PACKAGES & PYCORTEX

10.19.2020

RECAP

* **correlation:** how (linearly) related are two datasets

  * the datasets must be “parallel”, i.e. each item in the first dataset must “correspond” to the item with the same index in the second dataset

* *for example:* dataset A contains the reaction time for each subject, & dataset B contains their accuracy

RECAP

* correlation significance
  * “is this correlation bigger (or *more extreme*) than we would expect to see by chance?”
* exact test
* permutation test

INSTALLING PACKAGES

* so far we've gotten by with packages that are installed by default in anaconda (numpy, scipy, matplotlib)

* but sometimes you will need to install python packages that *aren't* included

* once you've installed something, you can **import** it using the usual syntax

PIP

* the easiest way to install packages is using **pip**:

```
$ pip install pycortex
```

* this will automatically download the package (from the Python Package Index https://pypi.org/) and install it to your python directory

SETUP.PY

* the other way you might need to install things is using **setup.py** (if the package is not on PyPI, which is typical for smaller/more specialized things)

* to do this, you need to first navigate (in terminal) to the package directory (which you might have downloaded with git)

* then run:

```
$ python setup.py install
```

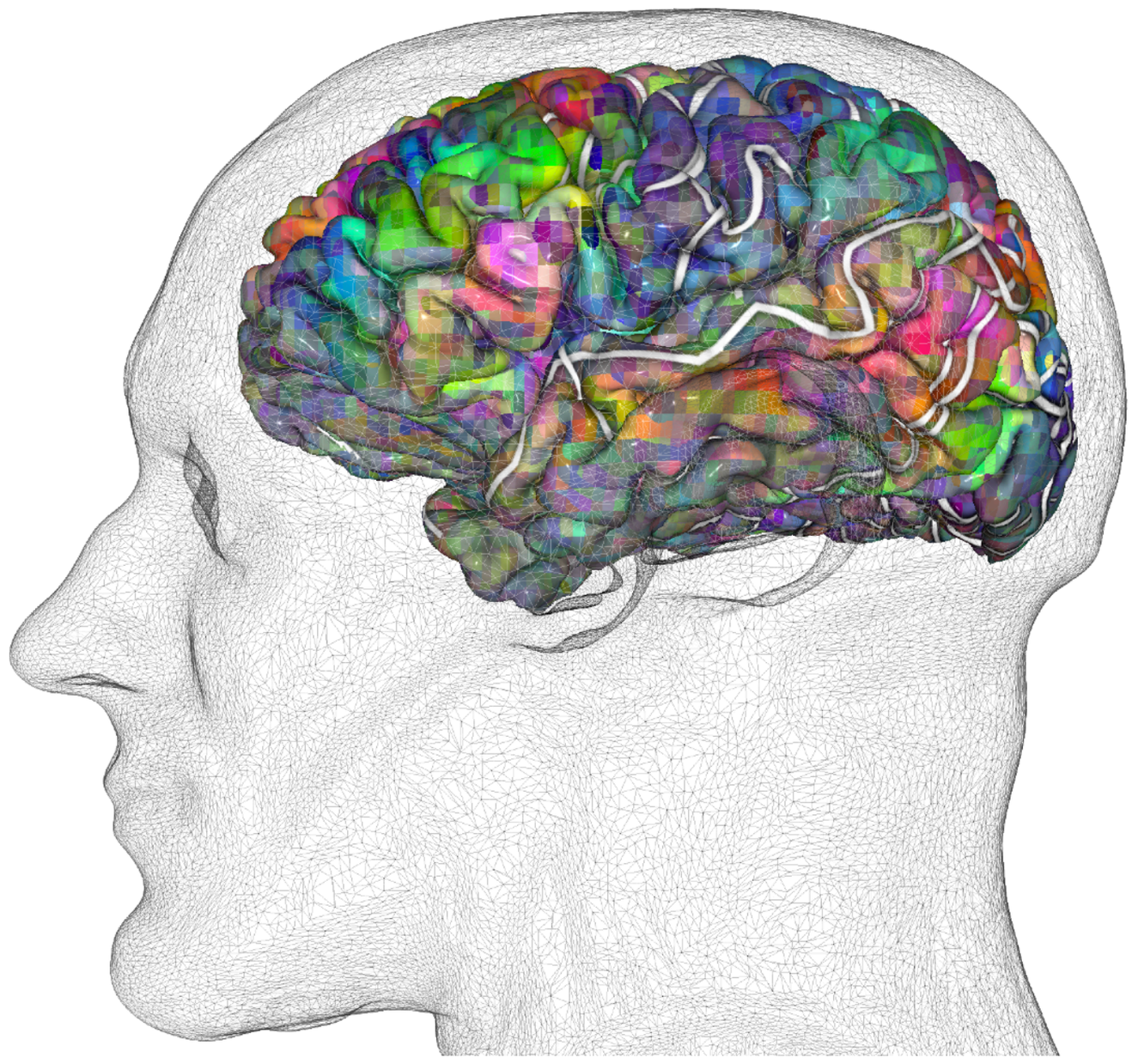
CUSTOM PACKAGE: PYCORTEX

* **pycortex** is an MRI/fMRI visualization package developed mainly by James Gao, with some help from me, Mark Lescroart, and many other talented folks

