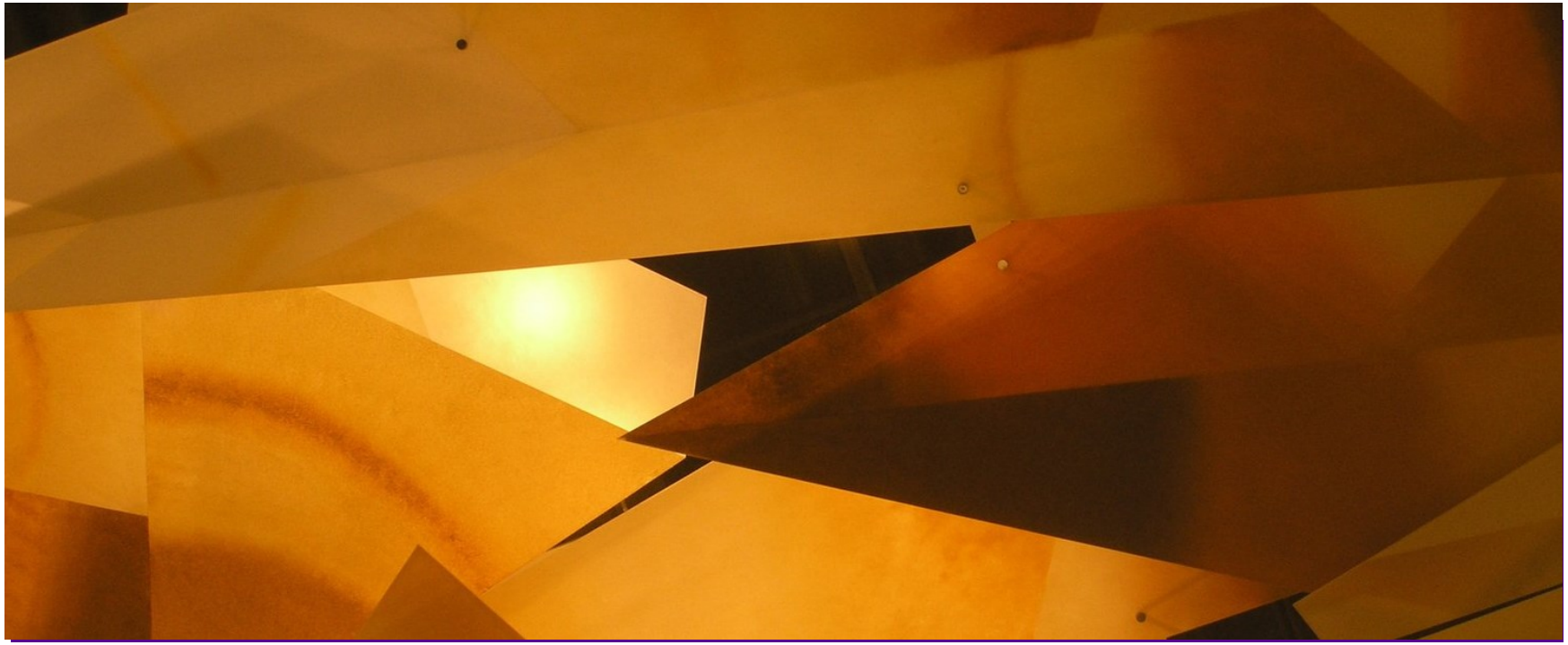
Installation of R & RStudio

Week #1 – Spring 2018



Learning Objectives

- The objective of this lecture is to introduce you to R and RStudio, which you'll be using throughout the course both to learn the concepts discussed in the textbook/class and also to analyze real data and come to informed conclusions.

- To straighten out which is which: R is the name of the programming language itself and RStudio is a convenient interface.

