RStudio and R Resources

Happy Scientist Seminar

Emil Hvitfeldt

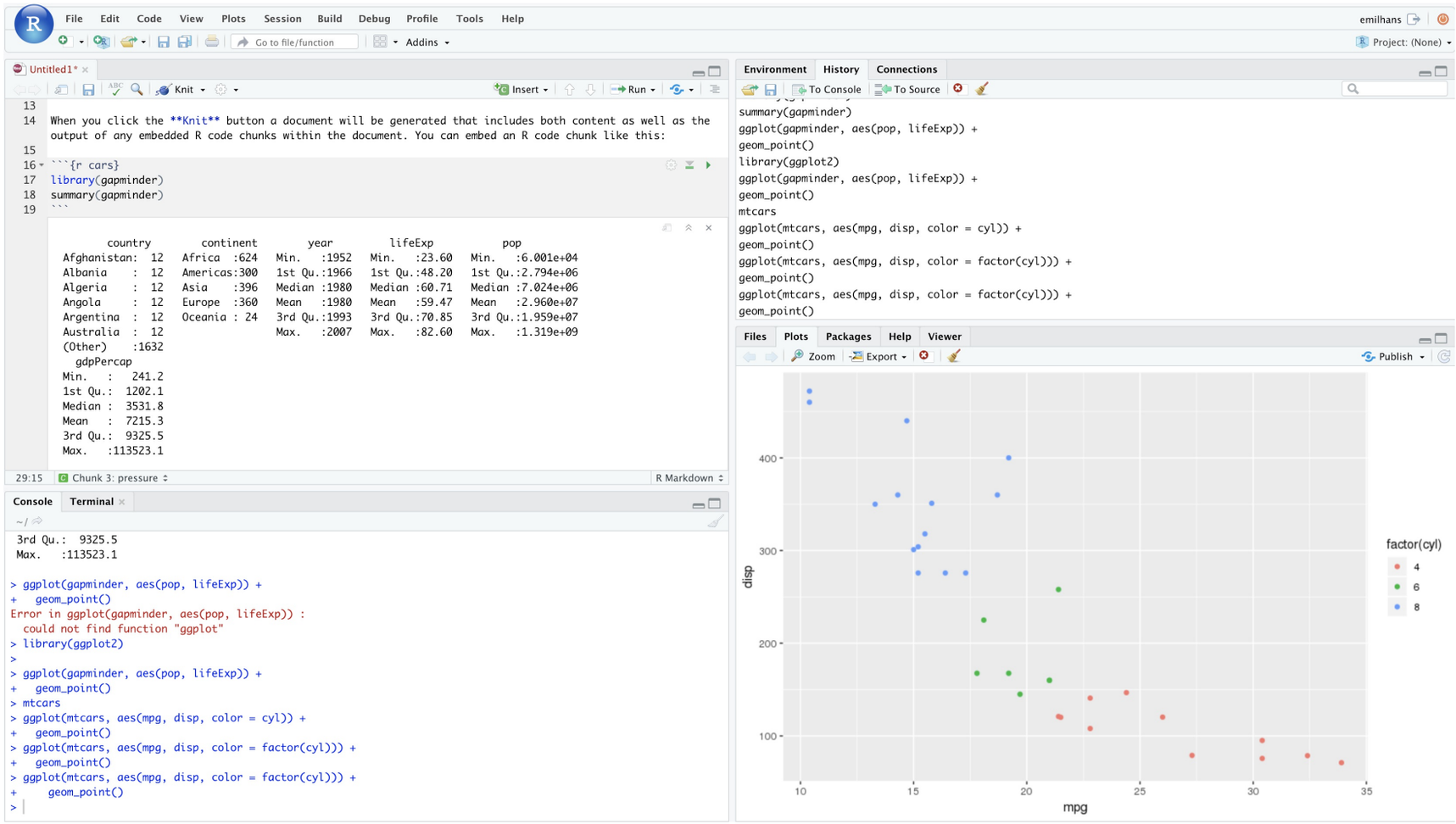
2019-1-22

Motivation

We will talk about what you are able to do in RStudio with R and where to find information and rescources to do it great.

- Data analysis scripts
- Interactive web applications
- Documents
- Reports
- Graphs
- more

