


Reproducible Research at the Turing



 @kirstie_j
<https://GitHub.com/KirstieJane/ReproducibleResearch>
doi: <https://dx.doi.org/10.6084/m9.figshare.5454991>



- Research fellow at the Alan Turing Institute for Data Science
- Research associate in the Brain Mapping Unit, Department of Psychiatry, University of Cambridge
- 2016/17 Mozilla Fellow for Science




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doi: <https://dx.doi.org/10.6084/m9.figshare.5454991>

Reproducible vs Replicable



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Code

Same

Different

Data

Same

Different



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Code

Same

Different

Reproducible

Robust

Data

Same

Different

Replicable



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Code

Same

Different

Data

Same

Different

Reproducible

Replicable

Robust

Generalisable




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Barriers to reproducible research



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Is not considered
for promotion

Requires
additional skills

Plead the 5th

Support
additional users

Takes time

Barriers to reproducible research

Held to higher
standards than
others

Publication bias
towards novel findings



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Reproducible research at the Turing




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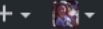
<https://GitHub.com/KirstieJane/ReproducibleResearch>
doi: <https://dx.doi.org/10.6084/m9.figshare.5454991>


The Alan Turing Institute





[Pull requests](#) [Issues](#) [Marketplace](#) [Explore](#)





Martin O'Reilly
martintoreilly


Research Software Engineer at the UK's national data science institute.

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Block or report user

 The Alan Turing Institute

 London

 Organizations

Overview

Repositories **10**

Stars **3**

Followers **2**

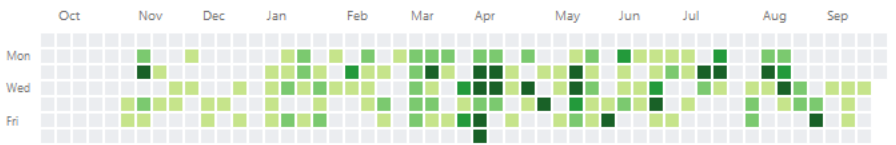
Following **0**

Pinned repositories

[alan-turing-institute/network-comparison](#)
An R package implementing the NetEMD and NetDis network comparison measures
R **3**

[bif-lab](#)
A MATLAB library for efficiently generating Basic Image Features (BIFs) from images.
Matlab

815 contributions in the last year




[Learn how we count contributions.](#)

Contribution activity

Jump to **2017**


2016


 Created 18 commits in 3 repositories

[alan-turing-institute/science-gateway-middleware](#) 16 commits

[alan-turing-institute/common-crawl](#) 1 commit

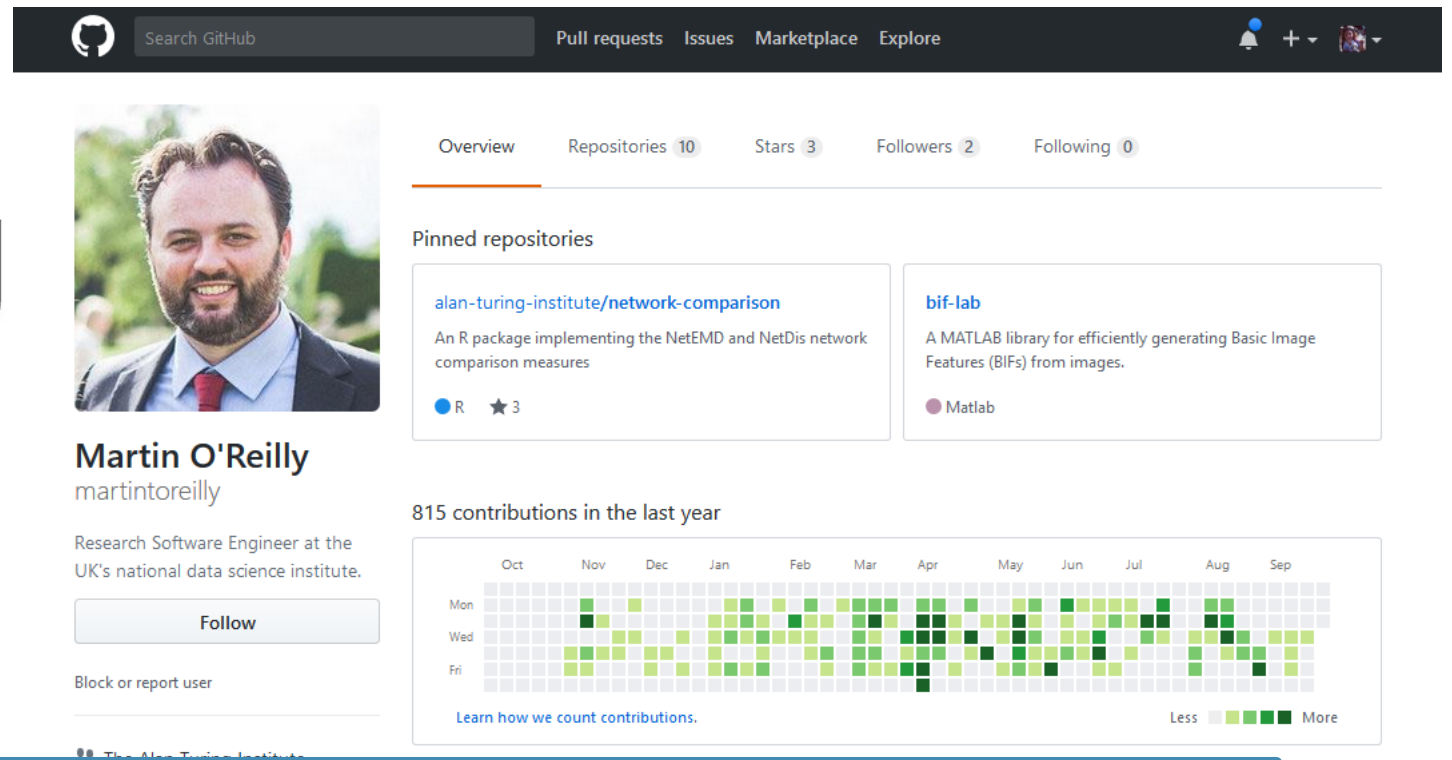
[alan-turing-institute/Hut23](#) 1 commit

 Created a pull request in alan-turing-institute/science-gateway-middleware that received 7 comments

 @kirstie_j

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The Alan Turing Institute



The screenshot shows the GitHub profile of Martin O'Reilly (martintoreilly). The profile includes a bio: "Research Software Engineer at the UK's national data science institute." and a "Follow" button. It also displays pinned repositories: "alan-turing-institute/network-comparison" (an R package) and "bif-lab" (a MATLAB library). A contribution graph shows 815 contributions in the last year, with a color-coded legend indicating the number of contributions per week. The top navigation bar includes links for Pull requests, Issues, Marketplace, and Explore.

