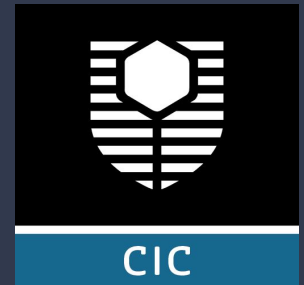


GRASP - Tools for Data Visualisation

Python and R

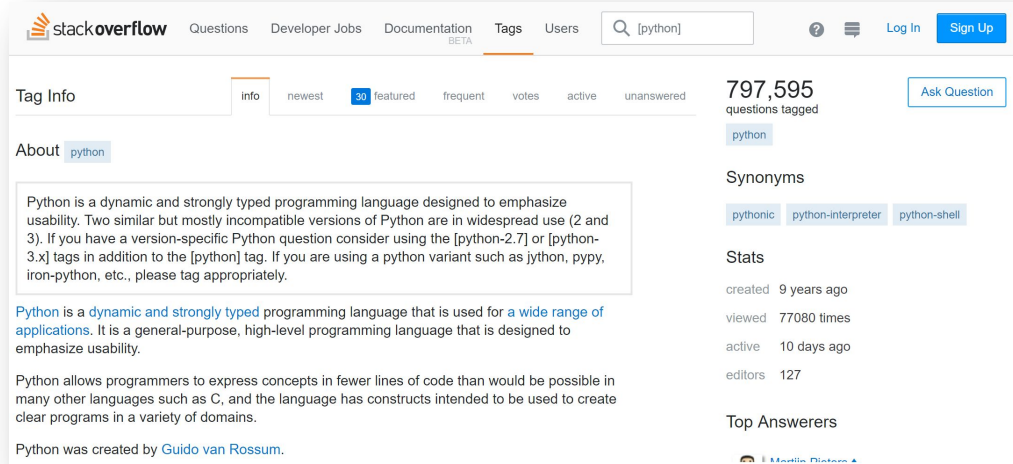
Dr. Rebecca Lange
Curtin Institute for Computation



Why use R
or Python?



Python and R are supported by a large open source community



The screenshot shows the Stack Overflow page for the Python tag. The header includes the Stack Overflow logo, navigation links (Questions, Developer Jobs, Documentation, Tags, Users), a search bar with "[python]", and user options (Log In, Sign Up). The tag page features a "Tag Info" section with tabs for info, newest, featured (30), frequent, votes, active, and unanswered. The "About python" section describes Python as a dynamic and strongly typed programming language. To the right, statistics show 797,595 questions tagged, synonyms (pythonic, python-interpreter, python-shell), and stats (created 9 years ago, viewed 77080 times, active 10 days ago, editors 127). Top Answerers are listed at the bottom.

stackoverflow Questions Developer Jobs Documentation BETA Tags Users [python] ? Log In Sign Up

Tag Info info newest 30 featured frequent votes active unanswered

About python

Python is a dynamic and strongly typed programming language designed to emphasize usability. Two similar but mostly incompatible versions of Python are in widespread use (2 and 3). If you have a version-specific Python question consider using the [python-2.7] or [python-3.x] tags in addition to the [python] tag. If you are using a python variant such as jython, pypy, iron-python, etc., please tag appropriately.

Python is a [dynamic and strongly typed](#) programming language that is used for [a wide range of applications](#). It is a general-purpose, high-level programming language that is designed to emphasize usability.

Python allows programmers to express concepts in fewer lines of code than would be possible in many other languages such as C, and the language has constructs intended to be used to create clear programs in a variety of domains.

Python was created by [Guido van Rossum](#).

797,595 questions tagged

python

Synonyms

pythonic python-interpreter python-shell

Stats

created 9 years ago

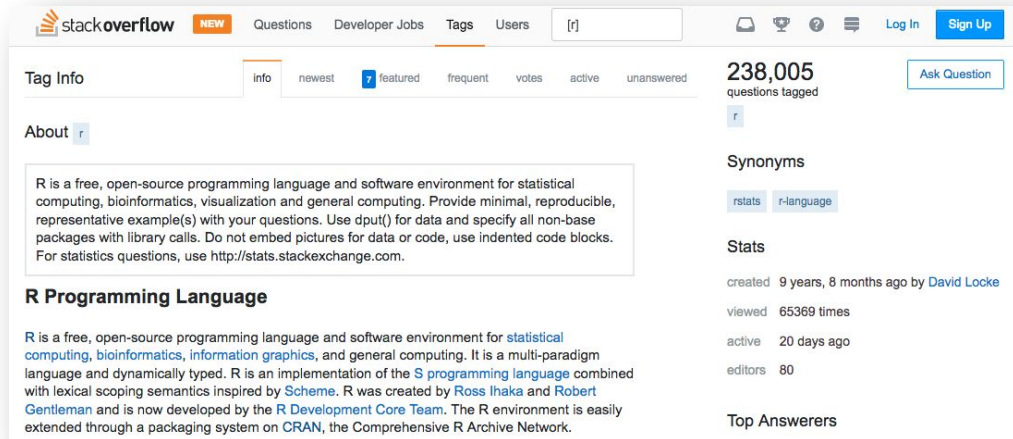
viewed 77080 times

active 10 days ago

editors 127

Top Answerers

[Martin Dorey](#)