* it doesn’t come with anaconda, so if you want to use it you need to install using pip or git clone and then use setup.py

PYCORTEX

* it can make ***very pretty*** pictures of brains

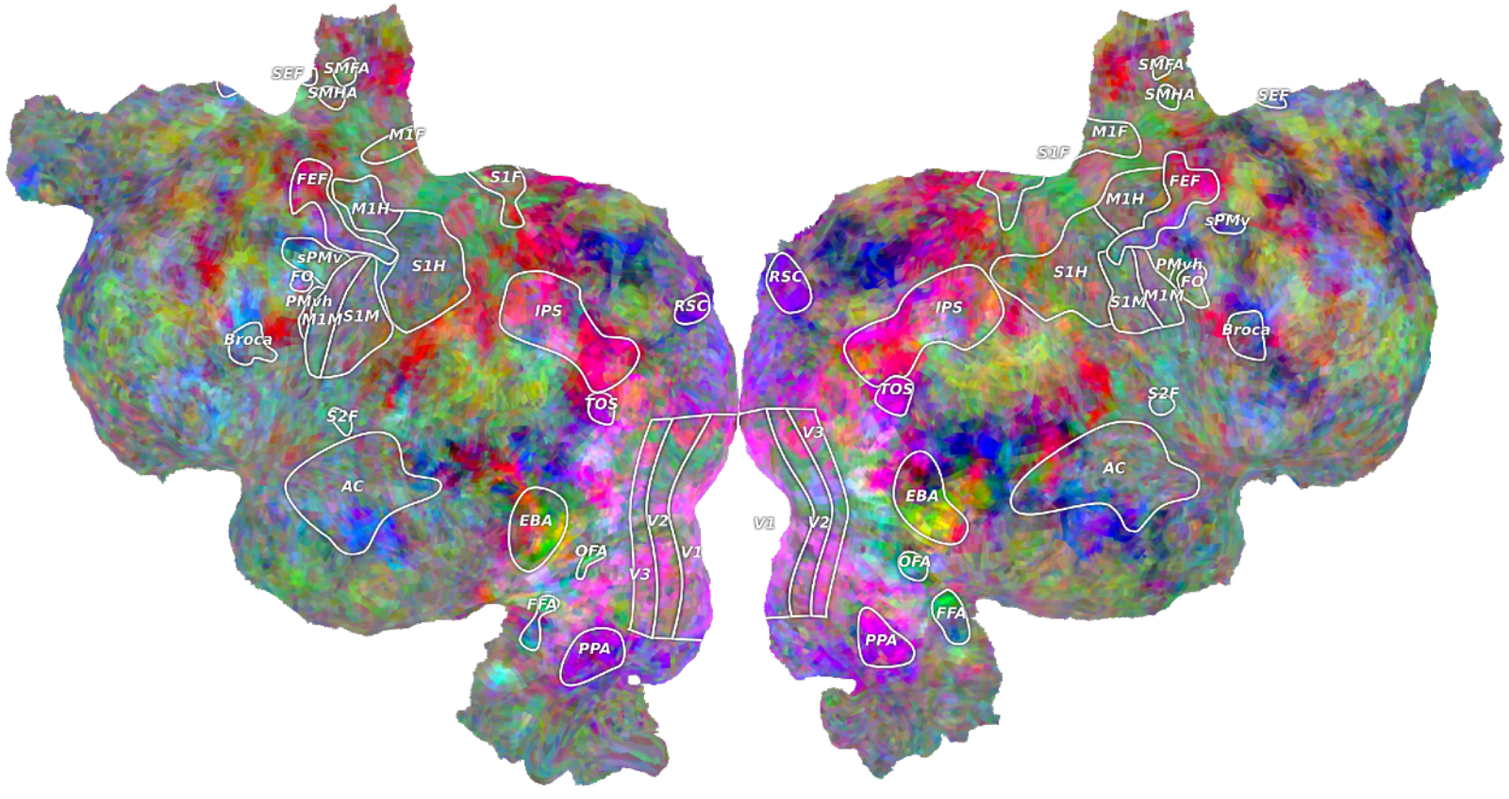


PYCORTEX

* pycortex can make both 2D and 3D brain images

* the 2D images are called *cortical flatmaps*

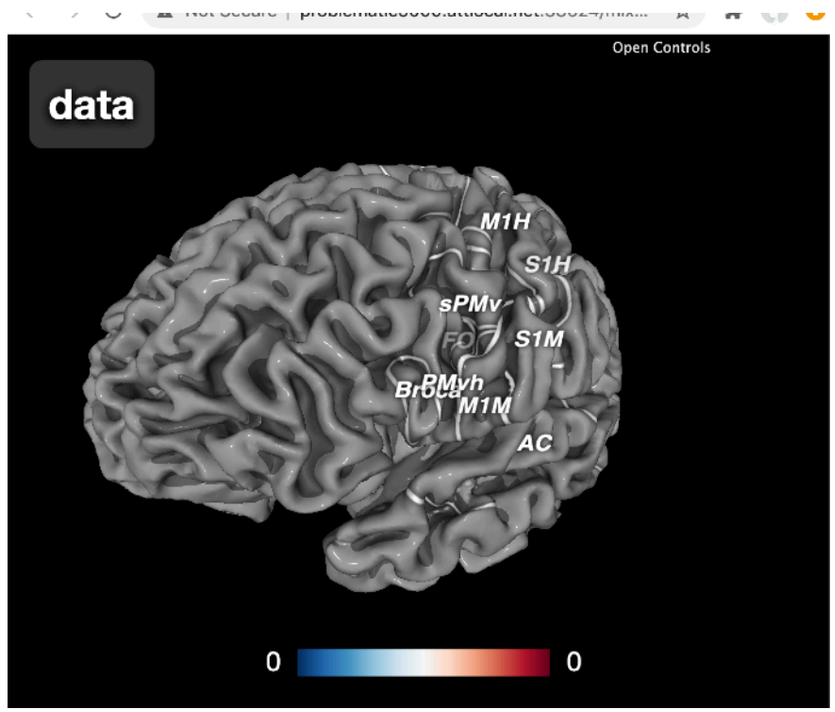