- Syntax highlighting
- code completion
- smart indentation
- Integrated R help
- data viewer
- Version control with Git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Go to file/function
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Untitled1*
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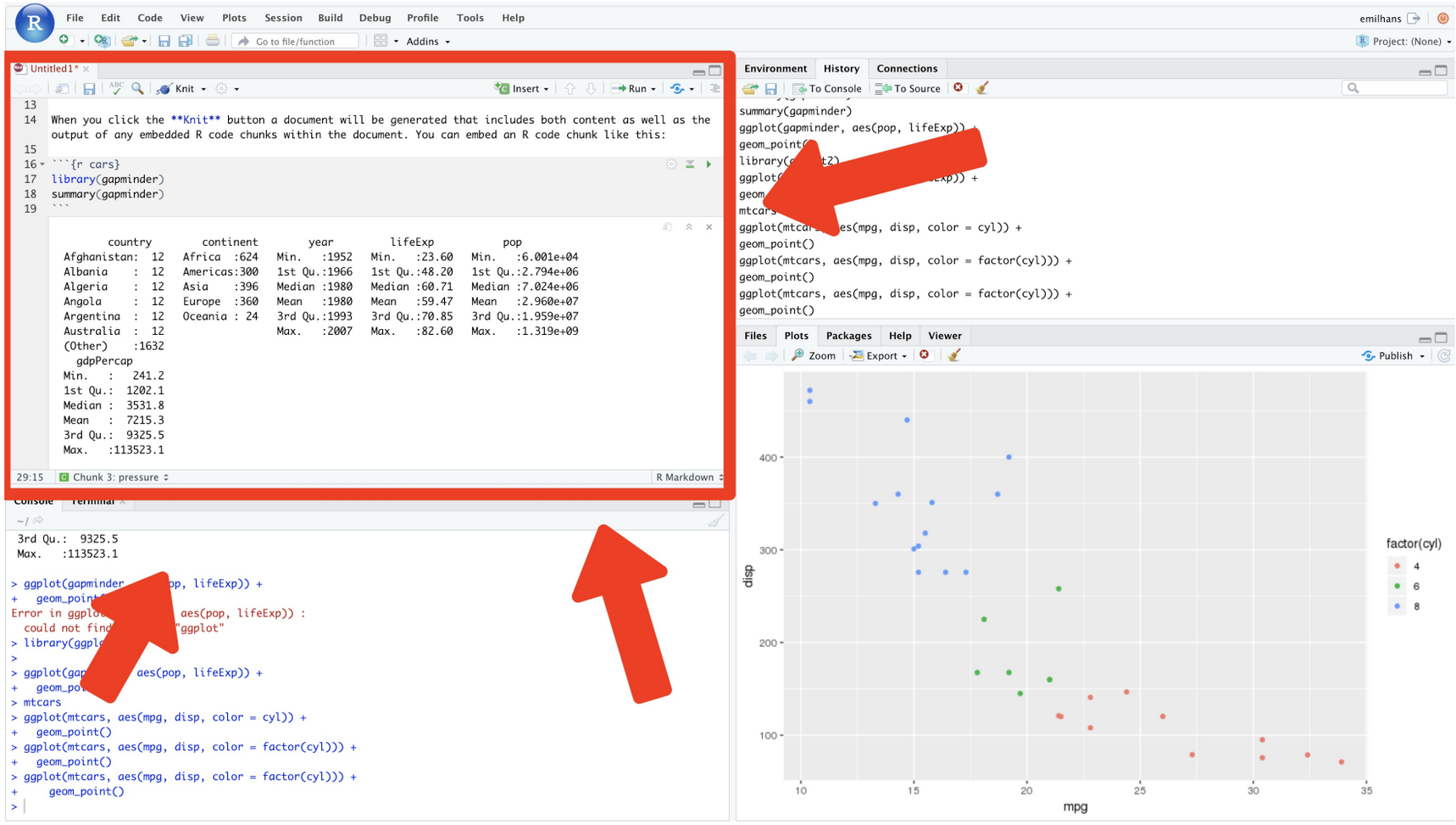
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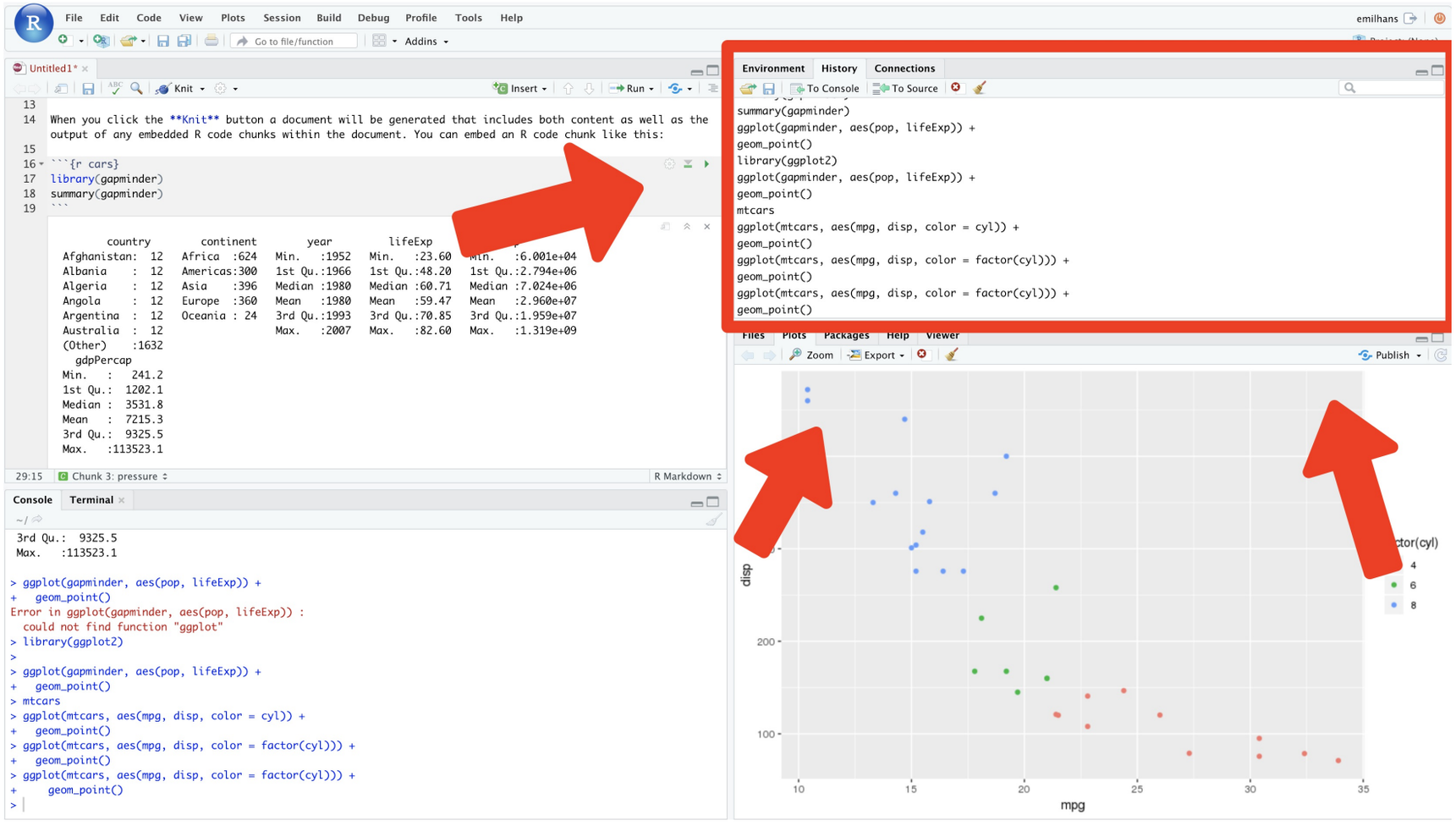
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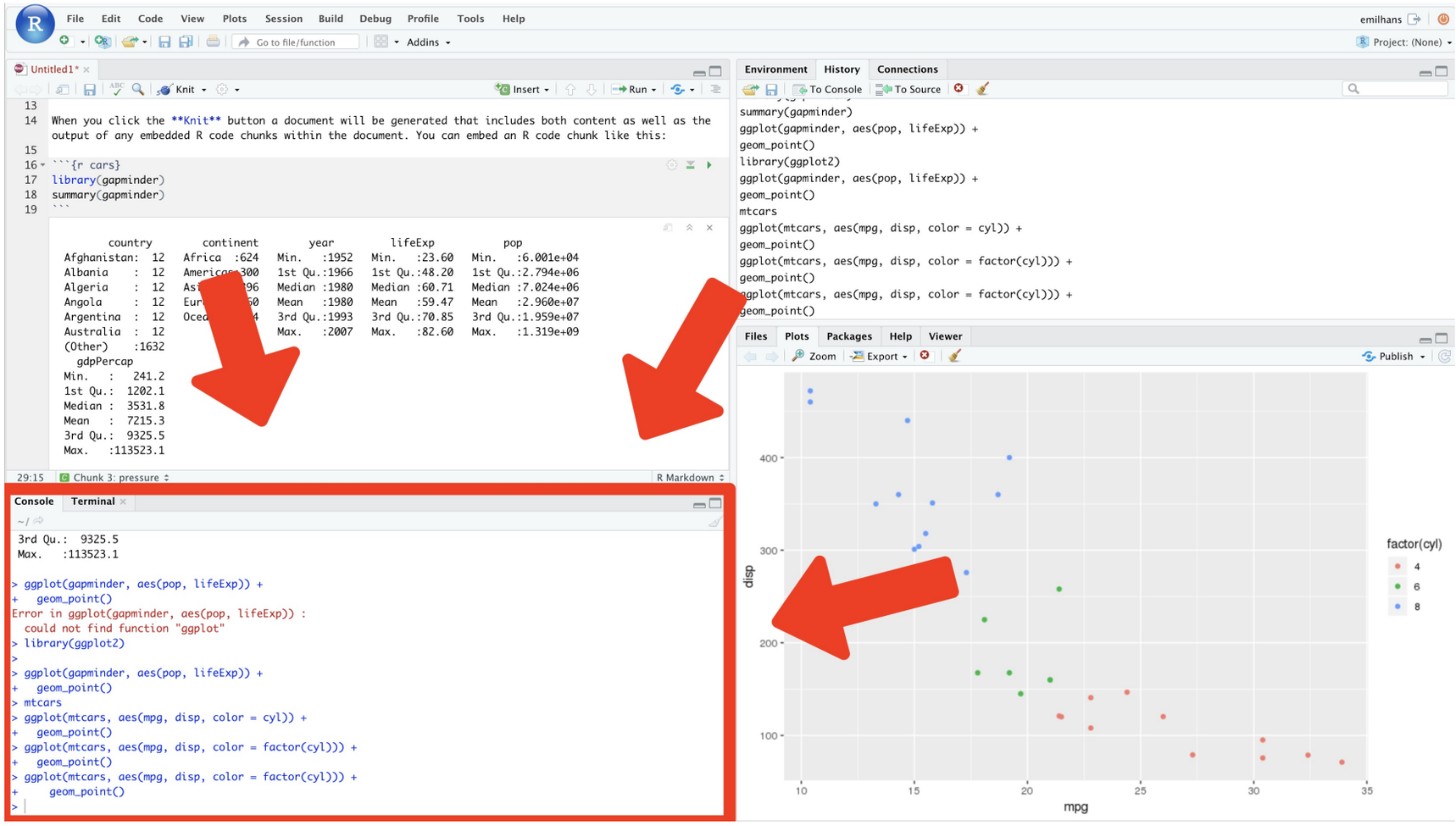
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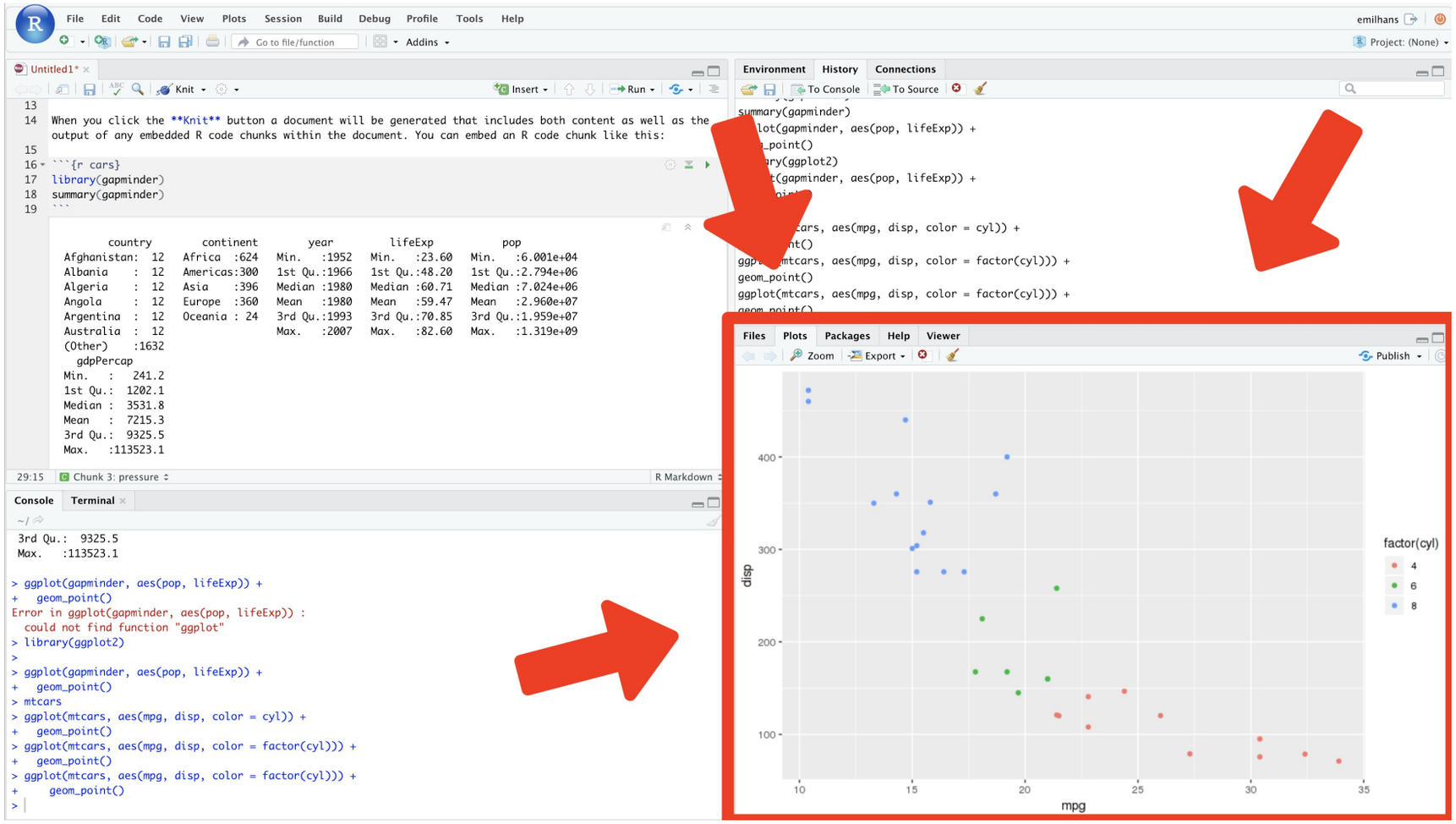
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Packages