Search GitHub

Pull requests Issues Marketplace Explore

Overview Repositories 10 Stars 3 Followers 2 Following 0

Pinned repositories

[alan-turing-institute/network-comparison](#)
An R package implementing the NetEMD and NetDis network comparison measures
R ★ 3

[bif-lab](#)
A MATLAB library for efficiently generating Basic Image Features (BIFs) from images.
Matlab

815 contributions in the last year

Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep


Mon
Wed
Fri

Learn how we count contributions.

Less More

My colleagues in the research software engineering team and I **seek to position The Alan Turing Institute as a world leader for reproducible research** by embedding a culture of “reproducible by default” at the institute and providing training and tools to make reproducible research “too easy not to do”.



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Reproducible research at the Turing

- Training & support for incoming students
- Software development support
 - From the beginning if possible
 - Posthoc for now
- Turing Reproducibility Champions
- Institutional buy in



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Reproducible research at the Turing

- Training & support for incoming students
- Software development support
 - From the beginning if possible
 - Posthoc for now
- Turing Reproducibility Champions
- Institutional buy in
- “The Turing Way”



Attr: edhiggins, CC BY 3.0, via Wikimedia Commons

Start small



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Protocols.io



 @kirstie_j

<https://GitHub.com/KirstieJane/ReproducibleResearch>
doi: <https://dx.doi.org/10.6084/m9.figshare.5454991>



Your protocols ×



Explore

View

Help



protocols.io > researchers > Kirstie Whitaker > protocols > UCHANGE structural neuroimaging pipeline protocols groups researchers jobs articles journal

+ New protocol

Viewing

✓ How to create a new protocol

v 2 ●

Personal

🌐 UCHANGE structural neuroimaging pipeline



UCHANGE structural neuroimaging pipeline [v1]



AUTHORS: KIRSTIE WHITAKER
BRAIN MAPPING UNIT, DEPARTMENT OF PSYCHIATRY, UNIVERSITY OF CAMBRIDGE

6 steps
0 private and 0 public forks
34 views

CONTACT:  KIRSTIE WHITAKER



Run



Publish

Edit



Steps

Before start

Comments

Metrics

Step 1 Check or complete software installation

Step 1
Check or complete software installation

You must have the following software libraries installed:

• **FreeSurfer** <https://surfer.nmr.mgh.harvard.edu>

Kirstie_J
research
54991



search protocols, groups and more

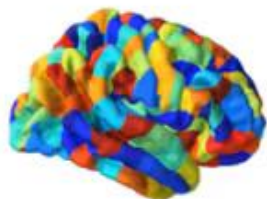


My protocols

Journal



save in journal



UCHANGE structural neuroimaging pipeline

13 steps

KIRSTIE WHITAKER, BRAIN MAPPING UNIT, DEPARTMENT OF PSYCHIATRY, UNIVERSITY OF CAMBRIDGE

CONTACT:  KIRSTIE WHITAKER

0/13

STEPS
COMPLETED

Step 1 Check or complete software installation You must have the following software libraries installed: Freesurfer: <https://s...> [read more](#)

Step 2 Set up your .bashrc file Open gedit and make sure your .bashrc file contains the following text:

Step 3 Set up directory structure You must have the appropriate input files in the displayed directory structure: Inside SUB_... [read more](#)

Step 4 Put the fsaverageSubP folder in the SUB_DATA directory The fsaverageSubP directory contains the 308 parcellation and nee... [read more](#)

Step 1

Check or complete software installation

You must have the following software libraries installed:

- **Freesurfer**: <https://surfer.nmr.mgh.harvard.edu/fswiki/DownloadAndInstall>
- **FSL**: <http://fsl.fmrib.ox.ac.uk/fsl/fslwiki/FslInstallation>
- **Anaconda**: <https://www.continuum.io/downloads>

From within **Anaconda** install the following python packages following the command below:

- [VTK](#)
- [Mayavi](#)
- [Nibabel](#)
- [pysurfer](#)

COMMAND (LINUX)

```
conda install vtk
```




Help



Coding your analyses



 @kirstie_j
<https://GitHub.com/KirstieJane/ReproducibleResearch>
doi: <https://dx.doi.org/10.6084/m9.figshare.5454991>

Comments are your friend!



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doi: <https://dx.doi.org/10.6084/m9.figshare.5454991>

```

1  #!/bin/bash
2
3  #=====
4  # Created by Kirstie Whitaker on 13th April 2016
5  #
6  # DESCRIPTION:
7  #   This code conducts a brain and head extraction of the PDw image to which
8  #   the quantitative multiparametric mapping (MPM) images have been aligned.
9  #   It then uses the head mask to set all voxels outside of the head to
10 #   zero for the quantitative MPM images and uses the brain mask to create
11 #   brain extracted versions of the MPM images (where all voxels outside of
12 #   the brain have been set to zero.
13 #
14 # USAGE:
15 #   NSPN_mpm_bet_mask.sh <pdw_file>
16 #
17 # INPUTS:
18 #   pdw_file : Proton density weighted file to which the MPM
19 #               quantitative maps are aligned.
20 #
21 # EXPECTS:
22 #   The following files should be in the same directory as the
23 #   input file:
24 #
25 #       R1.nii.gz      MT.nii.gz
26 #       R1s.nii.gz     A.nii.gz
27 #
28 # OUTPUTS:
29 #   All output are in the same directory as the input file.
30 #   A sub-directory called PDw_bet is created and contains all the
31 #   files created by FSL's bet command
32 #
33 #       R1_head.nii.gz   R1_brain.nii.gz

