

Vision Zero Hackathon



Gene Leynes & Siddharth Shah
November 16, 2019

THE VISION OF VISION ZERO



Vision Zero is a philosophy

- Traffic crashes are preventable
- Traffic crashes are not accidents
- Traffic safety is a shared responsibility
- Even one life lost is unacceptable

THE VISION OF VISION ZERO (CONT)



Saving lives doesn't have to be expensive; Vision Zero is a very technology forward way of thinking

SOFTWARE



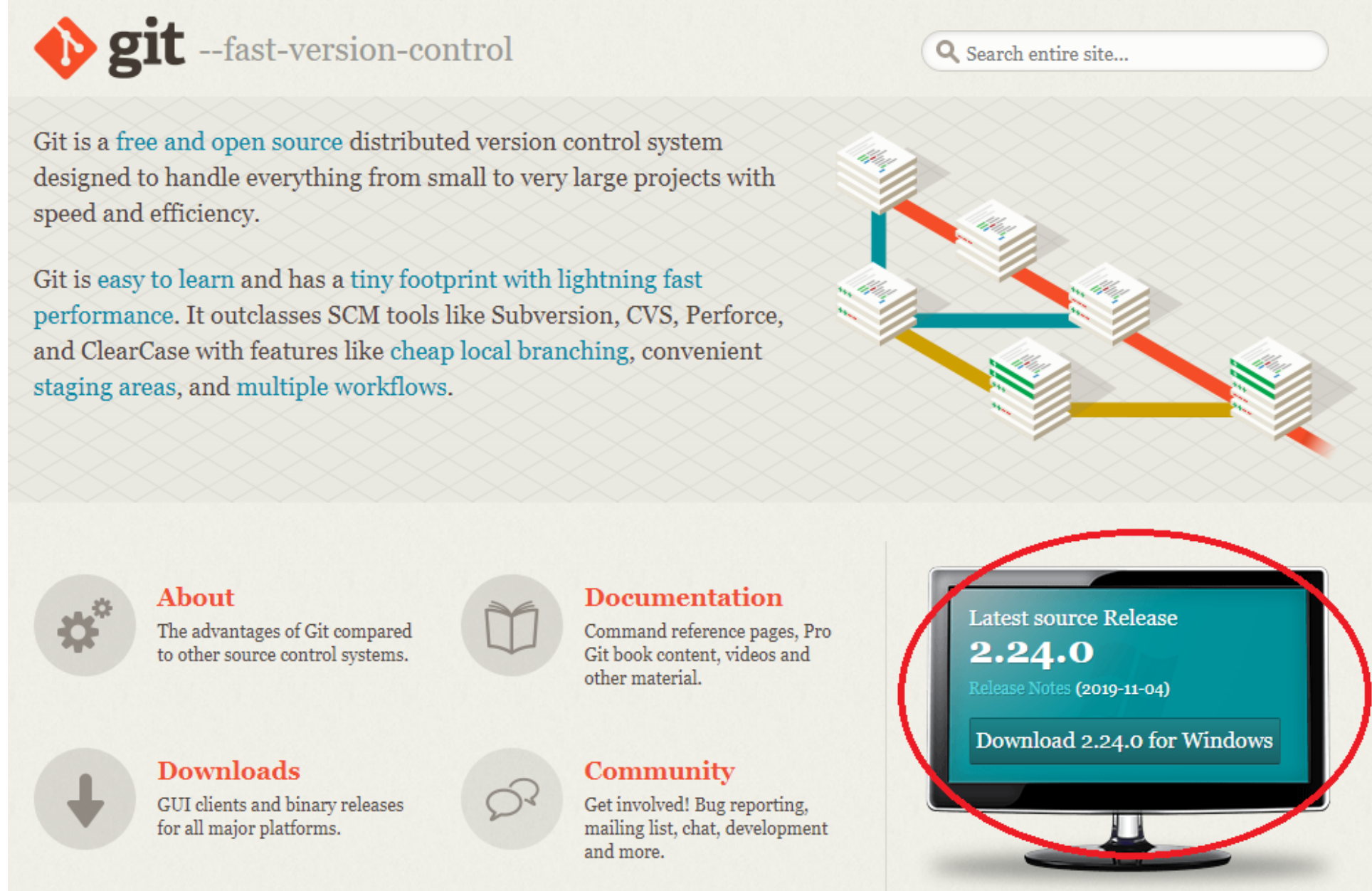
- Git (vs GitHub)
- Markdown
- RStudio
- R

Packages

- shiny
- leaflet
- data.table

Git bash for Windows

- Git
- Command line
- Linux commands



The screenshot shows the Git website homepage. At the top left is the Git logo (an orange diamond with a white branching diagram) followed by the text "git --fast-version-control". To the right is a search bar with the placeholder text "Search entire site...". Below the header, there are two paragraphs of text. The first paragraph states: "Git is a **free and open source** distributed version control system designed to handle everything from small to very large projects with speed and efficiency." The second paragraph states: "Git is **easy to learn** and has a **tiny footprint with lightning fast performance**. It outclasses SCM tools like Subversion, CVS, Perforce, and ClearCase with features like **cheap local branching**, convenient **staging areas**, and **multiple workflows**." To the right of this text is a diagram showing a sequence of Git repositories (represented as stacks of papers) connected by colored lines (red, blue, yellow) illustrating branching and merging. Below the text and diagram, there are four circular icons with corresponding text: a gear icon for "About" (The advantages of Git compared to other source control systems.), an open book icon for "Documentation" (Command reference pages, Pro Git book content, videos and other material.), a downward arrow icon for "Downloads" (GUI clients and binary releases for all major platforms.), and a speech bubble icon for "Community" (Get involved! Bug reporting, mailing list, chat, development and more.). On the right side of the page, there is a monitor displaying the "Latest source Release 2.24.0" with the date "Release Notes (2019-11-04)" and a button that says "Download 2.24.0 for Windows". This monitor area is circled in red.

git --fast-version-control

Search entire site...

Git is a **free and open source** distributed version control system designed to handle everything from small to very large projects with speed and efficiency.

Git is **easy to learn** and has a **tiny footprint with lightning fast performance**. It outclasses SCM tools like Subversion, CVS, Perforce, and ClearCase with features like **cheap local branching**, convenient **staging areas**, and **multiple workflows**.

About
The advantages of Git compared to other source control systems.