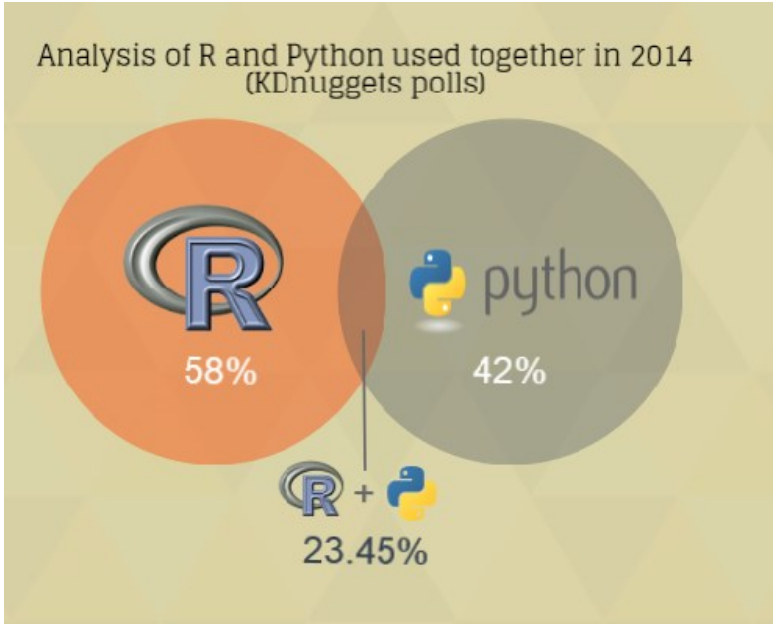
R IN CONTEXT

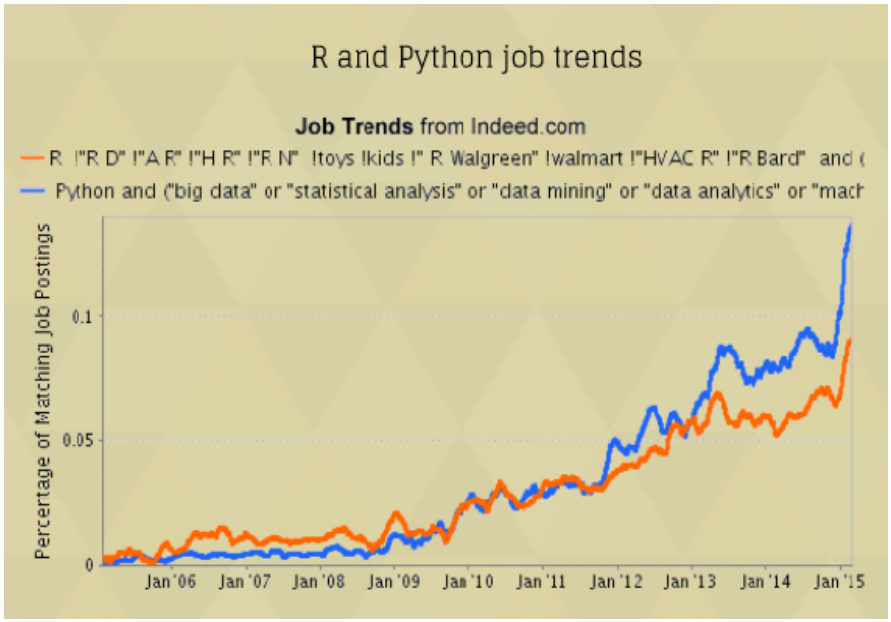
What is R

- R is an open source programming language released in 1995 by Ross Ihaka and Robert Gentleman to improve the visualization and data analysis features of a prior syntax such as S.
- R is named partly after the first names of the first two R authors and partly as a play on the name of S

R vs Python

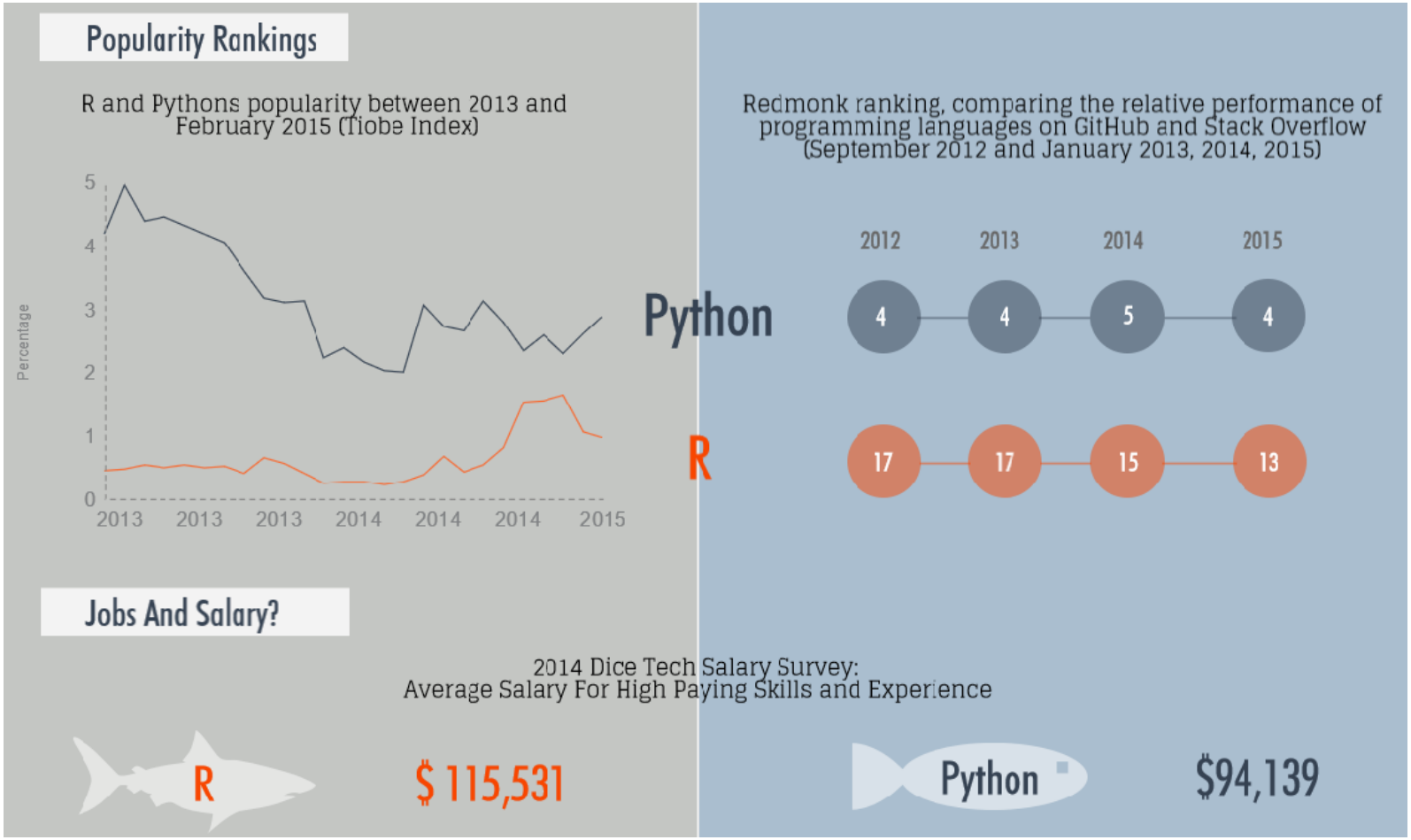
- R is mainly used for data analysis, while Python is used for general-purpose programing.