* they're created using **cortex.quickshow**



PYCORTEX

* since python/jupyter doesn’t (or really, didn’t) have a good way to show 3D images, pycortex uses your web browser to draw 3D brain images
  * you can see what this looks like at https://gallantlab.org/huth2016/

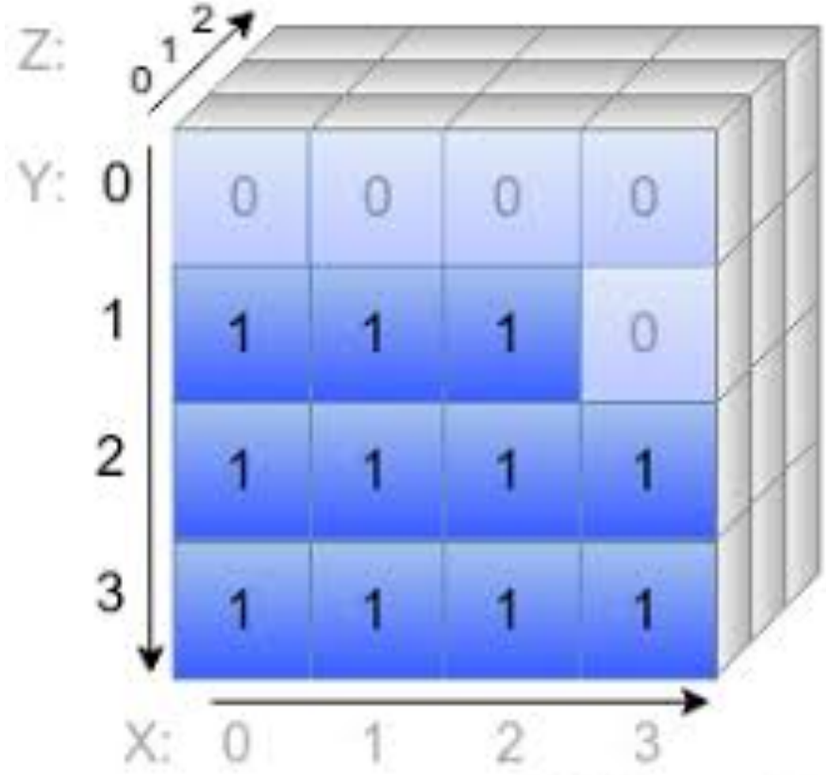
* 3D viewers are created using **cortex.webshow**