Documentation
Command reference pages, Pro Git book content, videos and other material.

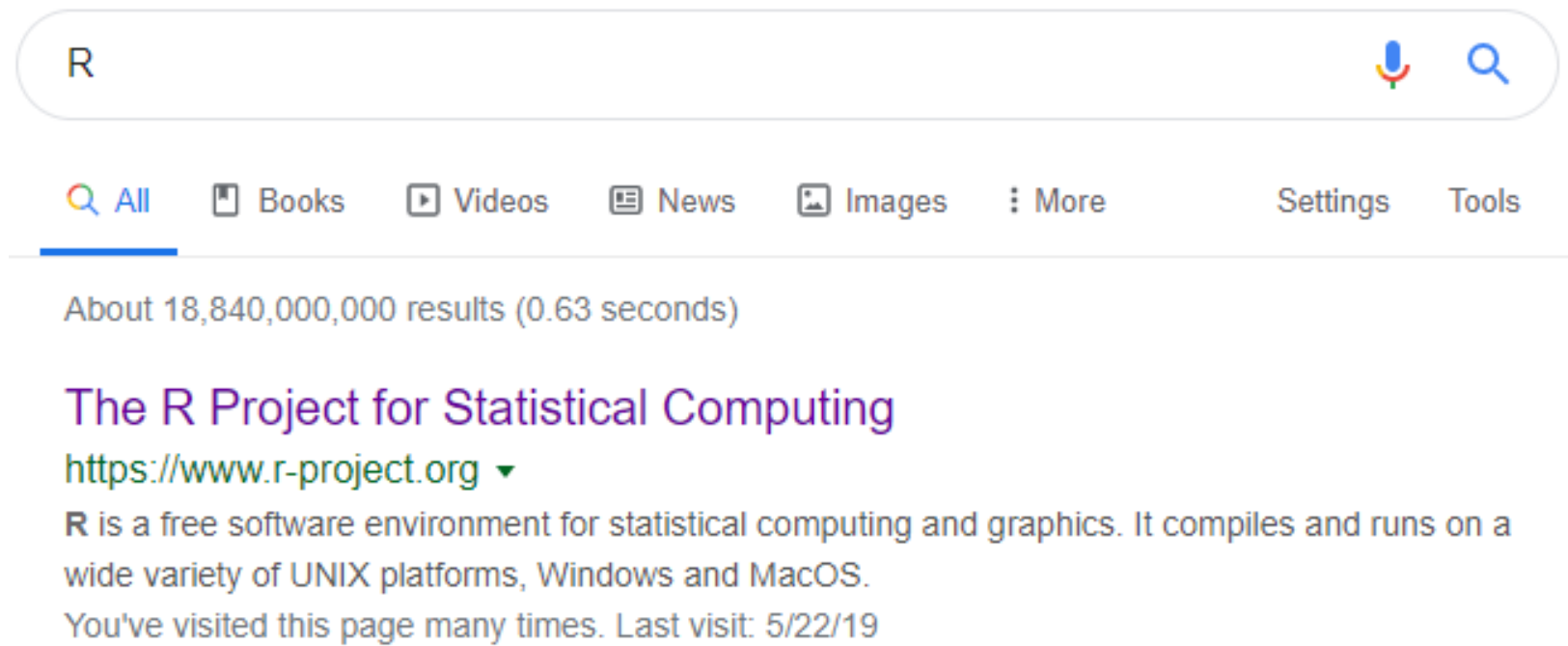
Downloads
GUI clients and binary releases for all major platforms.

Community
Get involved! Bug reporting, mailing list, chat, development and more.

Latest source Release
2.24.0
Release Notes (2019-11-04)
Download 2.24.0 for Windows

R

1. Search for “R”
2. Click “Download R”
3. Choose mirror
4. Choose OS
5. Choose “base”
6. Click on final
“Download” or “.pkg”
link



R

1. Search for “R”
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“Download” or “.pkg”
link



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Download

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R Project

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[Get Involved: Mailing Lists](#)

[Developer Pages](#)

[R Blog](#)

R Foundation

[Foundation](#)

The R Project for Statistical Computing

Getting Started

R is a free software environment for statistical computing and graphics. It compiles and runs on a wide variety of UNIX platforms, Windows and MacOS. To **download R**, please choose your preferred CRAN mirror.

If you have questions about R like how to download and install the software, or what the license terms are, please read our [answers to frequently asked questions](#) before you send an email.

News

- **R version 3.6.1 (Action of the Toes)** has been released on 2019-07-05.
- useR! 2020 will take place in St. Louis, Missouri, USA.
- **R version 3.5.3 (Great Truth)** has been released on 2019-03-11.
- The R Foundation Conference Committee has released a [call for proposals](#) to host useR! 2020 in North America.
- You can now support the R Foundation with a renewable subscription as a [supporting member](#)
- The R Foundation has been awarded the Personality/Organization of the year 2018 award by the professional association of German market and social researchers.

R

1. Search for “R”
2. Click “Download R”
3. Choose mirror
4. Choose OS
5. Choose “base”
6. Click on final
“Download” or “.pkg”
link

CRAN Mirrors

The Comprehensive R Archive Network is available at the following URLs, please choose a location close to you. Some statistics on the status of the mirrors can be found here: [main page](#), [windows release](#), [windows old release](#).

If you want to host a new mirror at your institution, please have a look at the [CRAN Mirror HOWTO](#).

0-Cloud

<https://cloud.r-project.org/>

Automatic redirection to servers worldwide, currently sponsored by Rstudio

Algeria

<https://cran.usthb.dz/>

University of Science and Technology Houari Boumediene

Argentina

<http://mirror.fcaglp.unlp.edu.ar/CRAN/>

Universidad Nacional de La Plata

Australia

<https://cran.csiro.au/>

CSIRO

<https://mirror.aarnet.edu.au/pub/CRAN/>

AARNET

<https://cran.ms.unimelb.edu.au/>

School of Mathematics and Statistics, University of Melbourne

<https://cran.curtin.edu.au/>

Curtin University of Technology

Austria

<https://cran.wu.ac.at/>

Wirtschaftsuniversität Wien

Belgium

<https://www.freeststatistics.org/cran/>

Patrick Wessa

<https://lib.ugent.be/CRAN/>

Ghent University Library

R

1. Search for “R”
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link



CRAN
[Mirrors](#)
[What's new?](#)
[Task Views](#)
[Search](#)

About R
[R Homepage](#)
[The R Journal](#)

Software
[R Sources](#)
[R Binaries](#)
[Packages](#)
[Other](#)

Documentation
[Manuals](#)
[FAQs](#)
[Contributed](#)

The Comprehensive R Archive Network

Download and Install R

Precompiled binary distributions of the base system and contributed packages, **Windows and Mac** users most likely want one of these versions of R:

- [Download R for Linux](#)
- [Download R for \(Mac\) OS X](#)
- [Download R for Windows](#)

R is part of many Linux distributions, you should check with your Linux package management system in addition to the link above.