Idea -> Code -> Package -> Share -> Happiness

If you want to do something, chance has it someone have worked on it before

CRAN (The Comprehensive R Archive Network)

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 (2018-12-20, Eggshell Igloo) R-3.5.2.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.

https://cran.r-project.org/

https://cran.r-project.org/web/packages/available_packages_by_name.html

Available CRAN Packages By Name

A3	Accurate, Adaptable, and Accessible Error Metrics for Predictive Models
abbyyR	Access to Abbyy Optical Character Recognition (OCR) API
abc	Tools for Approximate Bayesian Computation (ABC)
abc.data	Data Only: Tools for Approximate Bayesian Computation (ABC)
ABC.RAP	Array Based CpG Region Analysis Pipeline
ABCanalysis	Computed ABC Analysis
abcdeFBA	ABCDE_FBA: A-Biologist-Can-Do-Everything of Flux Balance Analysis with this package
ABCoptim	Implementation of Artificial Bee Colony (ABC) Optimization
ABCp2	Approximate Bayesian Computational Model for Estimating P2
abcrf	Approximate Bayesian Computation via Random Forests
abctools	Tools for ABC Analyses
abd	The Analysis of Biological Data
abe	Augmented Backward Elimination
abf2	Load Gap-Free Axon ABF2 Files
ABHgenotypeR	Easy Visualization of ABH Genotypes
abind	Combine Multidimensional Arrays
abjutils	Useful Tools for Jurimetrical Analysis Used by the Brazilian Jurimetrics Association
abn	Modelling Multivariate Data with Additive Bayesian Networks
abnormality	Measure a Subject's Abnormality with Respect to a Reference Population
abodOutlier	Angle-Based Outlier Detection
ABPS	The Abnormal Blood Profile Score to Detect Blood Doping
AbsFilterGSEA	Improved False Positive Control of Gene-Permuting GSEA with Absolute Filtering
AbSim	Time Resolved Simulations of Antibody Repertoires
abundant	High-Dimensional Principal Fitted Components and Abundant Regression
Ac3net	Inferring Directional Conservative Causal Core Gene Networks
ACA	Abrupt Change-Point or Aberration Detection in Point Series
acc	Exploring Accelerometer Data
accelerometry	Functions for Processing Accelerometer Data

https://cran.r-project.org/web/views/

CRAN Task Views

CRAN task views aim to provide some guidance which packages on CRAN are relevant for tasks related to a certain topic. They give a brief overview of the included packages and can be automatically installed using the ctv package. The views are intended to have a sharp focus so that it is sufficiently clear which packages should be included (or excluded) - and they are *not* meant to endorse the "best" packages for a given task.

- To automatically install the views, the ctv package needs to be installed, e.g., via
  `install.packages("ctv")`
  and then the views can be installed via `install.views` or `update.views` (where the latter only installs those packages are not installed and up-to-date), e.g.,
  `ctv::install.views("Econometrics")`
  `ctv::update.views("Econometrics")`
- The task views are maintained by volunteers. You can help them by suggesting packages that should be included in their task views. The contact e-mail addresses are listed on the individual task view pages.
- For general concerns regarding task views contact the ctv package maintainer.