Reference: https://www.datacamp.com/community/tutorials/r-or-python-for-data-analysis#gs.8sCBxyM

R vs Python



Reference: https://www.datacamp.com/community/tutorials/r-or-python-for-data-analysis#gs.8sCBxyM

INSTALLATION OF R

Installing R

- R is available for free on the Comprehensive R Archive Network (CRAN) website
  - Step 1: Open the R Project Homepage: www.r-project.org
  - Step 2: Click on the "CRAN" link on the menu on the left-hand side of the page. Pick the server that is (geographically) closest to you.
  - Step 3: Find your operating system (Windows, Macintosh, Linux, etc.) under "Precompiled Binary Distributions". These are the ready-to-install files containing the base R package, and are the easiest way to get R up and running on your machine.

Installing R

- Windows:
  - Click Download R for Windows.
  - Click base.
  - Click Download R 3.3.2 for Windows. Save it to a file on your hard drive. (Note: the installation file is about 52 Megabytes. If you have a slow Internet connection, download the installation file on a machine with a fast connection.
  - Find the installation file "R-3.3.2-win.exe" on your hard drive.
  - Close all other programs before beginning the installation.
  - Run the installation program with administrative privileges.

Installing R

- Mac OS X :
  - Click Download R for (Mac) OS X.
  - Click R-3.1.2.pkg.
  - Older version for old Mac OS X systems are also available.
  - To install R, simply double-click on the icon of the package file.

- Linux
  - Follow the instruction to install appropriate package

Installing R - Demo

www.r-project.org

About R
What is R?
Contributors
Screenshots
What's new?

Download, Packages
CRAN

R Project
Foundation
Members & Donors
Mailing Lists
Bug Tracking
Developer Page
Conferences
Search