The screenshot shows the Stack Overflow page for the R tag. The header includes the Stack Overflow logo, navigation links (Questions, Developer Jobs, Tags, Users), a search bar with "[r]", and user options (Log In, Sign Up). The tag page features a "Tag Info" section with tabs for info, newest, featured (7), frequent, votes, active, and unanswered. The "About r" section describes R as a free, open-source programming language. To the right, statistics show 238,005 questions tagged, synonyms (rstats, r-language), and stats (created 9 years, 8 months ago by David Locke, viewed 65369 times, active 20 days ago, editors 80). Top Answerers are listed at the bottom.

stackoverflow NEW Questions Developer Jobs Tags Users [r] ? Log In Sign Up

Tag Info info newest 7 featured frequent votes active unanswered

About r

R is a free, open-source programming language and software environment for statistical computing, bioinformatics, visualization and general computing. Provide minimal, reproducible, representative example(s) with your questions. Use dput() for data and specify all non-base packages with library calls. Do not embed pictures for data or code, use indented code blocks. For statistics questions, use <http://stats.stackexchange.com>.

R Programming Language

R is a free, open-source programming language and software environment for [statistical computing](#), [bioinformatics](#), [information graphics](#), and general computing. It is a multi-paradigm language and dynamically typed. R is an implementation of the [S programming language](#) combined with lexical scoping semantics inspired by [Scheme](#). R was created by [Ross Ihaka](#) and [Robert Gentleman](#) and is now developed by the [R Development Core Team](#). The R environment is easily extended through a packaging system on [CRAN](#), the Comprehensive R Archive Network.

238,005 questions tagged

r

Synonyms

rstats r-language

Stats

created 9 years, 8 months ago by [David Locke](#)

viewed 65369 times

active 20 days ago

editors 80

Top Answerers

Python and R are free

- No paywalls
 - No subscription costs
 - Open source software is free (as in freedom)
- ➡ everyone can afford their vegetables this week!

The code is readable

JAVA

```
public class Main {  
    public static void main(String[] args) {  
        System.out.println("hello world");  
    }  
}
```

PYTHON

```
print('hello world')
```

Analysis is scalable

```
fig = plt.figure(figsize=(20, 30))
markersize = 1
markertype = ',' # pixel
markercolor = '#325CA9' # blue
markeralpha = .8 # a bit of transparency

m = Basemap(
    projection='mill', lon_0=bbox['lon'], lat_0=bbox['lat'],
    llcrnrlon=bbox['ll_lon'], llcrnrlat=bbox['ll_lat'],
    urcrnrlon=bbox['ur_lon'], urcrnrlat=bbox['ur_lat'])

# Avoid border around map.
m.drawmapboundary(fill_color='ffffff', linewidth=0)

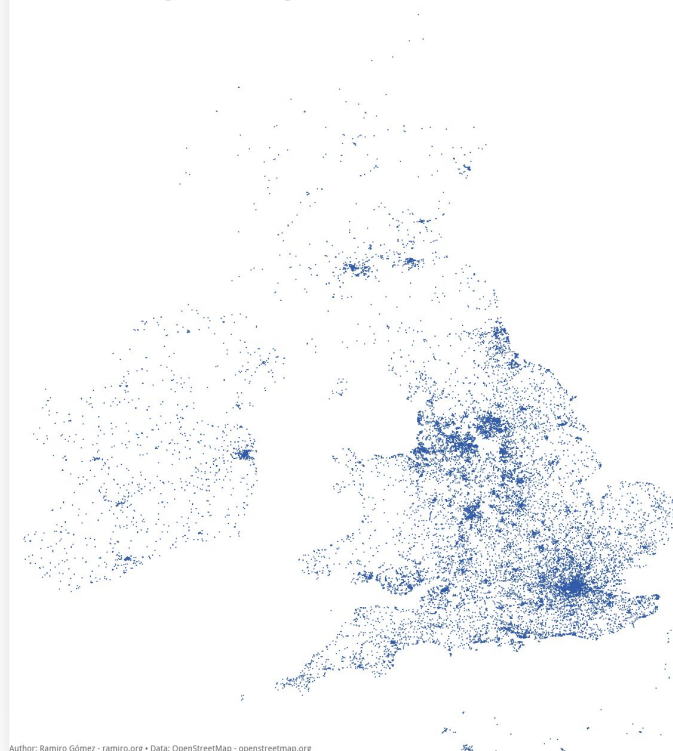
# Convert locations to x/y coordinates and plot them as dots.
lons, lats = zip(*locations)
x, y = m(lons, lats)
m.scatter(x, y, markersize=marker, color=markercolor, alpha=markeralpha)

# Set the map title.
plt.annotate('Britain & Ireland\ndrawn from pubs',
            xy=(0, .87),
            size=120,
            xycoords='axes fraction',
            color='#888888',
            family='Gloria')

# Set the map footer.
plt.annotate('Author: Ramiro Gómez - ramiro.org • Data: OpenStreetMap - openstreetmap.org',
            xy=(0, 0),
            size=14,
            xycoords='axes fraction',
            color='#666666',
            family='Droid Sans')

plt.savefig('img/britain-ireland-drawn-from-pubs.png', bbox_inches='tight')
```