Topics

Bayesian	Bayesian Inference
ChemPhys	Chemometrics and Computational Physics
ClinicalTrials	Clinical Trial Design, Monitoring, and Analysis
Cluster	Cluster Analysis & Finite Mixture Models
Databases	Databases with R
DifferentialEquations	Differential Equations
Distributions	Probability Distributions
Econometrics	Econometrics
Environmetrics	Analysis of Ecological and Environmental Data
ExperimentalDesign	Design of Experiments (DoE) & Analysis of Experimental Data
ExtremeValue	Extreme Value Analysis
Finance	Empirical Finance
FunctionalData	Functional Data Analysis
Genetics	Statistical Genetics
Graphics	Graphic Displays & Dynamic Graphics & Graphic Devices & Visualization
HighPerformanceComputing	High-Performance and Parallel Computing with R
Hydrology	Hydrological Data and Modeling
MachineLearning	Machine Learning & Statistical Learning
MedicalImaging	Medical Image Analysis
MetaAnalysis	Meta-Analysis
MissingData	Missing Data
ModelDeployment	Model Deployment with R
Multivariate	Multivariate Statistics
NaturalLanguageProcessing	Natural Language Processing
NumericalMathematics	Numerical Mathematics
OfficialStatistics	Official Statistics & Survey Methodology
Optimization	Optimization and Mathematical Programming
Pharmacokinetics	Analysis of Pharmacokinetic Data

https://www.bioconductor.org/

https://www.bioconductor.org/packages/release/BiocViews.html#___So

R Markdown

- Compile a single R Markdown document to a report in different formats, such as PDF, HTML, or Word.

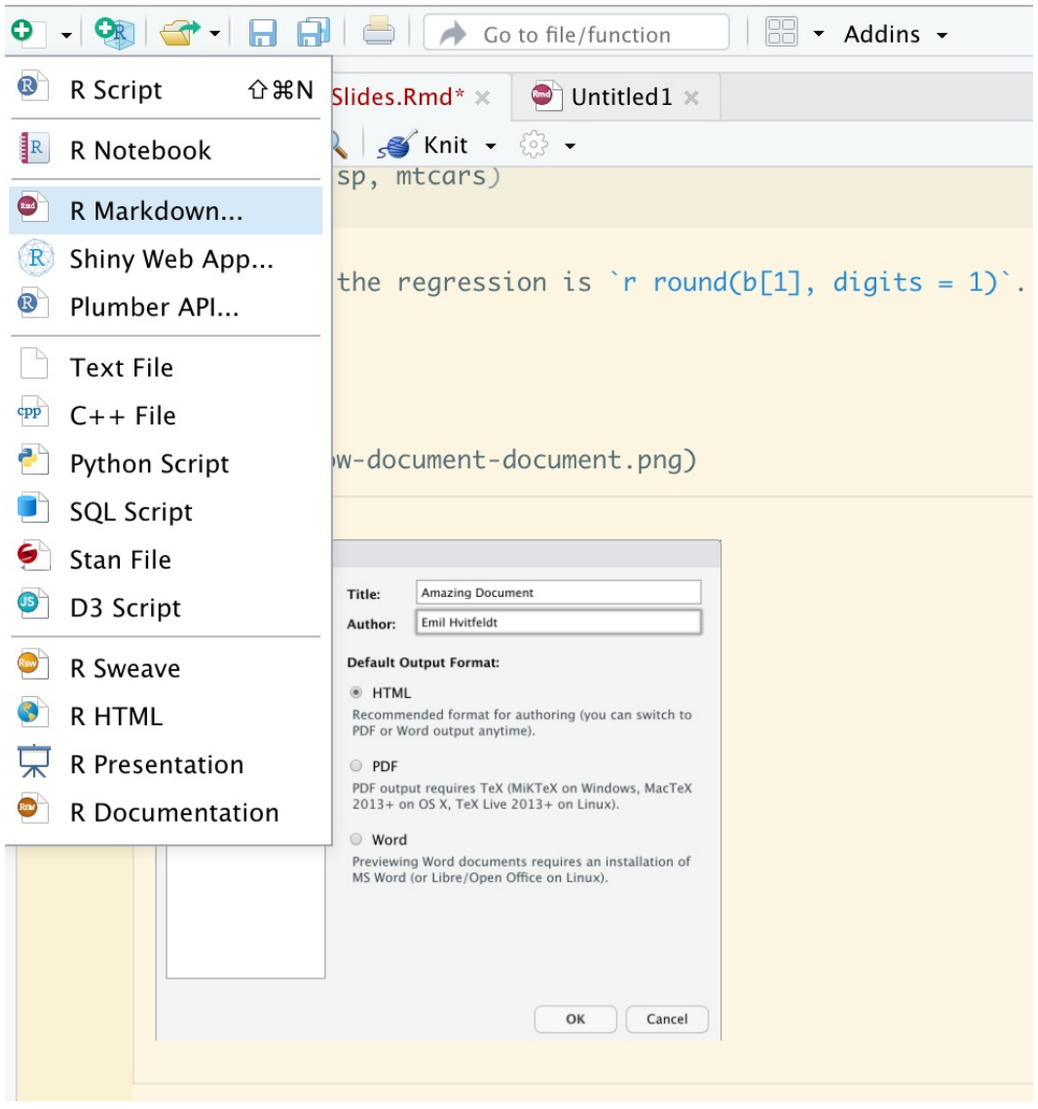
- Make slides for presentations (HTML5, LaTeX Beamer, or PowerPoint).

- Build interactive applications based on Shiny.

- Write journal articles.

- Much more.

Creating a R Markdown file



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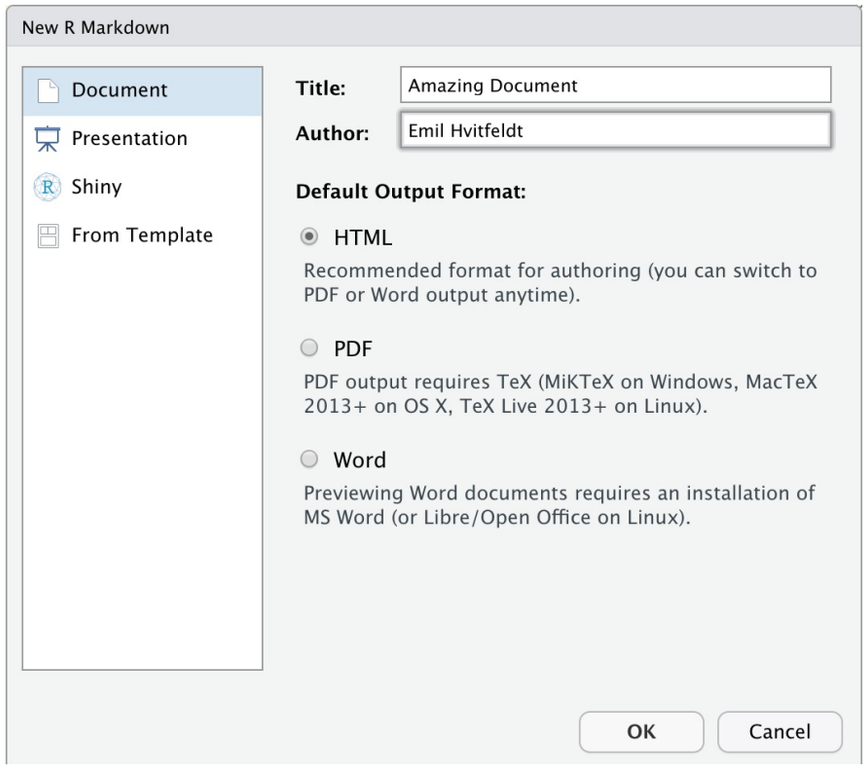