```

```

91
92 # Erode the brain mask by 3mm
93 if [[ ! -f ${mpm_dir}/PDw_brain_ero3.nii.gz ]]; then
94     fslmaths ${bet_dir}/PDw_brain.nii.gz -ero ${bet_dir}/PDw_brain_ero3.nii.gz
95 fi
96
97 #=====
98 # Now make the brain and head files for each of the
99 # calculated MPM files
100 #=====
101 echo -n " Applying masks"
102 for f_name in PDw ${calc_filename_list[@]}; do
103
104     # Don't run if it's already complete!
105     if [[ ! -f ${mpm_dir}/${f_name}_head.nii.gz ]]; then
106         echo -n " - ${f_name}"
107         fslmaths ${bet_dir}/PDw_brain_ero3.nii.gz \
108             -bin \
109             -mul ${mpm_dir}/${f_name}.nii.gz \
110             ${mpm_dir}/${f_name}_brain.nii.gz
111
112         fslmaths ${bet_dir}/PDw_brain_outskin_mask.nii.gz \
113             -bin \
114             -mul ${mpm_dir}/${f_name}.nii.gz \
115             ${mpm_dir}/${f_name}_head.nii.gz
116     fi
117 done # Close the mpm calculated file loop
118 echo ""
119
120 #=====
121 # All done!
122 #=====

```



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Aim for 40% comments in your code




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Share your comments with the original author



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(which is almost
always going to be
YOU!)



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Karen Cranston

@kcranstn

 Follow

@mtholder motivating git: You mostly collaborate with yourself, and me-from-two-months-ago never responds to email. @swcarpentry

4:23 PM - Aug 23, 2013



28



19



** It is embarrassing to me how often I forget not just details of experiments, but entire experiments. For example, for the manuscript I am working on now, I forgot that we had done an experiment to test for vertical transmission of the parasite. Fortunately, the undergrad who has been working on the project remembered and had it in his writeup!

<https://dynamicecology.wordpress.com/2015/02/18/the-biggest-benefit-of-my-shift-to-r-reproducibility>

<https://twitter.com/kcranstn/status/370914072511791104>

<https://GitHub.com/KirstieJane/ReproducibleResearch>
doi: <https://dx.doi.org/10.6084/m9.figshare.5454991>



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Asking for help: StackOverflow & MWEs

<http://stackoverflow.com>



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[https://mrcolley.com/2014/07/01/
talk-to-the-duck-debugging-and-resilience](https://mrcolley.com/2014/07/01/talk-to-the-duck-debugging-and-resilience)



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What if I can't share my code until I'm published?



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<https://education.github.com>



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This organization

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Pull requests

Issues

Marketplace

Explore



The
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Repositories 82

People 75

Teams 13

Projects 0

Search repositories...

Type: All

Language: All

New

2017-phd-students

Updated 15 minutes ago

common-crawl-readability Private

Scripts for processing common crawl web content through Mozilla readability.js

Python Updated 8 hours ago

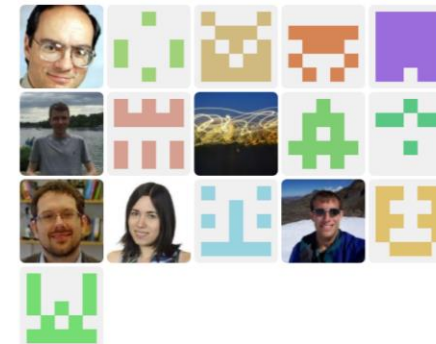
urban-dictionary Private

Python Updated 14 hours ago

Top languages

Python Jupyter Notebook HTML
TeX JavaScript

People 75




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Reproducible <> Open (and that's fine)



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Mozilla Open Leaders

Mentorship and Training on Working Open

Join a cohort of project leads fueling the Internet Health movement. Receive mentorship and training through the Mozilla Network in this 12-week online program on working open.