Documentation
Manuals
FAQs
The R Journal
Wiki
Books
Certification
Other

Misc
Bioconductor
Related Projects
User Groups
Links

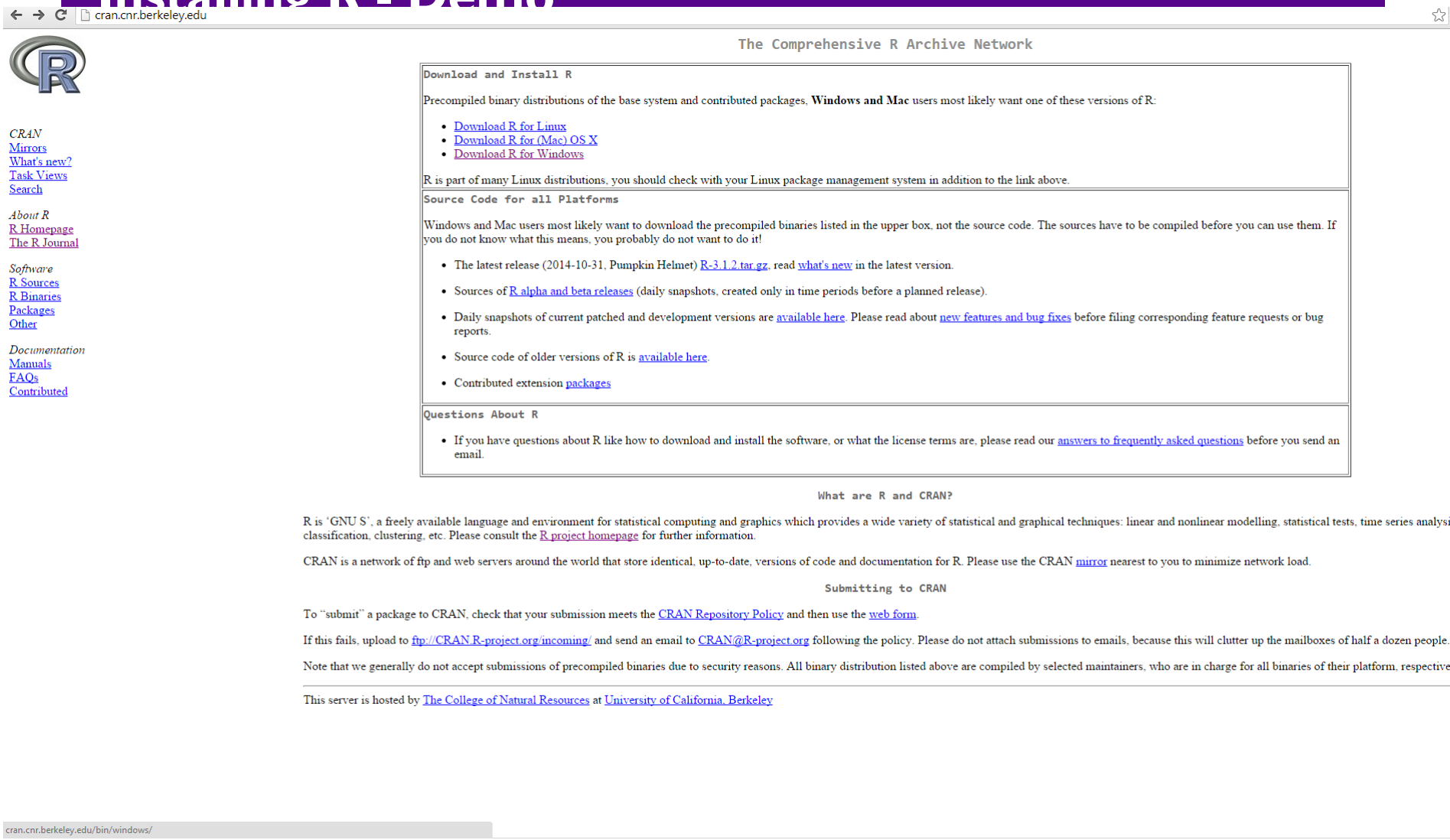
http://cran.mirror.ac.za/	TENET, Johannesburg
Spain	
http://cran.es.r-project.org/	Spanish National Research Network, Madrid
Sweden	
http://ftp.sunet.se/pub/lang/CRAN/	Swedish University Computer Network, Uppsala
Switzerland	
http://stat.ethz.ch/CRAN/	ETH Zuerich
Taiwan	
http://cran.cs.pu.edu.tw/	Providence University, Taichung
http://cran.csie.ntu.edu.tw/	National Taiwan University, Taipei
Thailand	
http://mirrors.psu.ac.th/pub/cran/	Prince of Songkla University, Hatyai
Turkey	
http://cran.pau.edu.tr	Pamukkale University, Denizli
UK	
http://www.stats.bris.ac.uk/R/	University of Bristol
http://cran.ma.imperial.ac.uk/	Imperial College London
http://mirror.mdx.ac.uk/R/	Middlesex University London
http://star-www.st-andrews.ac.uk/cran/	St Andrews University
USA	
http://cran.cnr.Berkeley.edu	University of California, Berkeley, CA
http://cran.stat.ucla.edu/	University of California, Los Angeles, CA
http://streaming.stat.iastate.edu/CRAN/	Iowa State University, Ames, IA
http://ftp.ussg.iu.edu/CRAN/	Indiana University
http://rweb.quant.ku.edu/cran/	University of Kansas, Lawrence, KS
http://watson.nci.nih.gov/cran_mirror/	National Cancer Institute, Bethesda, MD
http://cran.mtu.edu/	Michigan Technological University, Houghton, MI
http://cran.wustl.edu/	Washington University, St. Louis, MO
http://cran.case.edu/	Case Western Reserve University, Cleveland, OH
http://ftp.osuosl.org/pub/cran/	Oregon State University
http://lib.stat.cmu.edu/R/CRAN/	Statlib, Carnegie Mellon University, Pittsburgh, PA
http://cran.mirrors.hoobly.com	Hoobly Classifieds, Pittsburgh, PA
http://mirrors.nics.utk.edu/cran/	National Institute for Computational Sciences, Oak Ridge, TN
http://cran.revolutionanalytics.com	Revolution Analytics, Dallas, TX
http://cran.fhcrc.org/	Fred Hutchinson Cancer Research Center, Seattle, WA
http://cran.cs.wwu.edu/	Western Washington University, Bellingham, WA
Venezuela	
http://camoruco.ing.uc.edu.ve/cran/	Universidad de Carabobo Venezuela
Vietnam	
http://cran.vinastat.com/	VinaStat.com

Many of these sites can also be accessed using FTP. In addition, several StatLib mirrors around the world provide a complete CRAN mirror.