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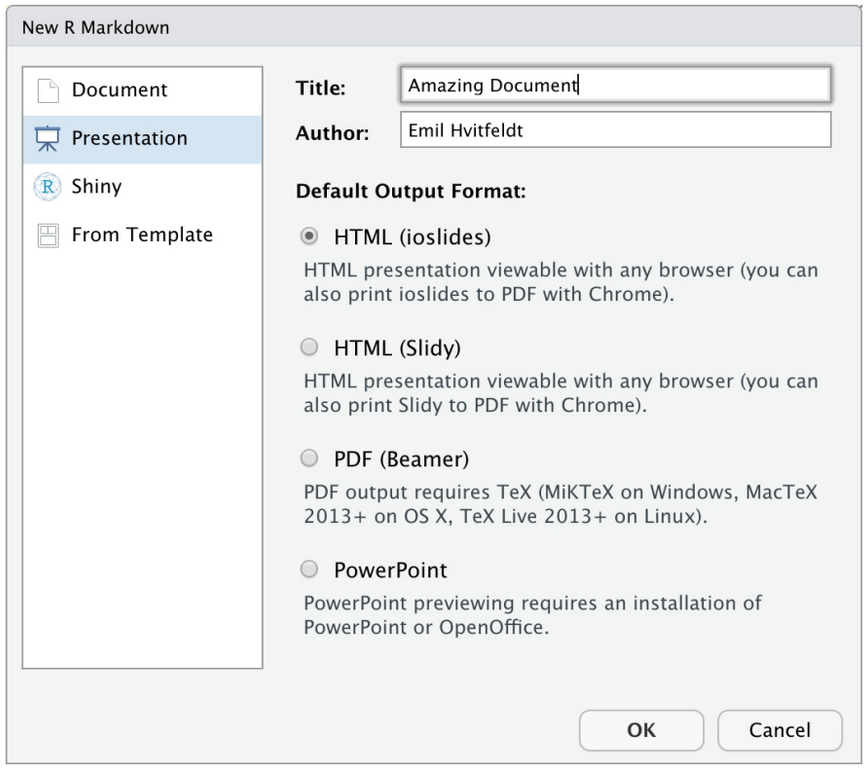

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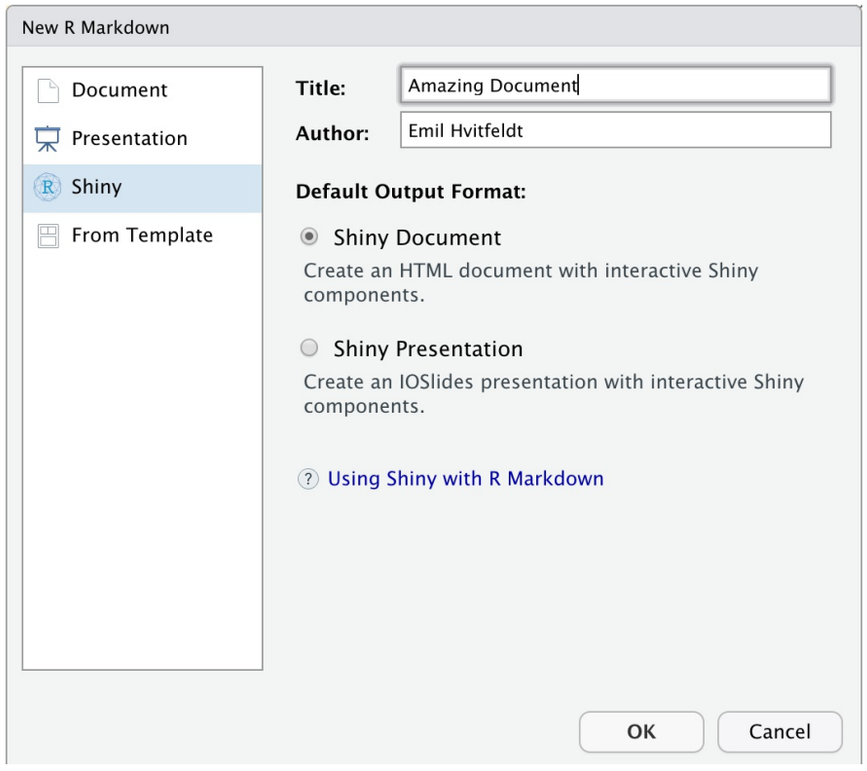

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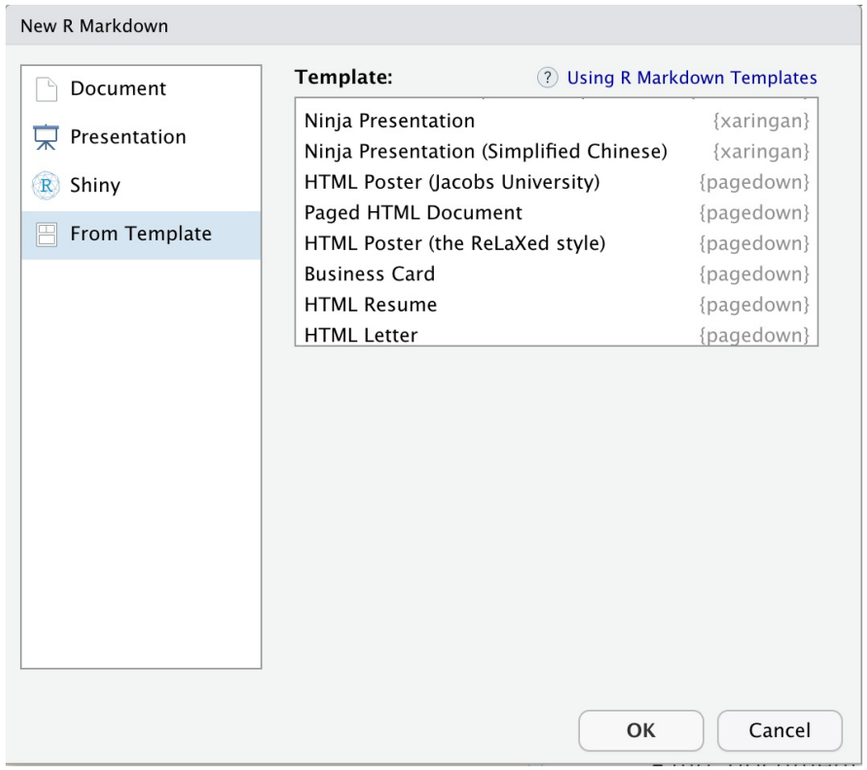

```
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title: "Amazing Document"
author: "Emil Hvitfeldt"
date: "1/20/2019"
output: html_document
---
```

YAML (optional)

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YAML: YAML Ain't Markup Language

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The R in R Markdown

Chunks of code surrounded by ```

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Chunks of code surrounded by ```

The R in R Markdown

Text with simple text formating.

The Markdown in R Markdown

What we write

````
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author: "Emil Hvitfeldt"
date: "1/20/2019"
output: html_document
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We built a **linear** regression model.

```{r}
fit <- lm(mpg ~ disp, data = mtcars)
b   <- coef(fit)
plot(mpg ~ disp, mtcars)
```

The slope of the regression is `r
round(b[1], digits = 1)` in the output.
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What we get

Amazing Document

Emil Hvitfeldt

1/20/2019

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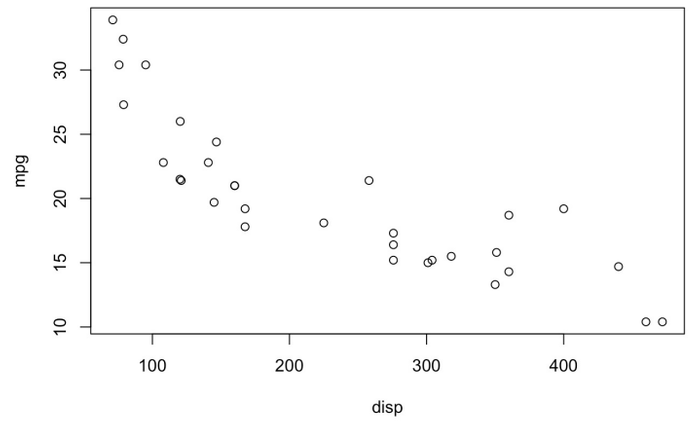

The slope of the regression is 29.6 in the output.

What we write

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author: "Emil Hvitfeldt"
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````
---
author: "Emil Hvitfeldt"
date: "1/20/2019"
output: pdf_document
---

We built a **linear** regression model.

