D volumes = data as gathered by MRI
  - SUMA is based on 2D surfaces = models of cortical surfaces
  - A few kinds of analysis can be done by pointing+clicking
- Batch mode programs and scripts
  - Are run by typing commands directly to computer, or by putting commands into a text file (script) and later executing them
  - Most **AFNI** complex analyses are done in batch programs
- Plugins and Plugouts
  - Separate programs that attach themselves to **AFNI** and/or SUMA to provide extra capabilities

Getting and Installing **AFNI**

- **AFNI** runs on **Unix** systems: Linux, Sun, Mac OS X
  - Can run under Windows with Cygwin Unix emulator
    - This option is really just for trying it out — not for regular use***!***
- **If you are at the NIH**: SSCC can install **AFNI** and update it on your system(s)
  - You must give us an account with ***ssh*** access
- You can download precompiled binaries from our Website
  - **http://afni.nimh.nih.gov/afni**
  - Also: documentation, message board, humor, data, …
- You can download source code and compile it
- **AFNI** is updated fairly frequently, so it is important to update occasionally
  - We can't help you with old versions***!***

AFNI at the NIH Scanners

- **AFNI** can take 2D (or 3D) images in "realtime" from an external program and assemble them into 3D+time datasets slice-by-slice at each TR – then update the images+graphs
- Jerzy Bodurka (ex-FMRIF) and Vinai Roopchansingh have set up the GE FMRI scanners (3 Ts, 1.5 T, and 7 T) to start **AFNI** automagically when scanning, and send reconstructed images over to the AFNI box as soon as they are available:
  - For immediate display (images and graphs of time series)
  - **Plus**: graphs of estimated subject head movement
  - **Also possible**: feedback to subject in realtime
- Goal is to let you see image data as they are acquired, so that if there are any big problems, you can fix them right away
  - Sample problem: someone typed in the imaging field-of-view (FOV) size wrong (240 cm instead of 24 cm), and so got garbage data, ***but only realized this too late*** (after scanning 8 subjects this way) — ***D'oh!***

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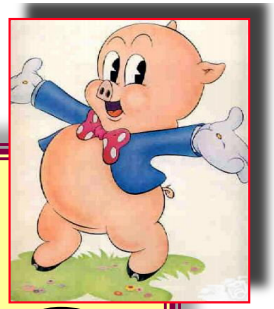
Interlude



That's All, Folks