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

To "submit" to CRAN, simply upload to ftp://cran.r-project.org/incoming and send email to cran@r-project.org. Please indicate the copyright situation (GPL, ...) in your submission.

Installing R - Demo



Installing R - Demo

cran.cnr.berkeley.edu

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

R for Windows

Subdirectories:

base	Binaries for base distribution (managed by Duncan Murdoch). This is what you want to **install R for the first time**.
contrib	Binaries of contributed packages (managed by Uwe Ligges). There is also information on third party software available for CRAN Windows services and corresponding environment and make variables.
Rtools	Tools to build R and R packages (managed by Duncan Murdoch). This is what you want to build your own packages on Windows, or to build R itself.

Please do not submit binaries to CRAN. Package developers might want to contact Duncan Murdoch or Uwe Ligges directly in case of questions / suggestions related to Windows binaries.

You may also want to read the R FAQ and R for Windows FAQ.

Note: CRAN does some checks on these binaries for viruses, but cannot give guarantees. Use the normal precautions with downloaded executables.

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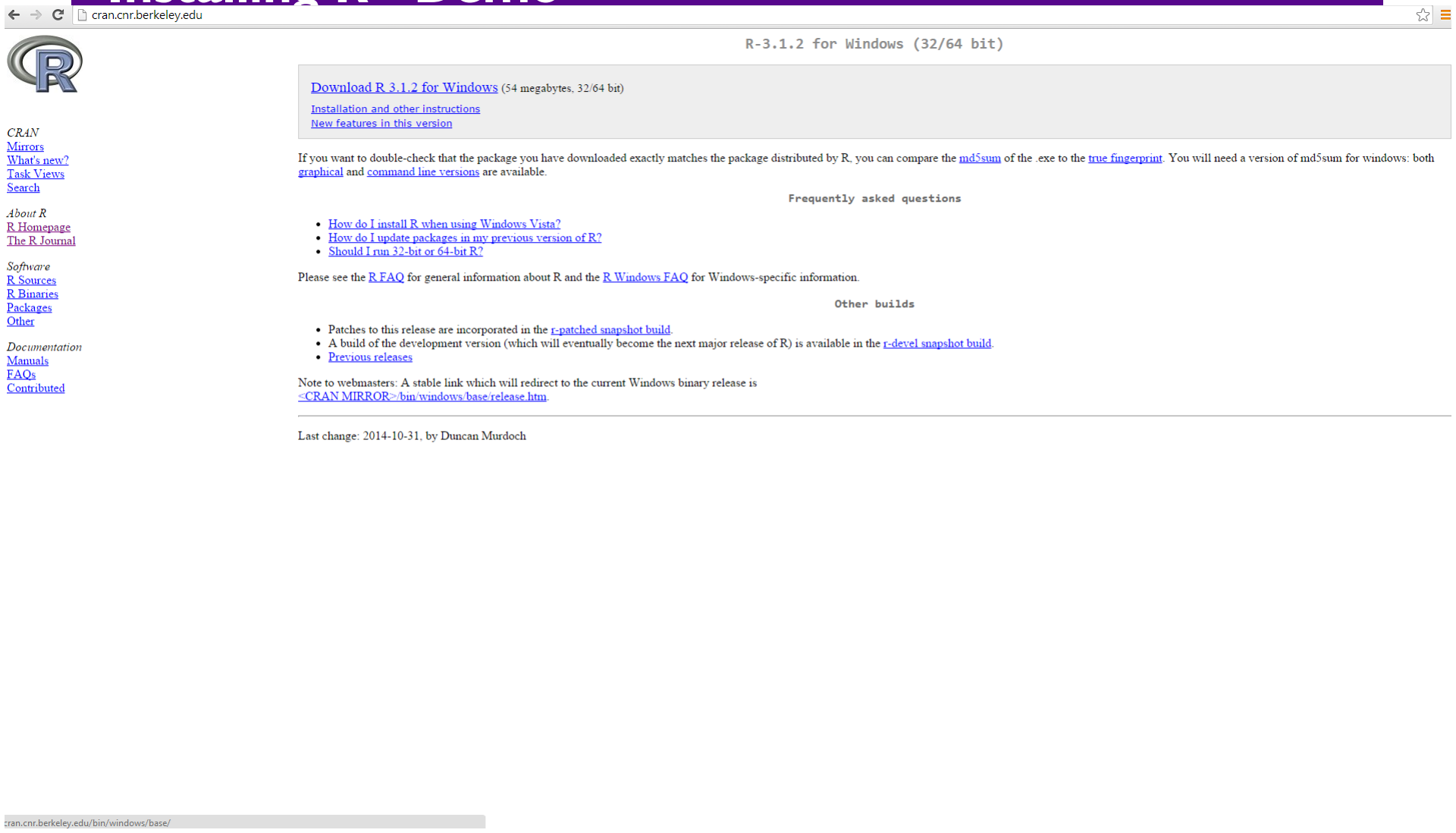
Installing R - Demo



INSTALLATION OF RSTUDIO

RStudio

- RStudio IDE is a powerful and productive user interface for R. It's free and open source, and works great on Windows, Mac, and Linux.
- Download: www.rstudio.com

RStudio

RStudio

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open source and enterprise-ready professional software for R

shinyapps.io Login

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RStudio

RStudio makes R easier to use. It includes a code editor, debugging & visualization tools.