```{r}
fit <- lm(mpg ~ disp, data = mtcars)
b   <- coef(fit)
plot(mpg ~ disp, mtcars)
```

The slope of the regression is `r
round(b[1], digits = 1)` in the output.
````

What we get

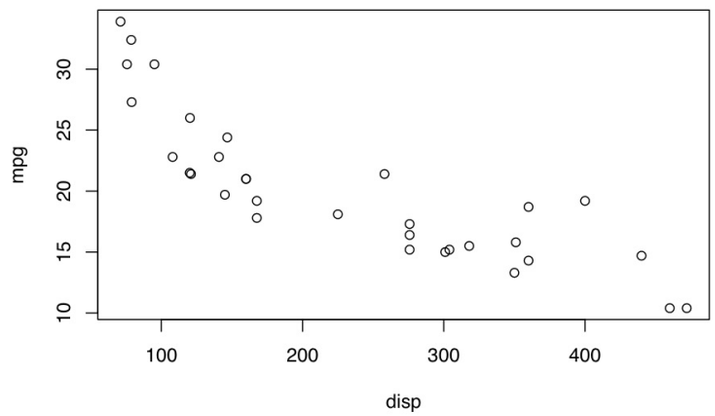
Amazing Document

Emil Hvitfeldt

1/20/2019

We built a **linear** regression model.

```
fit <- lm(mpg ~ disp, data = mtcars)
b   <- coef(fit)
plot(mpg ~ disp, mtcars)
```



The slope of the regression is 29.6 in the output.

Build-in Formats

- github_document
- html_document
- latex_document
- md_document
- odt_document
- pdf_document
- rtf_document
- word_document
- ioslides_presentation
- powerpoint_presentation
- slidy_presentation
- beamer_presentation

Notable Extensions

Notable Extensions

- xaringan

Notable Extensions

- xaringan
- flexdashboard

Notable Extensions

- xaringan
- flexdashboard
- learnr

Notable Extensions

- xaringan
- flexdashboard
- learnr
- rticles

xaringan

[ʃæ.'riŋ.gæn]

build passing

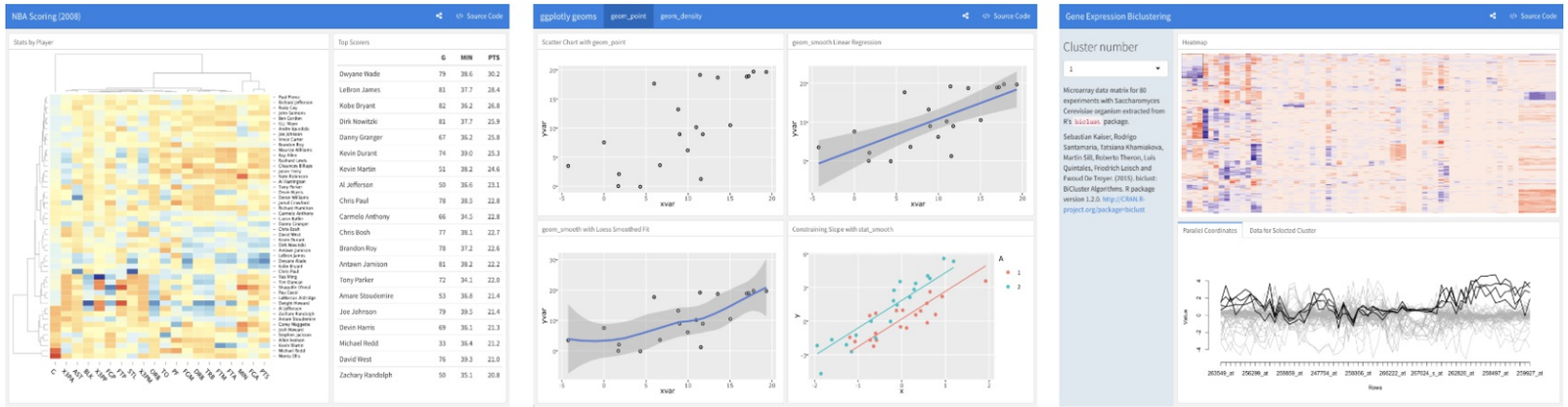
An R package for creating slideshows with remark.js through R Markdown. The package name **xaringan** comes from Sharingan, a dōjutsu in Naruto with two abilities: the "Eye of Insight" and the "Eye of Hypnotism". A presentation ninja should have these basic abilities, and I think remark.js may help you acquire these abilities, even if you are not a member of the Uchiha clan.

Please see the full documentation as a presentation here (中文版在此). The remark.js website provides a quick introduction to the underlying syntax upon which **xaringan** builds. If you prefer reading a book, **xaringan** is also documented in the R Markdown book (Chapter 7). You can use **remotes** to install the package:

https://github.com/yihui/xaringan

flexdashboard: Easy interactive dashboards for R

- Use R Markdown to publish a group of related data visualizations as a dashboard.
- Support for a wide variety of components including htmlwidgets; base, lattice, and grid graphics; tabular data; gauges and value boxes; and text annotations.
- Flexible and easy to specify row and column-based layouts. Components are intelligently re-sized to fill the browser and adapted for display on mobile devices.
- Storyboard layouts for presenting sequences of visualizations and related commentary.
- Optionally use Shiny to drive visualizations dynamically.



Learn more about flexdashboard: http://rmarkdown.rstudio.com/flexdashboard/

Sales Forecast

Sales by State

learnr: Interactive tutorials for R

The **learnr** package makes it easy to turn any R Markdown document into an interactive tutorial. Tutorials consist of content along with interactive components for checking and reinforcing understanding. Tutorials can include any or all of the following:

1. Narrative, figures, illustrations, and equations.
2. Videos (supported services include YouTube and Vimeo).
3. Code exercises (R code chunks that users can edit and execute directly).
4. Quiz questions.
5. Interactive Shiny components.

You can find documentation on using the **learnr** package here: https://rstudio.github.com/learnr/

Welcome

Visualisation is an important tool for generating insights, but your data won't always arrive ready to visualize. Often you'll need to filter unwanted observations from your data or create new variables and summaries to visualize. In this tutorial, you will learn how to filter your data, including:

- How to use `filter()` to extract observations that pass a logical test
- How to write logical comparisons in R
- How to combine logical comparisons with Boolean operators
- How to handle missing values within comparisons

The readings in this tutorial follow *R for Data Science* (http://r4ds.had.co.nz/), section 5.2.

Continue

The **rticles** package provides a suite of custom R Markdown LaTeX formats and templates for various formats, including:

- ACM articles
- ACS articles
- AEA journal submissions
- AMS articles
- Biometrics articles
- Bulletin de l'AMQ journal submissions
- CTeX documents
- Elsevier journal submissions
- IEEE Transaction journal submissions
- JSS articles
- MDPI journal submissions
- Monthly Notices of the Royal Astronomical Society articles
- NNRAS journal submissions
- PeerJ articles
- Royal Society Open Science journal submissions
- Sage journal submissions
- Springer journal submissions

Shiny

Combines the computational power of R with the interactivity of the modern web.