About the Program

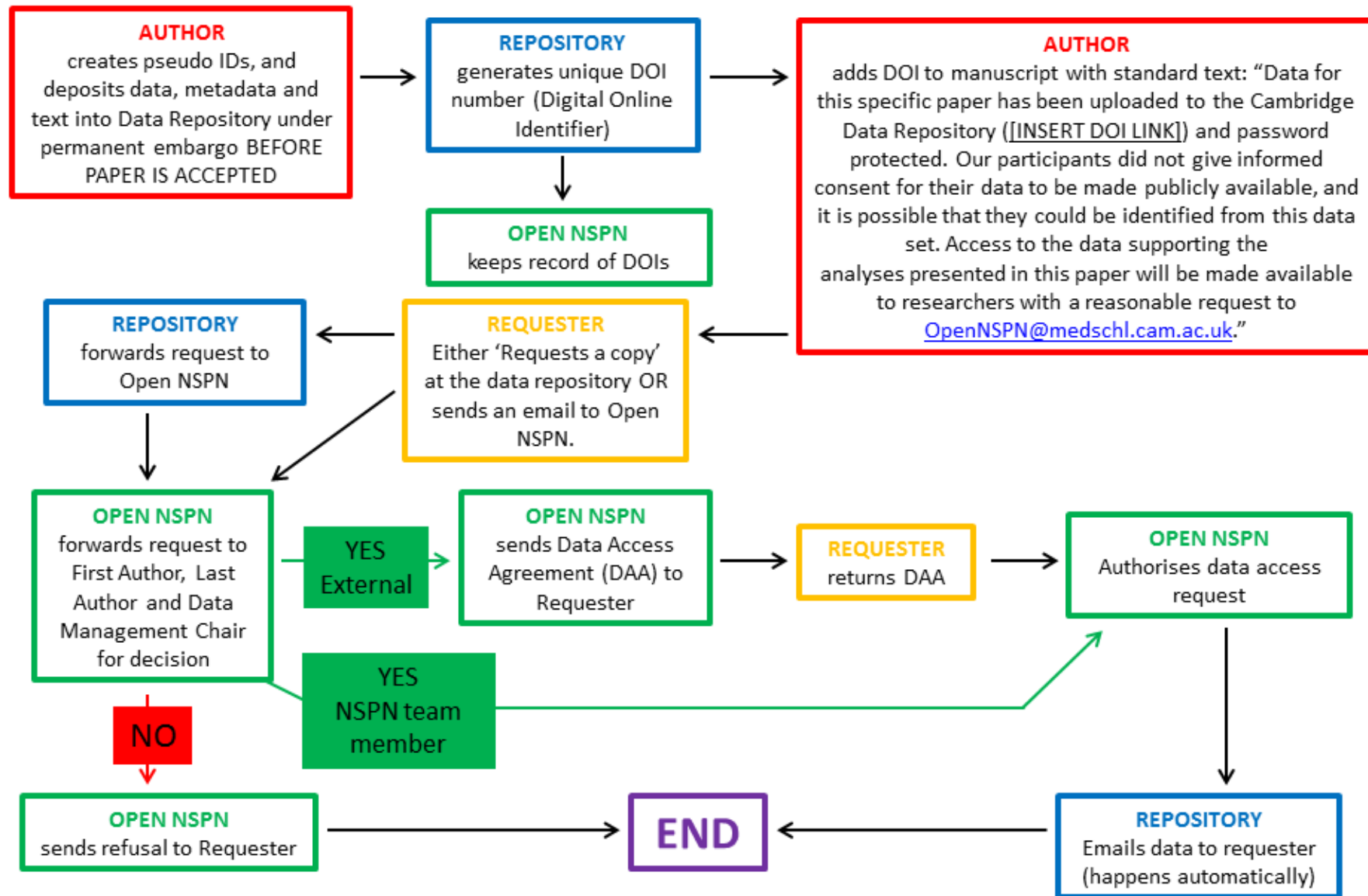
Our fourth cohort of Mozilla Open Leaders starts in September 2017! We're looking for Open Project Leaders to fuel the Internet Health movement by engaging more contributors in their work and co...

What if I can't (ever) share my data?



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doi: <https://dx.doi.org/10.6084/m9.figshare.5454991>





New Results

[Previous](#)[Next](#)**Adolescent Tuning Of Association Cortex In Human Structural Brain Networks**

František Váša, Jakob Seidlitz, Rafael Romero-Garcia, Kirstie J. Whitaker, Gideon Rosenthal, Petra E. Vértes, Maxwell Shinn, Aaron Alexander-Bloch, Peter Fonagy, Raymond J. Dolan, Peter B. Jones, Ian M. Goodyer, The NSPN Consortium, Olaf Sporns, Edward T. Bullmore

doi: <https://doi.org/10.1101/126920>

This article is a preprint and has not been peer-reviewed [what does this mean?].

Abstract[Info/History](#)[Metrics](#)[Supplementary material](#)[Preview PDF](#)**Abstract**

How does human brain organization change over the course of adolescence? Motivated by prior data on local cortical shrinkage and intracortical myelination, we predicted age-related changes in topological organisation of cortical structural networks. We estimated the structural correlation matrix from magnetic resonance imaging (MRI) measures of cortical thickness at 308 regions in a sample of N=297 healthy participants, aged 14-24 years (inclusive). We used

Posted September 15, 2017.

[Download PDF](#)[Share](#)[Email](#)[Citation Tools](#)[Tweet](#)[Like 0](#)[G+](#)**Subject Area****Neuroscience****Subject Areas****All Articles**[Animal Behavior and Cognition](#)[Biochemistry](#)

Váša et al, 2017



Availability of data and code

Data for this specific paper has been uploaded to the Cambridge Data Repository (<https://doi.org/10.17863/CAM.8856>) and password protected. Our participants did not give informed consent for their questionnaire measures to be made publicly available, and it is possible that they could be identified from this data set. Access to the data supporting the analyses presented in this paper will be made available to researchers with a reasonable request to NSPNdata@medschl.cam.ac.uk. The code used to conduct analyses is available from FV's github: https://github.com/frantisekvasa/structural_network_development (DOI: 10.5281/zenodo.528674).

Next ➞

prior data on local cortical shrinkage and intracortical myelination, we predicted age-related changes in topological organisation of cortical structural networks. We estimated the structural correlation matrix from magnetic resonance imaging (MRI) measures of cortical thickness at 308 regions in a sample of N=297 healthy participants, aged 14-24 years (inclusive). We used

All Articles

Animal Behavior and Cognition
Biochemistry



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Advanced search

Data supporting NSPN publication "Adolescent tuning of association cortex in human structural brain networks"

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Statistics



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- [str.net.dev.data.RData \(Unknown, 7Mb\)](#)
- [data-processing-and-description.docx \(Microsoft Word 2007, 106Kb\)](#)

Authors

Vasa, Frantisek

Citation

Vasa, F., Seidlitz, J., Romero Garcia, R., Whitaker, K. J., Rosenthal, G., Vertes, P. E., Shinn, M., et al. *Data supporting NSPN publication "Adolescent tuning of association cortex in human structural brain networks"* [Dataset]. <https://doi.org/10.17863/CAM.8856>

Description

There are two files supporting this publication. The first is an RData file containing all variables necessary to reproduce the main findings of the publication. The second is a Microsoft Word document describing 1) how the data was collected and processed and 2) all the variables stored in the RData file.

Software

Custom scripts written in R, available from Frantisek Vasa's github page: https://github.com/frantisekvasa/structural_network_development (DOI: 10.5281/zenodo.528674)

Keywords



Apollo Home / School of Clinical Medicine / Department of Psychiatry / NSPN (NeuroScience in Psychiatry Network)
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Keywords

Váša et al, 2017



Data supporting NSPN publication "Compulsivity and impulsivity are linked to distinct developmental trajectories of fronto-striatal myelination"

Ziegler, G; Hauser, TU; Moutoussis, M; Bullmore, ET; Goodyer, IM; Fonagy, P; Jones, PB et al.