Download Learn More

Shiny

Shiny helps you make interactive web applications for visualizing data. Bring R data analysis to life.

Learn More

R Packages

Our developers create popular packages to expand the features of R. Includes ggplot2, dplyr, R Markdown & more.

Learn More

RStudio

	RStudio Desktop Open Source License FREE	RStudio Desktop Commercial License $995 per year	RStudio Server Open Source License FREE	RStudio Server Pro Commercial License $9,995 per year
Integrated Tools for R	●	●	●	●
Priority Support		●		●
Access via Web Browser			●	●
Enterprise Security				●
Project Sharing				●
Manage Multiple R Sessions & Versions				●
Admin Dashboard				●
Load Balancing				●
License	AGPL	Commercial	AGPL	Commercial
Pricing	FREE	$995/yr	FREE	$9,995/yr
	DOWNLOAD	BUY NOW	DOWNLOAD	DOWNLOAD
	Learn More	Learn More	Learn More	Learn More

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RStudio

RStudio Desktop 1.0.136 — Release Notes

RStudio requires R 2.11.1+. If you don't already have R, download it here.

Installers for Supported Platforms

Installers	Size	Date	MD5
RStudio 1.0.136 - Windows Vista/7/8/10	81.9 MB	2016-12-21	93b3f307f567c33f7a4db4c114099b3e
RStudio 1.0.136 - Mac OS X 10.6+ (64-bit)	71.2 MB	2016-12-21	12d6d6ade0203a2fcef6fe3dea65c1ae
RStudio 1.0.136 - Ubuntu 12.04+/Debian 8+ (32-bit)	85.5 MB	2016-12-21	0a20fb89d8aaeb39b329a640ddadd2c5
RStudio 1.0.136 - Ubuntu 12.04+/Debian 8+ (64-bit)	92.1 MB	2016-12-21	2a73b88a12a9fbaf96251cecf8b41340
RStudio 1.0.136 - Fedora 19+/RedHat 7+/openSUSE 13.1+ (32-bit)	84.7 MB	2016-12-21	fa6179a7855bff0f939a34c169da45fd
RStudio 1.0.136 - Fedora 19+/RedHat 7+/openSUSE 13.1+ (64-bit)	85.7 MB	2016-12-21	2b3a148ded380b704e58496befb55545

Zip/Tarballs

Zip/tar archives	Size	Date	MD5
RStudio 1.0.136 - Windows Vista/7/8/10	117.5 MB	2016-12-21	f415939bf5012c0ab127c7cfbc9600be
RStudio 1.0.136 - Ubuntu 12.04+/Debian 8+ (32-bit)	86.2 MB	2016-12-21	fca75f953dd425694b7fd4335bd29165
RStudio 1.0.136 - Ubuntu 12.04+/Debian 8+ (64-bit)	93.2 MB	2016-12-21	7cf0092653aa44fc76325a8f1325fb1f
RStudio 1.0.136 - Fedora 19+/RedHat 7+/openSUSE 13.1+ (32-bit)	85.4 MB	2016-12-21	30c89299d30ec03b38098e51e9bf49b8
RStudio 1.0.136 - Fedora 19+/RedHat 7+/openSUSE 13.1+ (64-bit)	86.6 MB	2016-12-21	ea2a262f650e92f568f48edc1c093902

Source Code

A tarball containing source code for RStudio v1.0.136 can be downloaded from here

R Interface

RGui (64-bit)