Source Code for all Platforms

Windows and Mac users most likely want to download the precompiled binaries listed in the upper box, not the source code. The sources have to be compiled before you can use them. If you do not know what this means, you probably do not want to do it!

- The latest release (2019-07-05, Action of the Toes) [R-3.6.1.tar.gz](#), read [what's new](#) in the latest version.
- Sources of [R alpha and beta releases](#) (daily snapshots, created only in time periods before a planned release).
- Daily snapshots of current patched and development versions are [available here](#). Please read about [new features and bug fixes](#) before filing corresponding feature requests or bug reports.
- Source code of older versions of R is [available here](#).
- Contributed extension [packages](#)

Questions About R

- If you have questions about R like how to download and install the software, or what the license terms are, please read our [answers to frequently asked questions](#) before you send an email.



R

1. Search for “R”
2. Click “Download R”
3. Choose mirror
4. Choose OS
5. Choose “base”
6. Click on final

“Download” or “.pkg”

link

On a Windows here is the installer:

R-3.6.1 for Windows (32/64 bit)

[Download R 3.6.1 for Windows](#) (81 megabytes, 32/64 bit)

[Installation and other instructions](#)

[New features in this version](#)

If you want to double-check that the package you have downloaded matches the package distributed by CRAN, you can compare the [md5sum](#) of the .exe to the [fingerprint](#) on the master server. You will need a version of md5sum for windows: both [graphical](#) and [command line versions](#) are available.

On a Mac, download the .pkg here:

Latest release:

[R-3.6.1.pkg](#)

MD5-hash: 279e6662103dfe6a625b4573143cb995
SHA1-hash: 4e932f8e5013870d2a9179b54eae277f41657b0
(ca. 76MB)

R 3.6.1 binary for OS X 10.11 (El Capitan) and higher, signed package. Contains R 3.6.1 framework, R.app GUI 1.70 in 64-bit for Intel Macs, Tcl/Tk 8.6.6 X11 libraries and Texinfo 5.2. The latter two components are optional and can be omitted when choosing "custom install", they are only needed if you want to use the tcltk R package or build package documentation from sources.

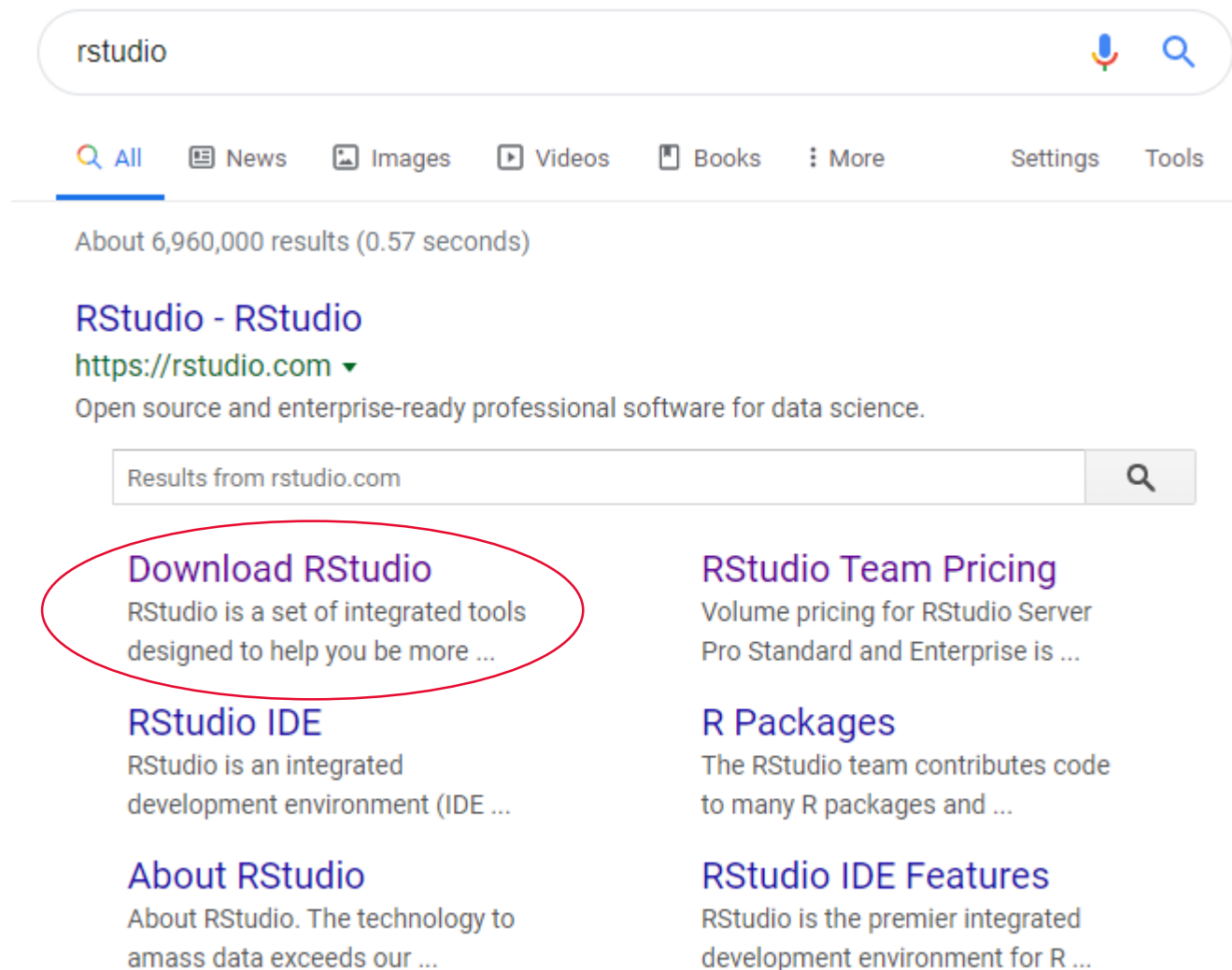
Note: the use of X11 (including tcltk) requires [XQuartz](#) to be installed since it is no longer part of OS X. Always re-install XQuartz when upgrading your macOS to a new major version.