Data supporting NSPN publication "The NSPN 2400 Cohort: a developmental sample supporting the Wellcome Trust NeuroScience in Psychiatry Network"

Kiddle, B; Inkster, B; Prabhu, G; Moutoussis, M; Whitaker, Kirstie Jane; Bullmore, ET; Dolan, RJ et al.



Data supporting NSPN publication 'Mutualistic and reasoning supports cognitive development in early adulthood'

Kievit, Rogier; Lindenberger, U; Goodyer, IM; Jones, Peter Briar et al.



Data supporting NSPN publication "Adolescent tuning of association cortex in human structural brain networks"

Vasa, Frantisek; Seidlitz, Jakob; Romero Garcia, Rafael; Whitaker, Kirstie Jane; Rosenthal, G; Vertes, Petra Eszter; Shinn, M et al.



Data supporting NSPN publication "Characterising the latent structure and organisation of self-reported thoughts, feelings and behaviours in adolescents and young adults"

St Clair, MC; Neufeld, S; Jones, Peter Brian; Fonagy, P; Bullmore, Edward Thomas; Dolan, RJ; Moutoussis, M et al.

> Keywords

> Type

Statistics

Data processing
Microsoft Word 2007

Authors

Vasa, Frantisek
Seidlitz, Jakob

keywords


network)

Search Apollo






Advanced search

n "Adolescent tuning of association
networks"

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frantisekvasa / structural_network_development

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Analysis code for manuscript "Adolescent tuning of association cortex in human structural brain networks"

8 commits1 branch1 release1 contributorMIT

Branch: masterNew pull request

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rp.main.R	initial upload of r code	6 months ago
struct.net.dev.R	Update struct.net.dev.R	13 days ago

README.md

Sliding window analysis of brain network development

The code in this repository reproduces most analyses and figures (with the exception of certain supplementary analyses) conducted in the manuscript "Adolescent tuning of association cortex in human structural brain networks" by František Váša et al.

For details regarding the motivation behind analyses and the interpretation of results, see the manuscript.

 @kirstie_j
lub.com/KirstieJane/ReproducibleResearch
://dx.doi.org/10.6084/m

Váša et al, 2017

Analysis code for manuscript "Adolescent tuning of association cortex in human structural brain networks"

8 commits

1 branch

Branch: master

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Sliding window analysis of bra

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For details regarding the motivation behind analyses and the interpretation of results, see the manuscript.

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April 11, 2017

Software Open Access

frantisekvasa/structural_network_development: Initial release

František Váša

Initial release of the code supporting the manuscript "Adolescent tuning of association cortex in human structural brain networks" by František Váša et al.

Preview

structural_network_development-v0.1.zip

frantisekvasa-structural_network_development-fcf901d

- [LICENSE](#) 1.1 kB
- [README.md](#) 422 Bytes
- [rp.main.R](#) 681 Bytes
- [struct.net.dev.R](#) 103.3 kB

Available in

GitHub

Publication date:

April 11, 2017

DOI:

DOI [10.5281/zenodo.528674](#)

Related identifiers:

Supplement to:

https://github.com/frantisekvasa/structural_network_development/tree/v0.1

License (for files):

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Version Control



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A STORY TOLD IN FILE NAMES:

Location: C:\user\research\data

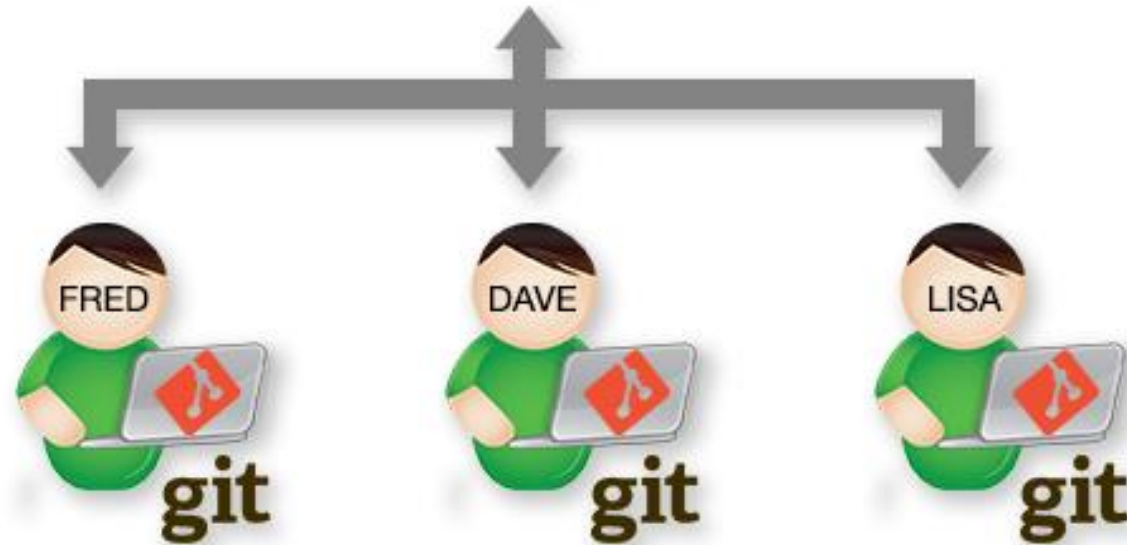
Filename	Date Modified	Size	Type
data_2010.05.28_test.dat	3:37 PM 5/28/2010	420 KB	DAT file
data_2010.05.28_re-test.dat	4:29 PM 5/28/2010	421 KB	DAT file
data_2010.05.28_re-re-test.dat	5:43 PM 5/28/2010	420 KB	DAT file
data_2010.05.28_calibrate.dat	7:17 PM 5/28/2010	1,256 KB	DAT file
data_2010.05.28_huh??.dat	7:20 PM 5/28/2010	30 KB	DAT file
data_2010.05.28_WTF.dat	9:58 PM 5/28/2010	30 KB	DAT file
data_2010.05.29_aaarrgh.dat	12:37 AM 5/29/2010	30 KB	DAT file
data_2010.05.29_#\$@*&!!.dat	2:40 AM 5/29/2010	0 KB	DAT file
data_2010.05.29_crap.dat	3:22 AM 5/29/2010	437 KB	DAT file
data_2010.05.29_notbad.dat	4:16 AM 5/29/2010	670 KB	DAT file
data_2010.05.29_woohoo!!.dat	4:47 AM 5/29/2010	1,349 KB	DAT file
data_2010.05.29_USETHISONE.dat	5:08 AM 5/29/2010	2,894 KB	DAT file
analysis_graphs.xls	7:13 AM 5/29/2010	455 KB	XLS file
ThesisOutline!.doc	7:26 AM 5/29/2010	38 KB	DOC file
Notes_Meeting_with_ProfSmith.txt	11:38 AM 5/29/2010	1,673 KB	TXT file
JUNK...	2:45 PM 5/29/2010		Folder
data_2010.05.30_startingover.dat	8:37 AM 5/30/2010	420 KB	DAT file