PYCORTEX DATA TYPES

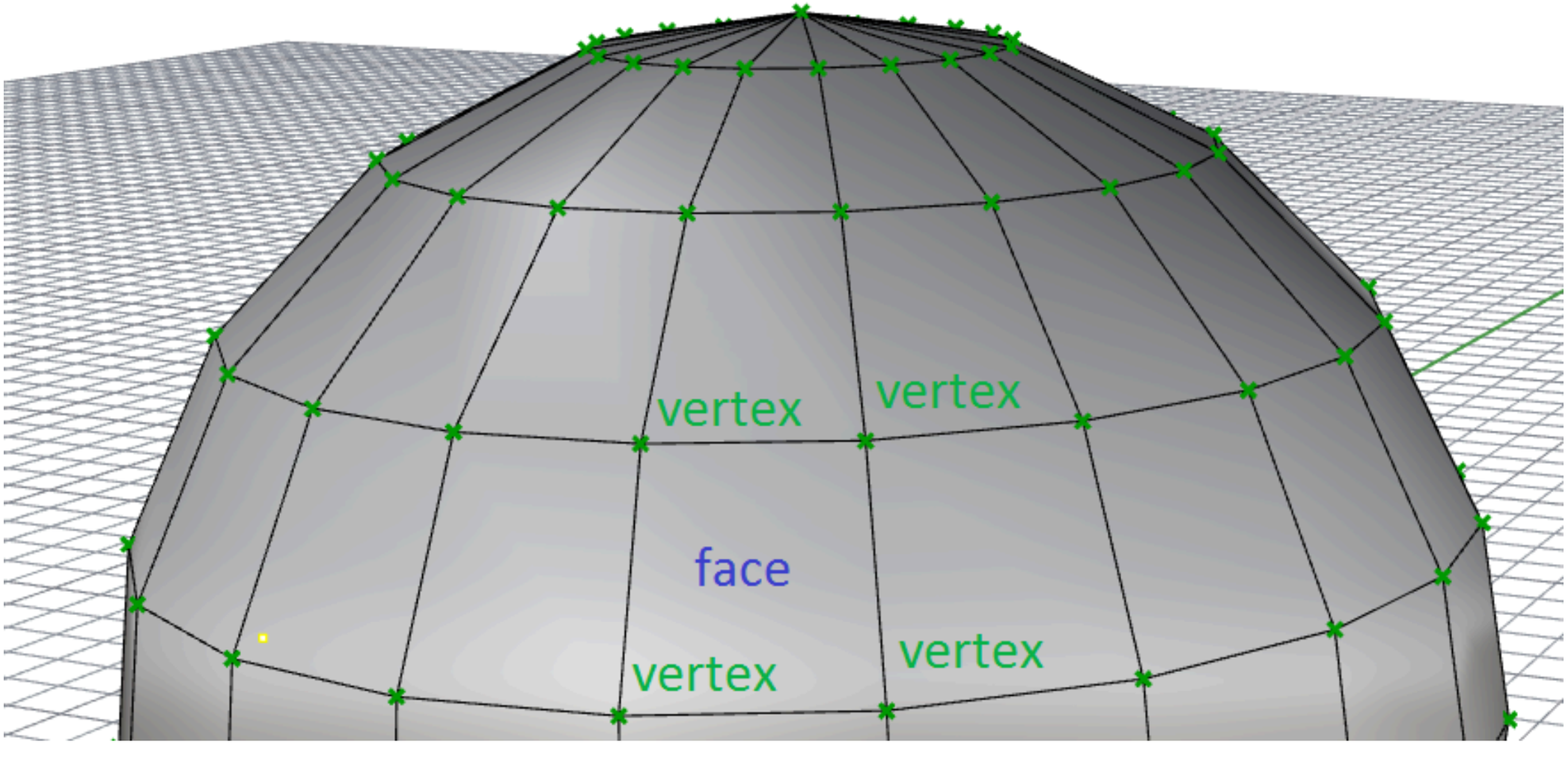
* (f)MRI data is natively 3D, so it's usually represented as a 3D numpy array in the **cortex.Volume** class

* let's see what it looks like to construct a 3D array and show it in pycortex



PYCORTEX DATA TYPES

* (f)MRI data can also be represented as values for each point (i.e. a 1D array) on the brain surface using the **cortex.Vertex** class



PYCORTEX

* like in matplotlib, pycortex allows you to set vmin, vmax, and a colormap for your data when you create it

* unlike matplotlib, pycortex also has 2D colormaps (they take 2 values instead of 1)

an example 1D colormap

an example 2D colormap

END