Important: this release uses Clang 7.0.0 and GNU Fortran 6.1, neither of which is supplied by Apple. If you wish to compile R packages from sources, you will need to download and install those tools - see the [tools](#) directory.



RStudio

- Convenient IDE for using R
- Easy to install
- R needs to be already installed



A screenshot of a Google search for "rstudio". The search bar at the top contains the text "rstudio" and a microphone icon. Below the search bar, navigation tabs for "All", "News", "Images", "Videos", "Books", "More", "Settings", and "Tools" are visible. The search results show "About 6,960,000 results (0.57 seconds)". The first result is "RStudio - RStudio" with the URL "https://rstudio.com" and the description "Open source and enterprise-ready professional software for data science." Below the main results, a sidebar contains several links: "Download RStudio" (circled in red), "RStudio IDE", "About RStudio", "RStudio Team Pricing", "R Packages", and "RStudio IDE Features". Each link in the sidebar has a short description below it.

Search results for **rstudio**

About 6,960,000 results (0.57 seconds)

RStudio - RStudio
<https://rstudio.com> ▼
Open source and enterprise-ready professional software for data science.

Results from rstudio.com

Download RStudio
RStudio is a set of integrated tools designed to help you be more ...

RStudio IDE
RStudio is an integrated development environment (IDE ...

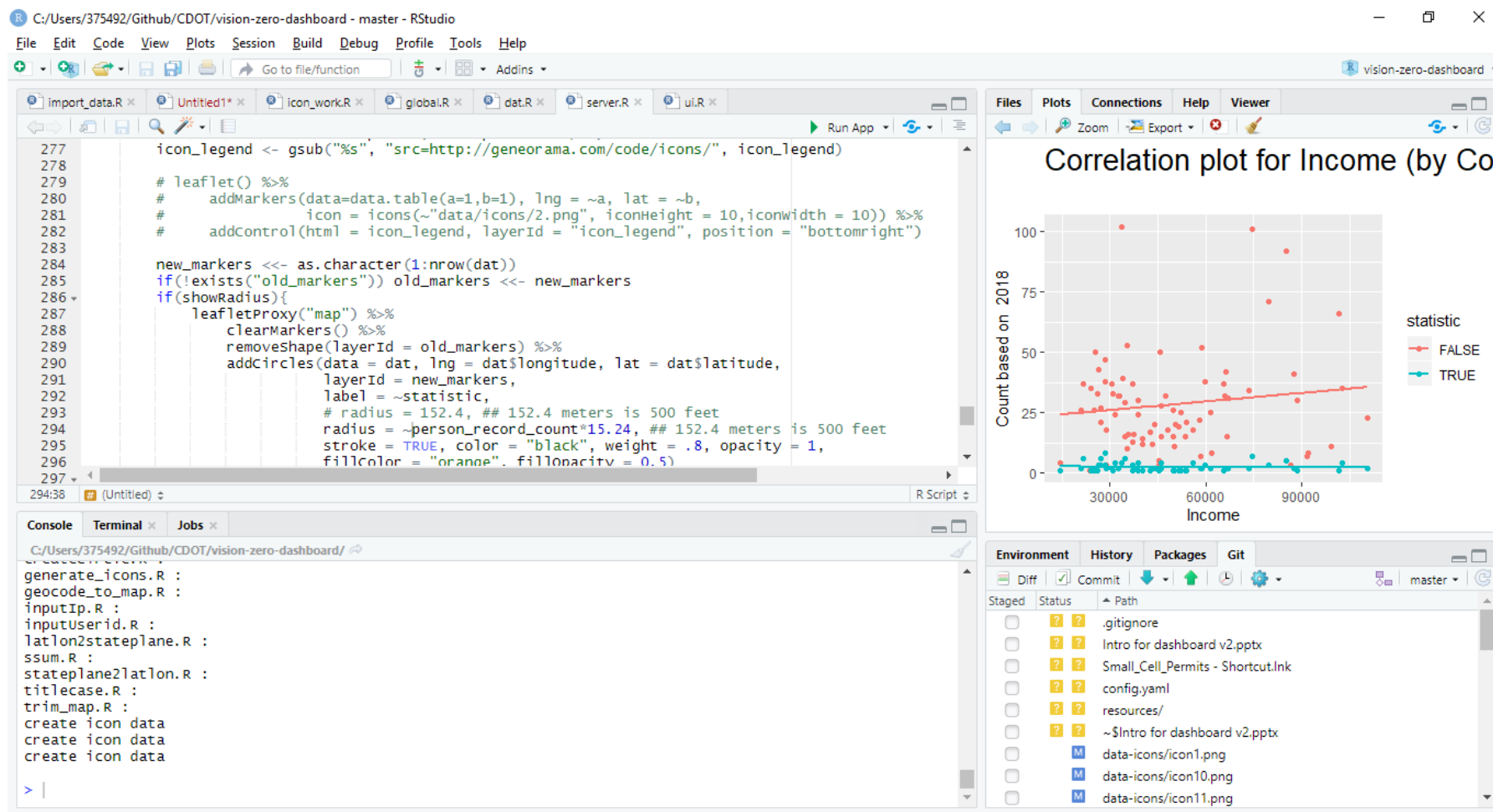
About RStudio
About RStudio. The technology to amass data exceeds our ...

RStudio Team Pricing
Volume pricing for RStudio Server Pro Standard and Enterprise is ...

R Packages
The RStudio team contributes code to many R packages and ...

RStudio IDE Features
RStudio is the premier integrated development environment for R ...