Type: Ph.D Thesis Modified: too many times Copyright: Jorge Cham www.phdcomics.com



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Submit your first pull request!

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<https://www.mozillascience.org>


<http://software-carpentry.org>

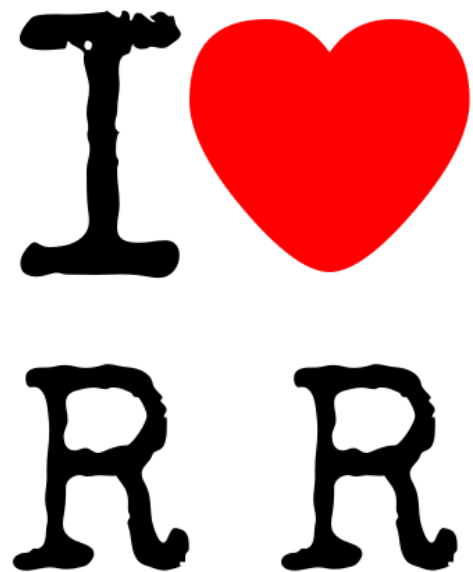
<http://data-carpentry.org>

<https://www.coursera.org/specializations/jhu-data-science>

<https://www.coursera.org/learn/python/home/info>



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Thank you!

 alan-turing-institute/2017-phd-students

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Python vs R

(vs Matlab vs STATA etc...)



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RStudio

File Edit Code View Plots Session Build Debug Tools Help

Go to file/function

Project: (None)

Environment History

Files Plots Packages Help Viewer

The R Language Find in Topic

Statistical Data Analysis

Manuals

Reference

Console

```
> mean(c(1,2,5))
[1] 2.666667
```

198 observations of 8 variables

	column1	column2	column3	column4	column5
1	training	1	right	leftresponse	incompati
2	training	2	right	rightresponse	compatibl
3	training	2	right	rightresponse	compatibl
4	training	0	left	leftresponse	compatibl
5	training	1	right	leftresponse	incompati
6	training	1	right	leftresponse	incompati
7	training	2	right	rightresponse	compatibl
8	block1	1	right	leftresponse	incompati
9	block1	2	right	rightresponse	compatibl

An Introduction to R
Writing R Extensions
R Data Import/Export

The R Language Definition
R Installation and Administration
R Internals

Packages
Search Engine & Keywords

RStudio

File Edit Code View Project Workspace Plots Tools Help

Go to file/function

Project: (None)

Workspace History

Data

diamonds 53940 obs. of 10 variables

Values

aveSize 0.7979
clarity character[8]
p ggplot[8]

Functions

format.plot(plot, size)

Files Plots Packages Help

Zoom Export Clear All

Diamond Pricing

Price

Carat

Clarity

I1
SI2
SI1
VS2
VS1
VVS2
VVS1
IF

15:1 (Top Level) R Script

```
1 library(ggplot2)
2 source("plots/formatPlot.R")
3
4 View(diamonds)
5 summary(diamonds)
6
7 summary(diamonds$price)
8 aveSize <- round(mean(diamonds$carat), 4)
9 clarity <- levels(diamonds$clarity)
10
11 p <- qplot(carat, price,
12            data=diamonds, color=clarity,
13            xlab="Carat", ylab="Price",
14            main="Diamond Pricing")
15
```

Console

```
Min. x: 0.000 Min. y: 0.000 Min. z: 0.000
1st Qu.: 4.710 1st Qu.: 4.720 1st Qu.: 2.910
Median: 5.700 Median: 5.710 Median: 3.530
Mean: 5.731 Mean: 5.735 Mean: 3.539
3rd Qu.: 6.540 3rd Qu.: 6.540 3rd Qu.: 4.040
Max.: 10.740 Max.: 58.900 Max.: 31.800
> summary(diamonds$price)
Min. 1st Qu. Median Mean 3rd Qu. Max.
326 950 2401 3933 5324 18820
> aveSize <- round(mean(diamonds$carat), 4)
> clarity <- levels(diamonds$clarity)
> p <- qplot(carat, price,
+            data=diamonds, color=clarity,
+            xlab="Carat", ylab="Price",
+            main="Diamond Pricing")
> format.plot(p, size=24)
>
```



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doi: <https://dx.doi.org/10.6084/m9.figshare.5454991>

OVERVIEW

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GALLERY

REFERENCE

DEPLOY

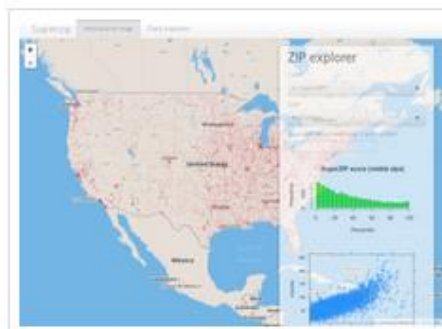
HELP

Gallery

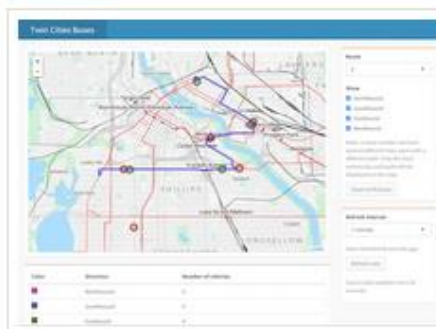
This gallery contains useful examples to learn from. Visit the [Shiny User Showcase](#) to see an inspiring set of sophisticated apps.