File History Resize Windows

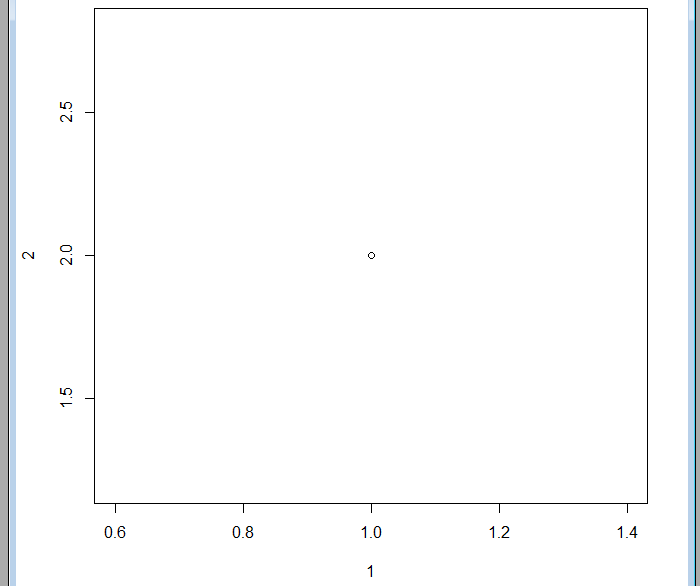
R Console

```
 Version 1.5.2 installed in C:/Users/Traffic/Documents/R/win-library/3.0
 Version 1.6.1 available at http://cran.cs.wwu.edu
Update (y/N/c)?  y
R.oo :
 Version 1.15.8 installed in C:/Users/Traffic/Documents/R/win-library/3.0
 Version 1.17.0 available at http://cran.cs.wwu.edu
Update (y/N/c)?  y
R.utils :
 Version 1.27.1 installed in C:/Users/Traffic/Documents/R/win-library/3.0
 Version 1.28.4 available at http://cran.cs.wwu.edu
Update (y/N/c)?  y
RODBC :
 Version 1.3-9 installed in C:/Users/Traffic/Documents/R/win-library/3.0
 Version 1.3-10 available at http://cran.cs.wwu.edu
Update (y/N/c)?  y
foreign :
 Version 0.8-55 installed in C:/Program Files/R/R-3.0.2/library
 Version 0.8-59 available at http://cran.cs.wwu.edu

Update (y/N/c)?  >
> plot(1,2)
>
```

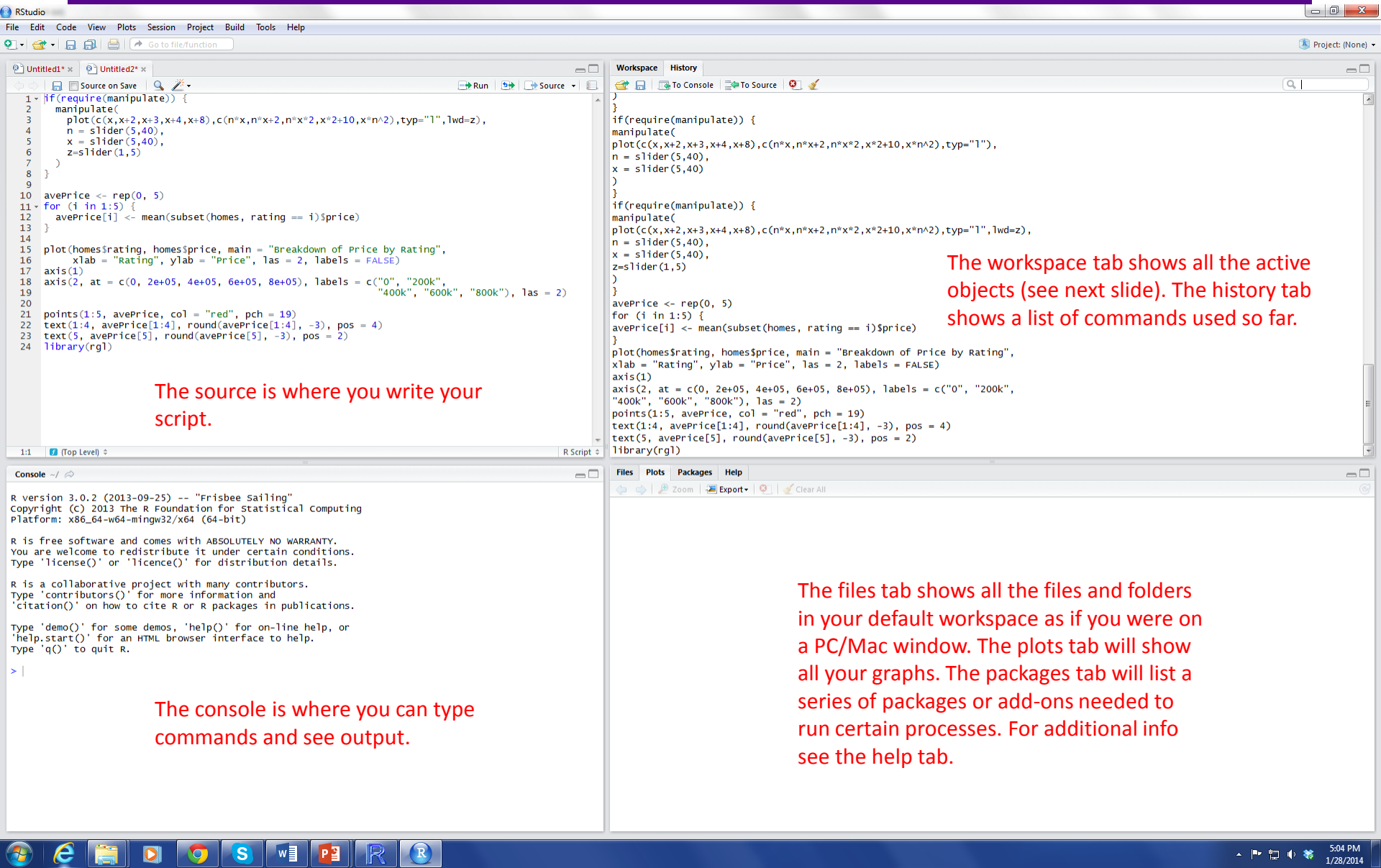
Untitled - R Editor

R Graphics: Device 2 (ACTIVE)