Projects: RStudio's way to manage your work



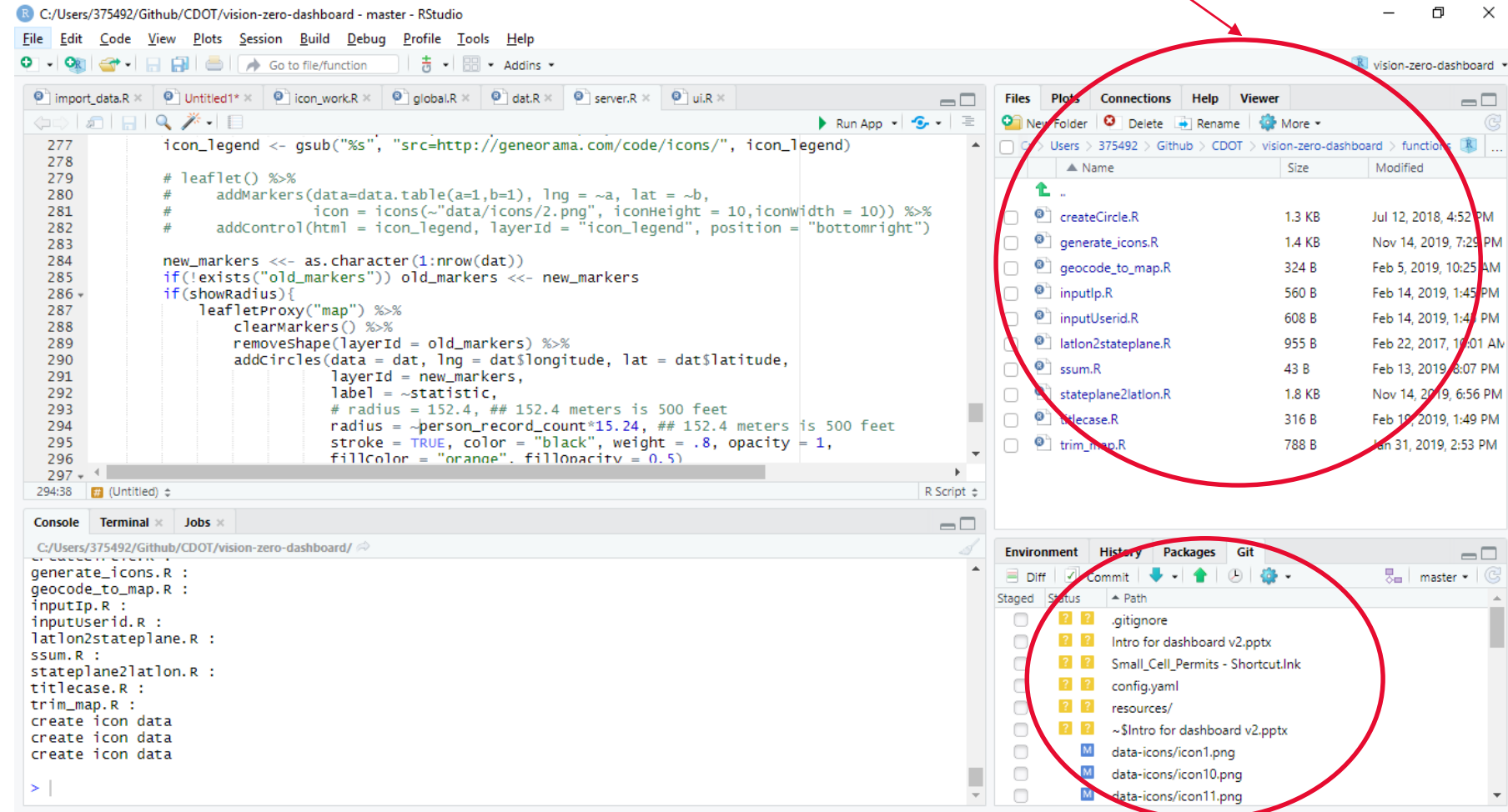
Projects: RStudio's way to manage your work

Project Management;
See your .Rproj file here!

The screenshot displays the RStudio IDE interface for a project named "vision-zero-dashboard". The top menu bar includes File, Edit, Code, View, Plots, Session, Build, Debug, Profile, Tools, and Help. The toolbar contains icons for file operations and running code. The main editor window shows an R script with code for creating a map using leaflet, including functions like `gsub`, `leaflet`, `addMarkers`, `addControl`, `new_markers`, `leafletProxy`, `clearMarkers`, `removeShape`, and `addCircles`. The console at the bottom shows the execution of various R scripts, including `generate_icons.R`, `geocode_to_map.R`, `inputIp.R`, `inputUserId.R`, `latlon2stateplane.R`, `ssum.R`, `stateplane2latlon.R`, `titlecase.R`, `trim_map.R`, `create icon data`, `create icon data`, and `create icon data`. The right sidebar shows the Files, Plots, Connections, Help, and Viewer tabs. The Plots tab is active, displaying a scatter plot titled "Correlation plot for Income (by Co)". The plot shows "Count based on 2018" on the y-axis (ranging from 0 to 100) and "Income" on the x-axis (ranging from 30,000 to 90,000). The plot includes two data series: "statistic FALSE" (red dots) and "statistic TRUE" (teal dots). The bottom right pane shows the Environment, History, Packages, and Git tabs. The Environment tab is active, displaying a list of files and folders, including `.gitignore`, `Intro for dashboard v2.pptx`, `Small_Cell_Permits - Shortcut.lnk`, `config.yaml`, `resources/`, `~$Intro for dashboard v2.pptx`, `data-icons/icon1.png`, `data-icons/icon10.png`, and `data-icons/icon11.png`.