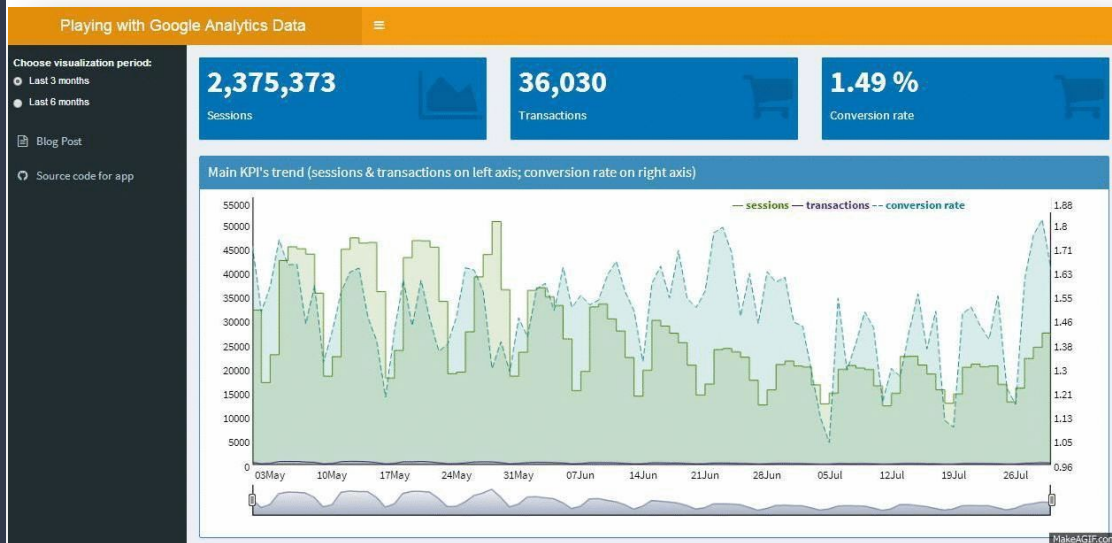
Britain & Ireland
drawn from pubs



Author: Ramiro Gómez - ramiro.org • Data: OpenStreetMap - openstreetmap.org

<http://ramiro.org/notebook/mapping-pubs/>

Results are shareable



Visualisation examples



Visualisation Examples

The **type of variable** determines the **kind of visual**, e.g.:

- Diagrams
 - barcharts, histograms, boxplots
- Plots
 - simple plots, trend plots, scatter plots
- Figures
 - photos, drawing, schematic

Visualisation Examples

Live coding visualisation examples

Python (seaborn) - https://github.com/CurtinIC/GRASP_workshop/blob/master/Python%20Vis%20Examples.ipynb

R (ggplot2) - https://github.com/CurtinIC/GRASP_workshop/blob/master/R%20Vis%20Examples.ipynb

Interactive plots examples

Python (Bokeh) - <https://demo.bokehplots.com/apps/gapminder>

R (ggplot2 + googlevis) - http://remi-daigle.github.io/2016-04-15-UCSB/viz/#14_interactive:_motion_plot

3D plotting examples

Python (matplotlib) - <https://jakevdp.github.io/PythonDataScienceHandbook/04.12-three-dimensional-plotting.html>

R (plotly) - <https://plot.ly/r/3d-scatter-plots/>

Support from the CIC!



- Hacky Hour
 - Community support for computing, programming and data analysis
 - Every Wednesday 3pm-4pm, Library Makerspace
 - Follow @CUHackyHour
- Carpentries Workshops
 - teach foundational computational, coding, and data science skills to researchers
 - Workshops planned for semester breaks -> check our webpage



THE
CARPENTRIES



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