Interactive visualizations

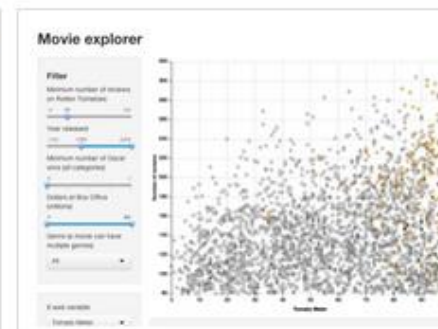
Shiny is designed for fully interactive visualization, using JavaScript libraries like [d3](#), [Leaflet](#), and [Google Charts](#).



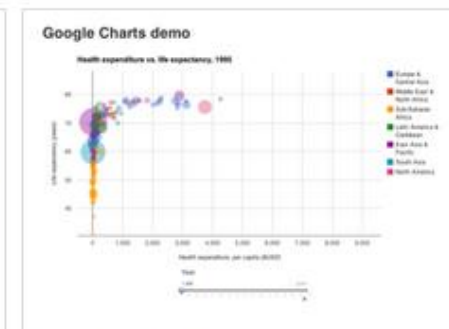
SuperZip example



Bus dashboard



Movie explorer



Google Charts

Shiny gallery



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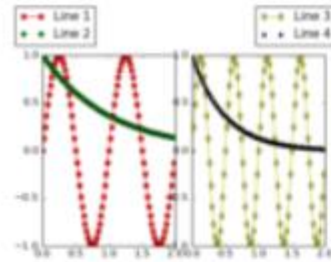


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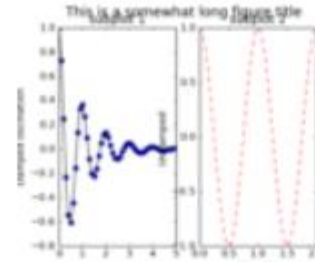
<https://GitHub.com/KirstieJane/ReproducibleResearch>
doi: <https://dx.doi.org/10.6084/m9.figshare.5454991>