Projects:
RStudio's
way to
manage
your work

See your PROJECT files



Manage some "git" operations



Shiny

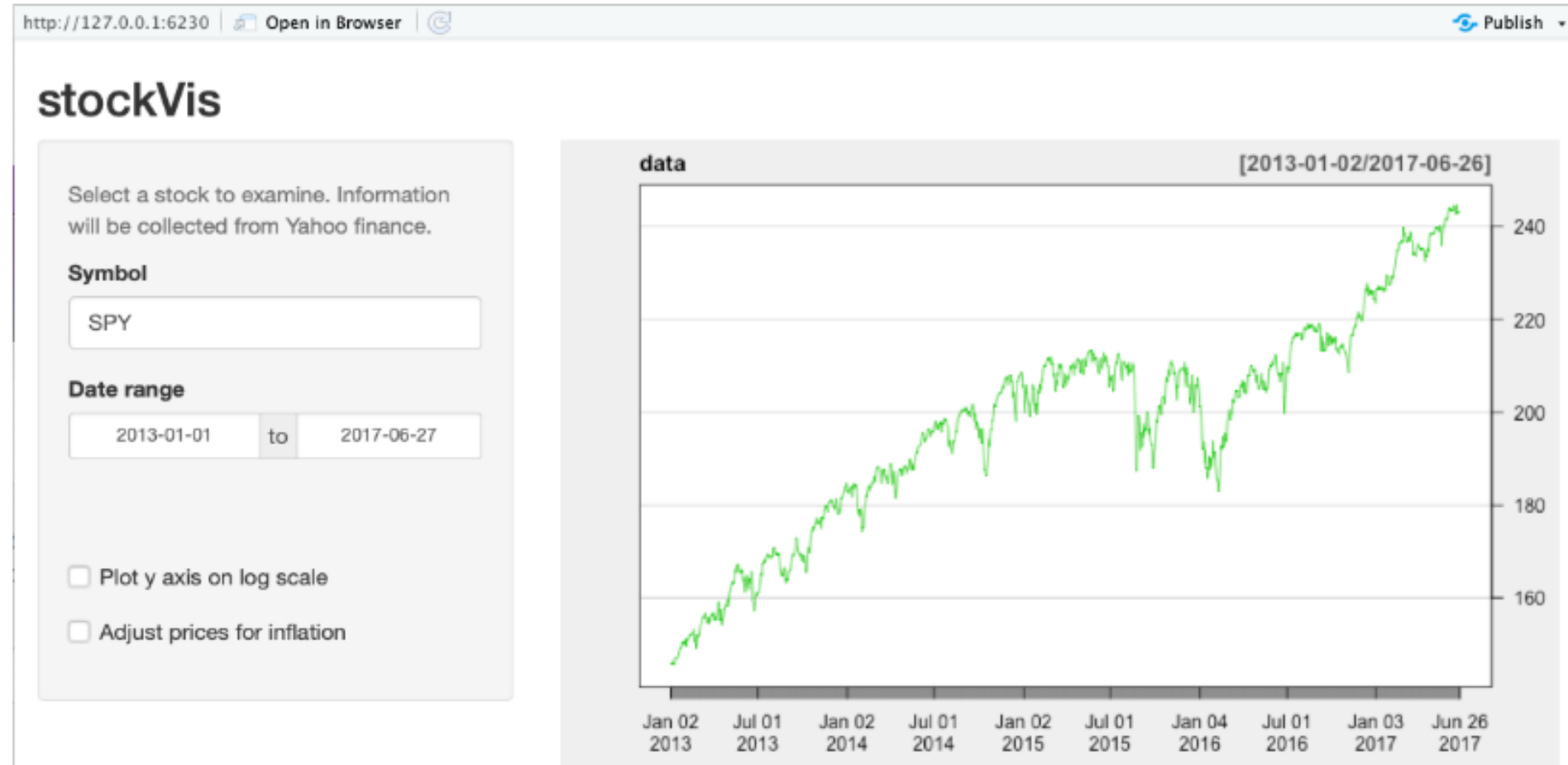
- Web app builder in R
- Tutorials at RStudio.com
- Uses jQuery and Twitter Bootstrap
- Reactive framework

```
server <- function(input, output) {  
  
  dataInput <- reactive({  
    getSymbols(input$symb, src = "yahoo",  
              from = input$dates[1],  
              to = input$dates[2],  
              auto.assign = FALSE)  
  })  
  
  output$plot <- renderPlot({  
  
    chartSeries(dataInput(), theme = chartTheme("white"),  
              type = "line", log.scale = input$log, TA = NULL)  
  })  
  
}
```

Source: <https://shiny.rstudio.com/tutorial>

Shiny

- Web app builder in R
- Tutorials at RStudio.com
- Uses jQuery and Twitter Bootstrap
- Reactive framework



Source: <https://shiny.rstudio.com/tutorial>

FUTURE DESIGN WORK



Next year: Chicago specific bootstrap can be imported as the default, applying Chicago styles automatically

SHINY DASHBOARDS



Three main flavors of dashboard

- Shiny / HTML – Requires a shiny server, and lots of page coding
- ShinyDashboard – Requires a shiny server
- Flexdashboard – Client side “interaction”, not server based

SHINY DASHBOARDS



See issue for discussion

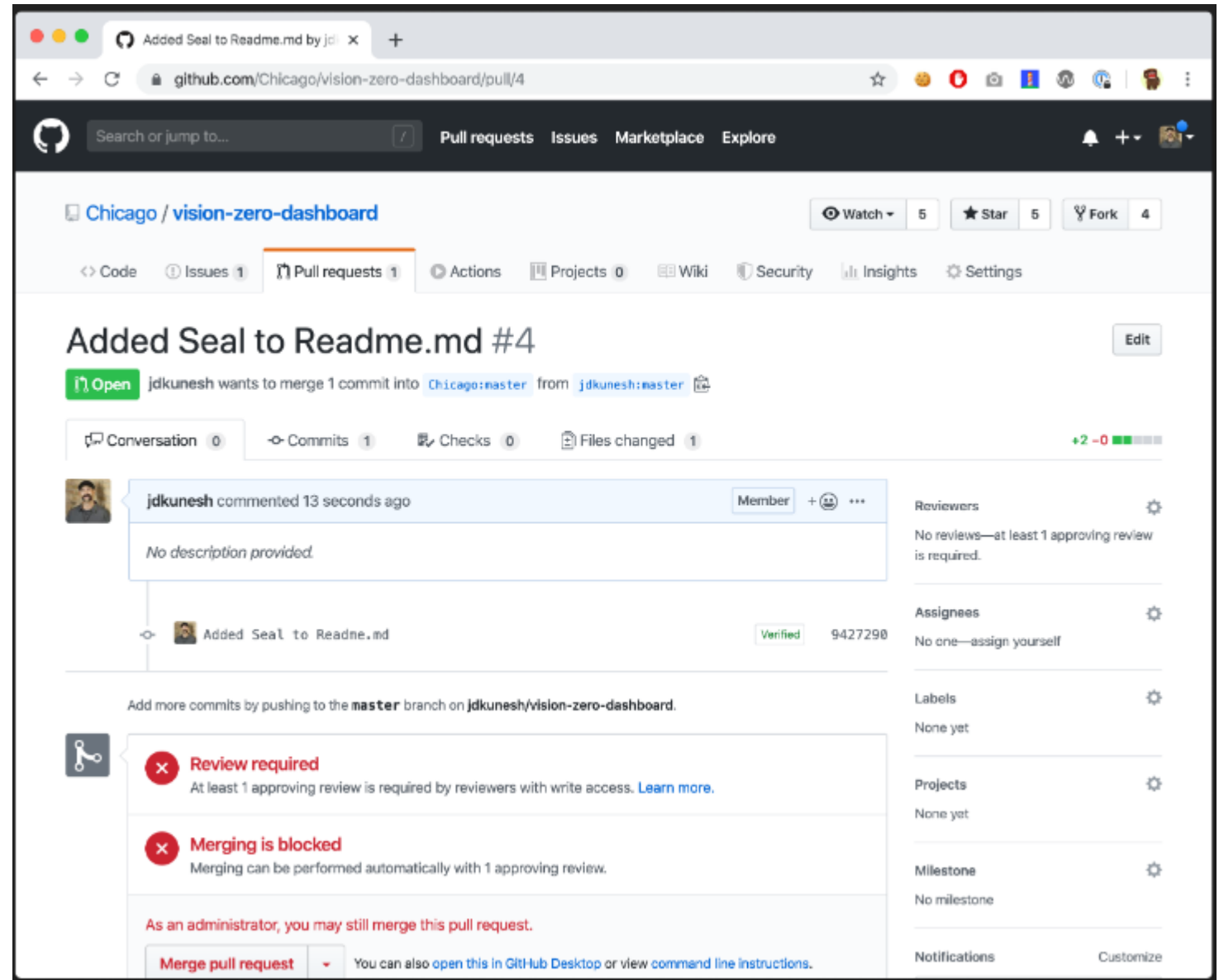
<https://github.com/Chicago/vision-zero-dashboard/issues/6>