Powerful web framework.

https://gallery.shinyapps.io/050-kmeans-example/

Iris k-means clustering

X Variable

Sepal.Length

Y Variable

Sepal.Width

Cluster count

3

Kmeans example
by Joe Cheng <joe@rstudio.com>
(http://www.rstudio.com/)

server.R ui.R

show with app

```
function(input, output, session) {

  # Combine the selected variables into a new data frame
```

https://gallery.shinyapps.io/082-word-cloud/

Word Cloud

Choose a book:

A Mid Summer Night's Dream

Change

Minimum Frequency:

1 15 50

1 11 21 31 41

Maximum Number of Words:

1 100 300

1 61 121 241

Word cloud

by Fereshteh Karimeddini
<fereshteh@rstudio.com>
(http://www.rstudio.com/)

A simple word cloud generator, based on

global.R server.R ui.R

show with app

```
# Text of the books downloaded from:
# A Mid Summer Night's Dream:
#  http://www.gutenberg.org/cache/epub/2242/pg2242.txt
```

https://gallery.shinyapps.io/086-bus-dashboard/

Show

- [x] Northbound
- [x] Southbound
- [x] Eastbound
- [x] Westbound

Note: a route number can have several different trips, each with a different path. Only the most commonly-used path will be displayed on the map.

Zoom to fit buses

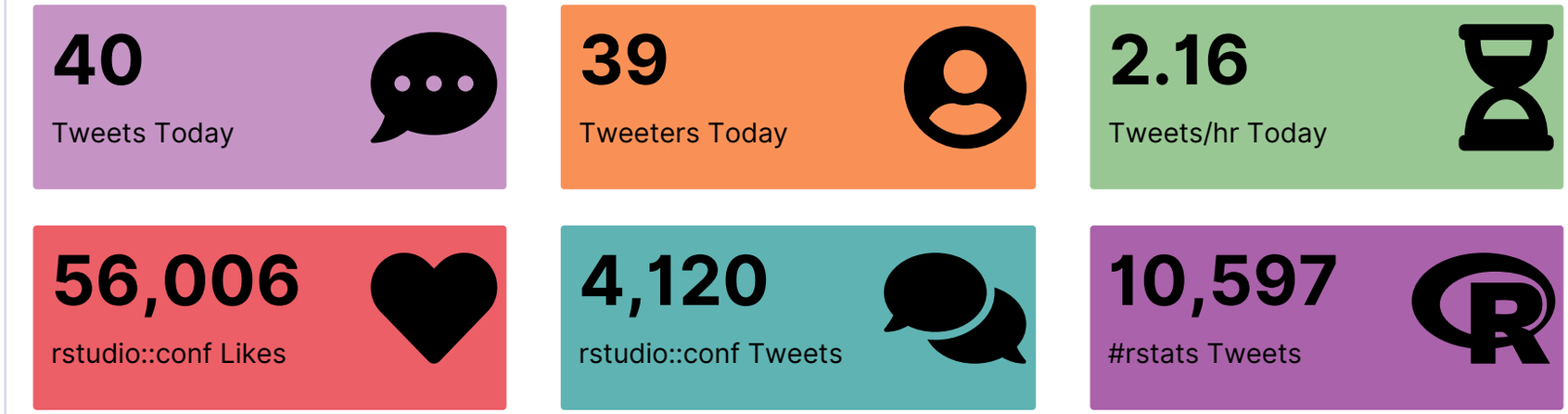
Refresh interval

1 minute

Refresh now

Source data updates every 30 seconds.

https://apps.garrickadenbuie.com/rstudioconf-2019/



http://www.dataseries.org/

Choose variable, e.g., GDP

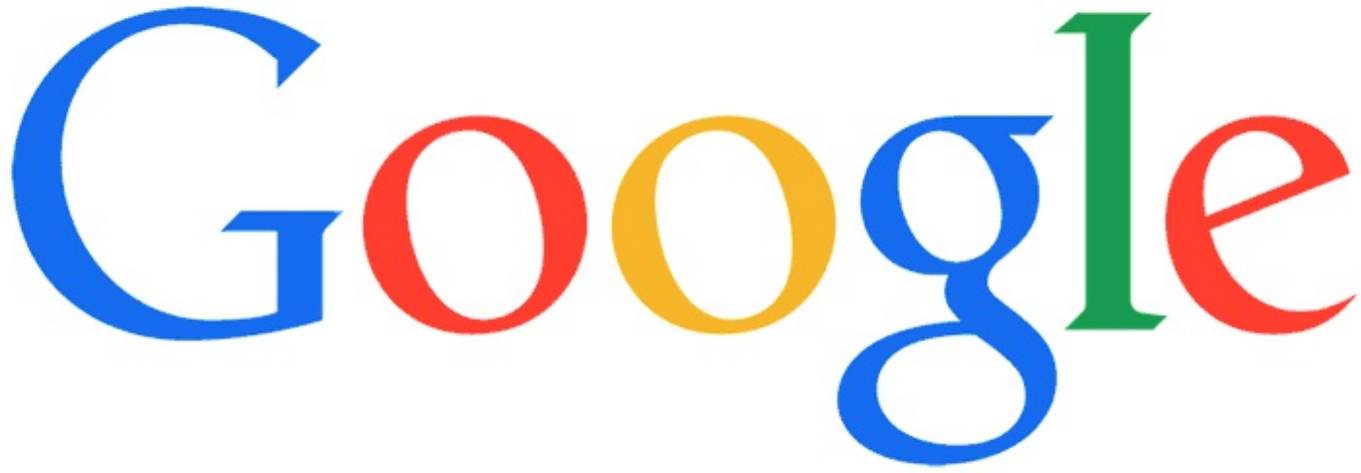
TIDIED UP

Switzerland's data series in one place

Where do I go for more information?

- Cheatsheets
- Books
- rweekly.org
- Forums
- USCbiostats/software-dev

Have a question? Google it



https://www.google.com/

parsnip

All Images Shopping News Videos More Settings Tools

About 9,150,000 results (0.46 seconds)

Parsnip - Wikipedia
https://en.wikipedia.org/wiki/Parsnip

The **parsnip** (Pastinaca sativa) is a root vegetable closely related to the carrot and parsley. It is a biennial plant usually grown as an annual. Its long, tuberous ...
Description · Taxonomy · Nutrients · Cultivation

Roasted Parsnips - How to Cook Parsnips - Parsnip Recipes
https://www.fifteenspatulas.com › Recipes › Vegetable Sides

★★★★★ Rating: 5 - 11 votes - 45 min - 230 cal
Apr 14, 2018 - Roasted **Parsnips** are simple to make and incredibly delicious as a vegetable side to any dinner. They have a natural sweetness that ...

What is Parsnip Good For? - Mercola Food Facts - Dr. Mercola
https://foodfacts.mercola.com › Vegetables

Jan 9, 2017 - But what about the other vegetables that are not often given the same attention, though they are equally healthy? The **parsnip** is one example ...

Parsnips
Vegetable

The parsnip is a root vegetable closely related to the carrot and parsley. It is a biennial plant usually grown as an annual. Its long, tuberous root has cream-colored skin and flesh, and left in the ground to mature, it becomes sweeter in flavor after winter frosts. Wikipedia

Nutrition Facts
Parsnips

https://rseek.org/

Created and maintained by Sasha Goodman.
Serving the R community since 2007. Version 2.0.