Matplotlib gallery

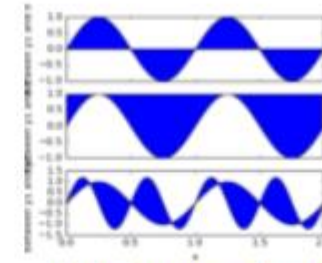
Click each
example to see
source code



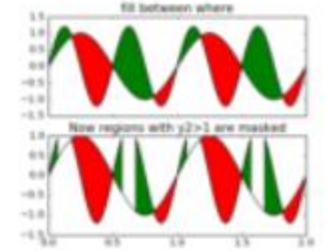
figlegend_demo



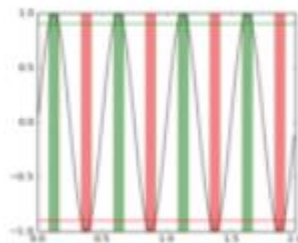
figure_title



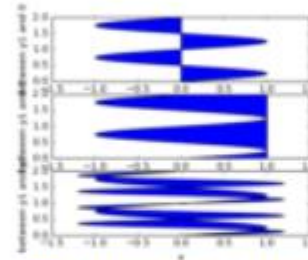
fill_between_demo



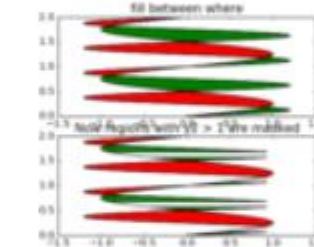
fill_between_demo



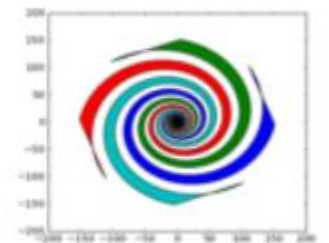
fill_between_demo



fill_betweenx_demo



fill_betweenx_demo



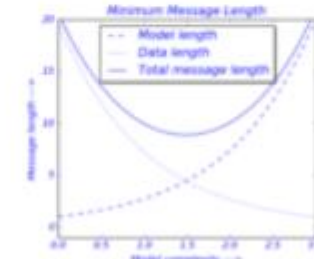
fill_spiral



finance_demo



finance_work2



findobj_demo

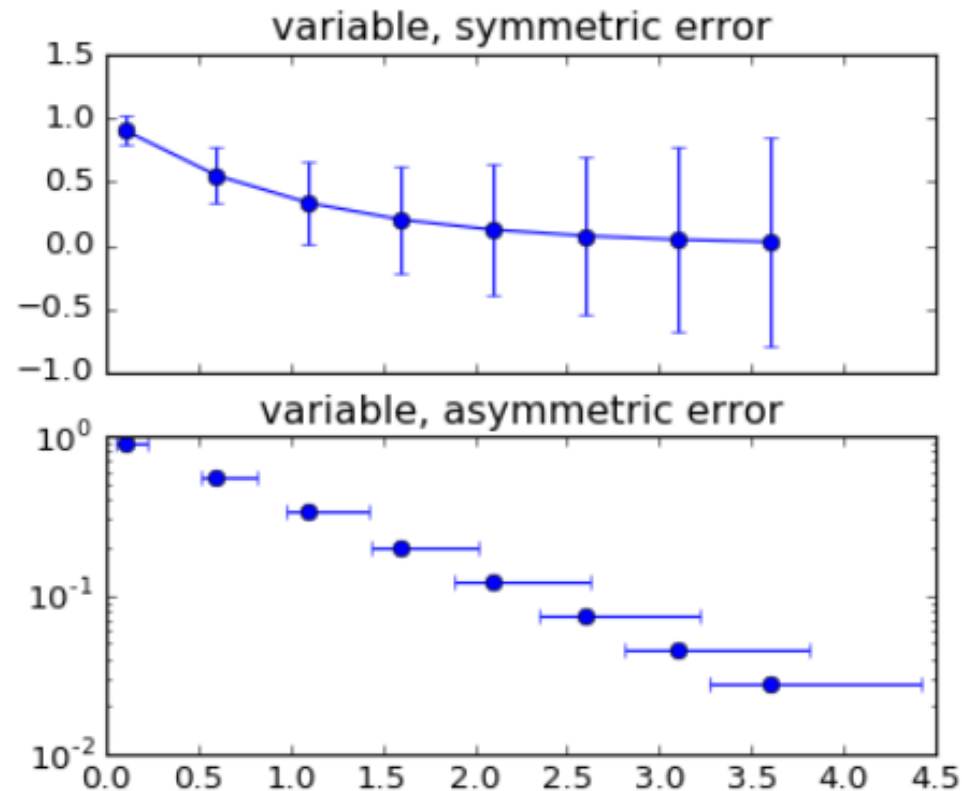


fonts_demo



statistics example code: errorbar_demo_features.py

(Source code, png, hires.png, pdf)



```
"""
Demo of errorbar function with different ways of specifying error bars.

Errors can be specified as a constant value (as shown in `errorbar_demo.py`),
or as demonstrated in this example, they can be specified by an N x 1 or 2 x N,
where N is the number of data points.

N x 1:
    Error varies for each point, but the error values are symmetric (i.e. the
    lower and upper values are equal).

2 x N:
    Error varies for each point, and the lower and upper limits (in that order)
    are different (asymmetric case)

In addition, this example demonstrates how to use Log scale with errorbar.
"""
import numpy as np
import matplotlib.pyplot as plt

# example data
x = np.arange(0.1, 4, 0.5)
y = np.exp(-x)
# example error bar values that vary with x-position
error = 0.1 + 0.2 * x
# error bar values w/ different +/- errors
lower_error = 0.4 * error
upper_error = error
asymmetric_error = [lower_error, upper_error]

fig, (ax0, ax1) = plt.subplots(nrows=2, sharex=True)
ax0.errorbar(x, y, yerr=error, fmt='o')
ax0.set_title('variable, symmetric error')

ax1.errorbar(x, y, xerr=asymmetric_error, fmt='o')
ax1.set_title('variable, asymmetric error')
ax1.set_yscale('log')
plt.show()
```



http://matplotlib.org/examples/statistics/errorbar_demo_features.html

<https://GitHub.com/KirstieJane/ReproducibleResearch>
doi: <https://dx.doi.org/10.6084/m9.figshare.5454991>

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Jupyter Notebook



<http://jupyter.org>



 @kirstie_j

<https://GitHub.com/KirstieJane/ReproducibleResearch>
doi: <https://dx.doi.org/10.6084/m9.figshare.5454991>

SIGNAL PROCESSING WITH GW150914 OPEN DATA

Welcome! This ipython notebook (or associated python script GW150914_tutorial.py) will go through some typical signal processing tasks on strain time-series data associated with the LIGO GW150914 data release from the LIGO Open Science Center (LOSC):

- <https://losc.ligo.org/events/GW150914/>
- View the tutorial as a web page - https://losc.ligo.org/s/events/GW150914/GW150914_tutorial.html
- Download the tutorial as a python script - https://losc.ligo.org/s/events/GW150914/GW150914_tutorial.py
- Download the tutorial as iPython Notebook - https://losc.ligo.org/s/events/GW150914/GW150914_tutorial.ipynb

To begin, download the ipython notebook, readligo.py, and the data files listed below. You can then run the python script GW150914_tutorial.py. You will need the python packages:

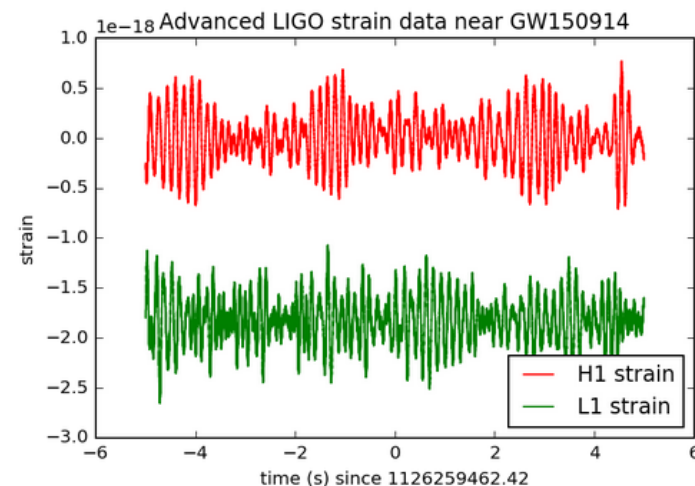
On Windows, or if you prefer, you can use a python development environment such as Anaconda (<https://www.anaconda.com/>) or Enthought Canopy (<https://www.enthought.com/products/canopy/>)


Questions, comments, suggestions, corrections, etc: email losc@ligo.org

v20160208b

```
In [6]: # plot +/- 5 seconds around the event:
tevent = 1126259462.422      # Mon Sep 14 09:50:45 GMT 2015
deltat = 5.                  # seconds around the event
# index into the strain time series for this time interval:
indxt = np.where((time_H1 >= tevent-deltat) & (time_H1 < tevent+deltat))

plt.figure()
plt.plot(time_H1[indxt]-tevent, strain_H1[indxt], 'r', label='H1 strain')
plt.plot(time_L1[indxt]-tevent, strain_L1[indxt], 'g', label='L1 strain')
plt.xlabel('time (s) since ' + str(tevent))
plt.ylabel('strain')
plt.legend(loc='lower right')
plt.title('Advanced LIGO strain data near GW150914')
plt.savefig('GW150914_strain.png')
```




Observation of Gravitational Waves from a Binary Black Hole Merger

B. P. Abbott *et al.**
(LIGO Scientific Collaboration and Virgo Collaboration)
(Received 21 January 2016; published 11 February 2016)