How to contribute with Git through Pull requests

1. Fork the repo
2. Clone your fork to your computer
3. Make edits, do work
4. Add edits
5. Commit your changes
6. Push to github (your repo)
7. Open a pull request to Chicago repo



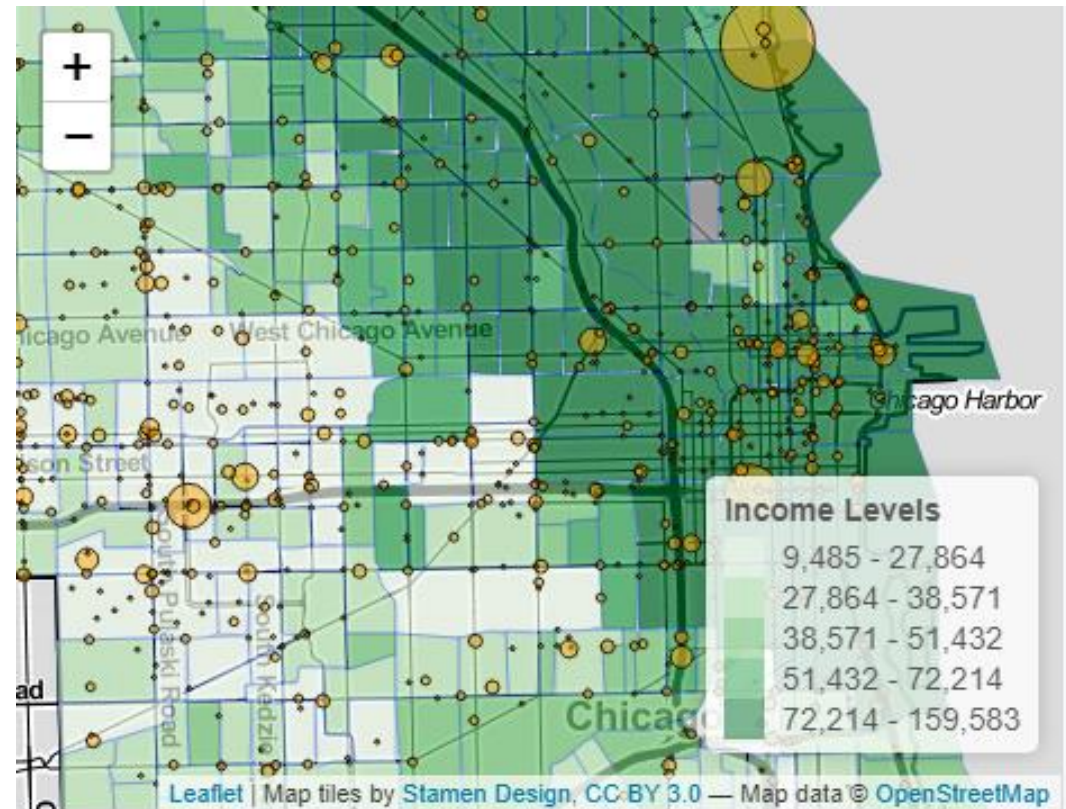
Pull Request



LEAFLET

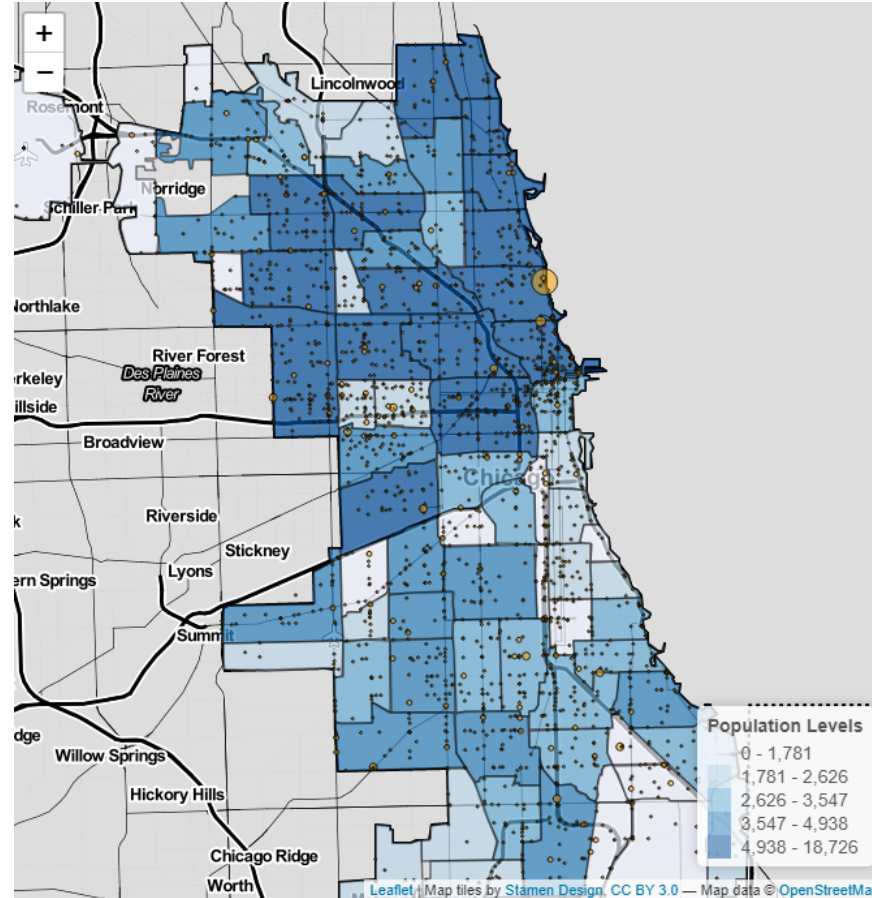
R's leaflet package allows you to create maps with intuitive code:

```
leaflet() %>%  
  addProviderTiles("Stamen.TonerHybrid") %>%  
  addPolygons(data = city_outline, fill = FALSE, color = "black", weight = 2) %>%  
  fitBounds(-87.94011, 41.64454, -87.52414, 42.02304) %>%  
  addPolylines(data = city_outline, weight=2, fill=FALSE, color="black", opacity=1) %>%  
  addPolygons(data = tracts,  
    fillcolor = ~ pal_inc(tracts@data$B19013_001E),  
    fillopacity = 0.7, weight = 0.5,  
    label = ~NAMELSAD)%>%  
  addLegend(colors = legend_colors_inc,  
    values = legend_values_inc,  
    labels = legend_labels_inc,  
    position = "bottomright",  
    title = "Income Levels") %>%  
  addCircles(data = dat, lng = dat$lon, lat = dat$lat,  
    radius = ~person_record_count*15.24,  
    stroke = TRUE, color = "black", weight = .8,  