Privacy Policy

Download and Install R

https://rseek.org/

parsnip

All | Github | Package | Documentation | R-project | Blog | Source | RStudio | Twitter | Popular Package

About 389,000 results (0.32 seconds) Sort by: Relevance

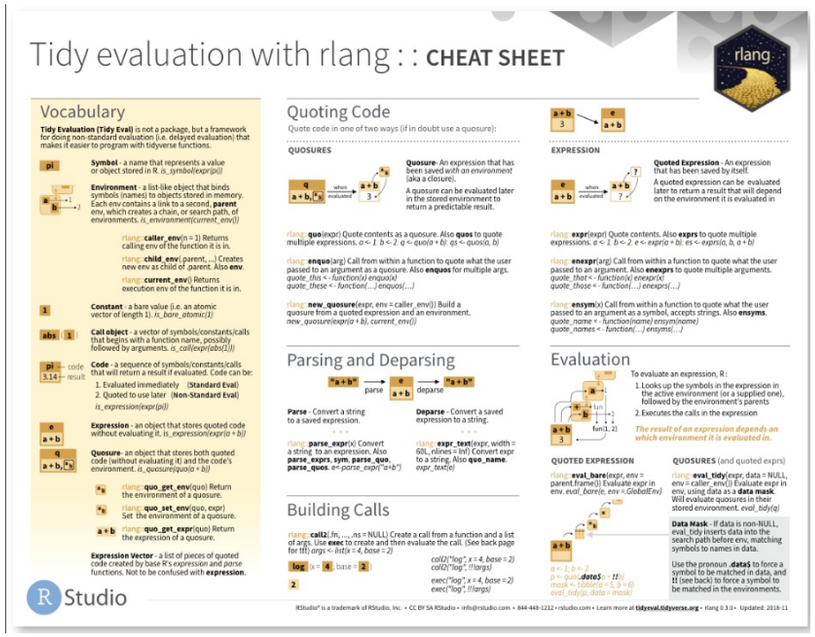
CRAN - Package parsnip
https://cran.r-project.org/package=parsnip
Nov 12, 2018 ... **parsnip**: A Common API to Modeling and Analysis Functions. A common ... Author: Max Kuhn [aut, cre], Davis Vaughan [aut], **RStudio** [cph].
Labeled Package R-project

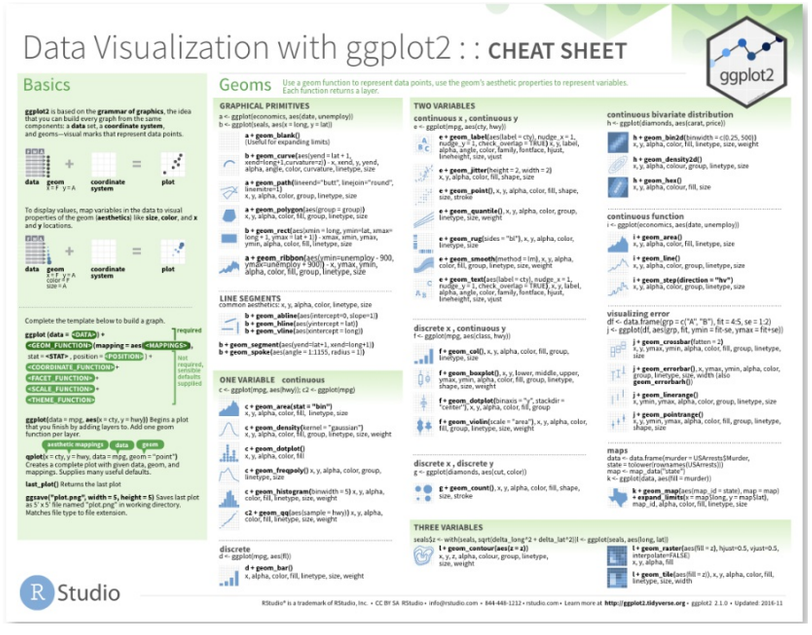
parsnip - Tidyverse
https://www.tidyverse.org/articles/2018/11/parsnip-0-0-1/
The **parsnip** package is now on CRAN. It is designed to solve a specific problem related to model fitting in **R**, the interface. Many functions have different ...

Examples of non-linear optimization with dials and parsnip help ...
https://community.rstudio.com/t/examples-of...parsnip.../19603
Dec 9, 2018 ... **RStudio** Community · Examples of non-linear optimization with dials and **parsnip** help · Machine Learning and Modeling · tidymodels ...
Labeled Issues RStudio

R Weekly 2018-49 parsnip, Validation | RWeekly.org - Blogs to ...
https://rweekly.org/2018-49.html
Dec 3, 2018 ... **R** Weekly 2018-49 **parsnip**, Validation ... **R** in the Real World ... How to work with strings in base **R** - An overview of 20+ methods for daily ...
Labeled Blog

Cheatsheets





https://www.rstudio.com/resources/cheatsheets/

Books

https://bookdown.org/

Home About Archive Tags Authors Log in

BOOKDOWN

Write HTML, PDF, ePub, and Kindle books with R Markdown

The **bookdown** package is an open-source R package that facilitates writing books and long-form articles/reports with R Markdown. Features include:

- Generate printer-ready books and ebooks from R Markdown documents.
- A markup language easier to learn than LaTeX, and to write elements such as section headers, lists, quotes, figures, tables, and citations.
- Multiple choices of output formats: PDF, LaTeX, HTML, EPUB, and Word.
- Possibility of including dynamic graphics and interactive applications (HTML widgets and Shiny apps).
- Support a wide range of languages: R, C/C++, Python, Fortran, Julia, Shell scripts, and SQL, etc.
- LaTeX equations, theorems, and proofs work for all output formats.
- Can be published to GitHub, bookdown.org, and any web servers.
- Integrated with the RStudio IDE.
- One-click publishing to https://bookdown.org.

Below is a list of featured books. For a full list, please see the archive page. For the full documentation of the **bookdown** package, please see the free online book *bookdown: Authoring Books and Technical Documents with R Markdown*.

Books

R Programming for Data Science

by Roger D. Peng

2016-12-22

Star 63

The R programming language has become the de facto programming language for data science. Its flexibility, power, sophistication, and expressiveness have made it an invaluable tool for data scientists around the world. This book is about the fundamentals of R programming. You will get started with the basics of the language, learn how to manipulate datasets, how to write functions, and how to debug and optimize code. With the fundamentals provided in this book, you will have a solid foundation on which to build your data science toolbox. *Read more* →

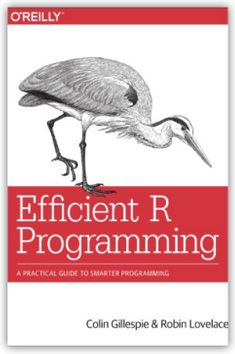
9

Efficient R programming

by Colin Gillespie, Robin Lovelace

2016-11-30

Star 452



Efficient R Programming is about increasing the amount of work you can do with R in a given amount of time. It's about both computational and programmer efficiency. […] This is the online version of the O'Reilly book: Efficient R programming. Pull requests and general comments are welcome. Colin Gillespie is Senior lecturer (Associate professor) at Newcastle University, UK. His research interests are high performance statistical computing and Bayesian statistics. He is regularly employed as a consultant by Jumping Rivers and has been teaching R since 2005 at a variety of levels, ranging … *Read more* →

10

https://www.rweekly.org/

Live

- hrbrthemes 0.6.0 on CRAN + Other In-Development Package News (rud.is)
- eventstudies Event Study Analysis (cran.r-project.org)
- CluMix Clustering and Visualization of Mixed-Type Data (cran.r-project.org)

More

R Weekly 2019-03 RStudio Conf 2019

21 Jan 2019

type to filter

Release Date: 2019-01-21

Highlight

- RStudio Conf 2019 Slides - Karl Broman
  - Contains workshop materials and presentation slides for RStudio Conf

  (github.com)
- The Unreasonable Effectiveness of Public Work (dropbox.com)
- Our Colour of Magic: The open sourcery of fantastic R packages (docs.google.com)

Insights

- You did a sentiment analysis with tidytext but you forgot to do dependency parsing to answer WHY is something positive/negative (bnosac.be)

https://community.rstudio.com/

https://stackoverflow.com/

https://github.com/USCbiostats/software-dev

Software Development Standards

This project's main contents is located in the project's Wiki:

Coding Standards

1. Coding Standards
2. Software Thinking
3. Development Workflow
4. Misc

We do have some direct guidelines developed as issue templates here.

Bioghost Server

1. Introduction
2. Setup
3. Cheat Sheet

HPC in R

- Parallel computing in R
- parallel
- iterators+foreach
- RcppArmadillo + OpenMP