    opacity = 1, fillcolor = "orange", fillopacity = 0.5)
```



EXAMPLE APP

Code is in folder:
example-shiny-
crashes



Vision Zero Example

Map datasource options:

Map Regions:

☐ Census Tracts ☒ Community Areas

Map Statistic:

☐ Income ☒ Population

Choose year and statistics:

Select Year:

2018

Highest severity:

A Injury Crash

Source Statistic:

☒ belts used

☐ highest BAC

☒ Show cell radius circles

☐ Show vehicle make icons

Correlation maps:

Corellation plot for Population (by Community)

WHAT IS IT FOR?

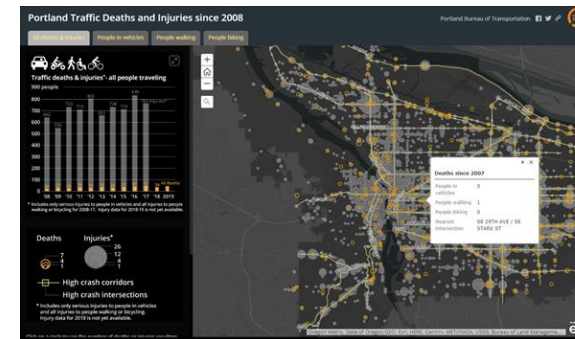
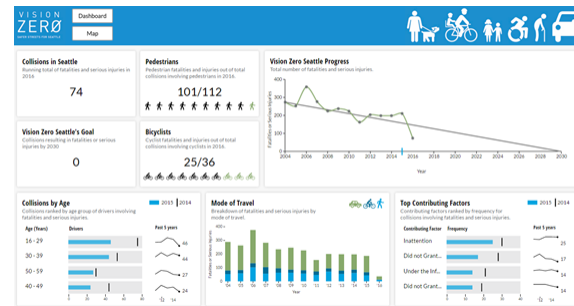
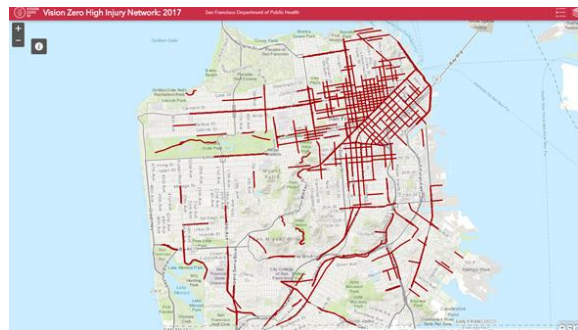
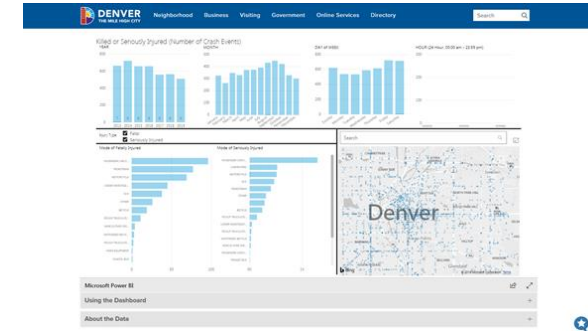
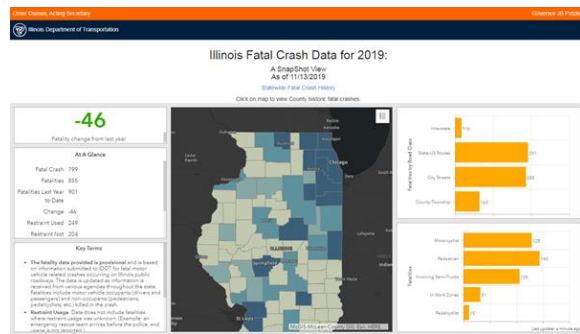


- Awareness
- Accountability
- Advocacy

EXAMPLES OF FROM OTHER PLACES:

- [Illinois IDOT](#)
- [Seattle](#)
- [Denver](#)
- Portland (offline was [this](#))
- [Washington DC](#)
- [San Francisco](#)
- [Los Angeles](#)
- [New York \(citizen created\)](#)
- [New York \(official\)](#)
- [Toronto](#)

Examples of dashboards from other places:



Thank you

Please visit:

<https://github.com/Chicago/vision-zero-dashboard/>

Feel free to discuss topics in the issues.