5:05 PM
1/28/2014

RStudio Interface



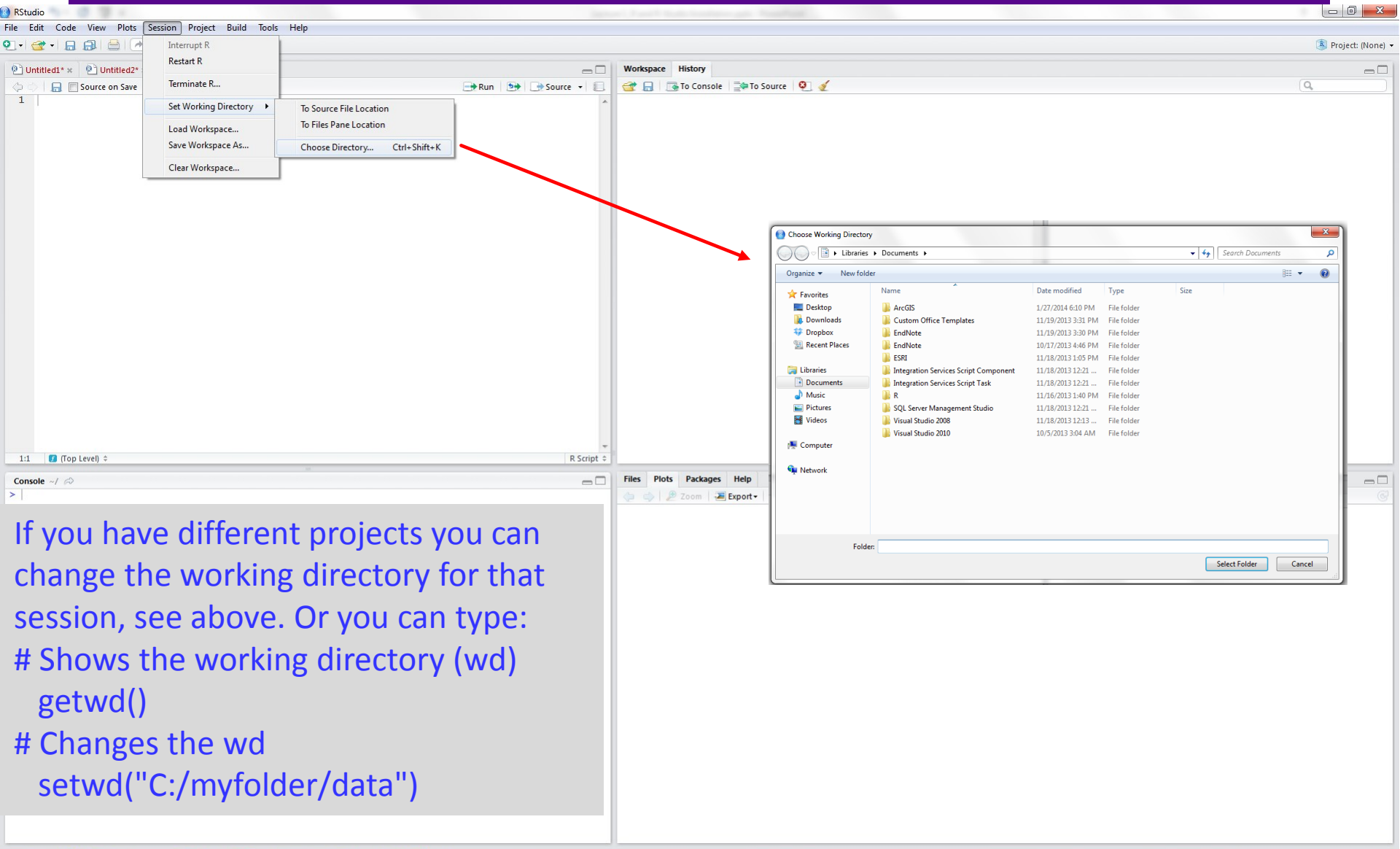
The source is where you write your script.

The workspace tab shows all the active objects (see next slide). The history tab shows a list of commands used so far.

The console is where you can type commands and see output.

The files tab shows all the files and folders in your default workspace as if you were on a PC/Mac window. The plots tab will show all your graphs. The packages tab will list a series of packages or add-ons needed to run certain processes. For additional info see the help tab.

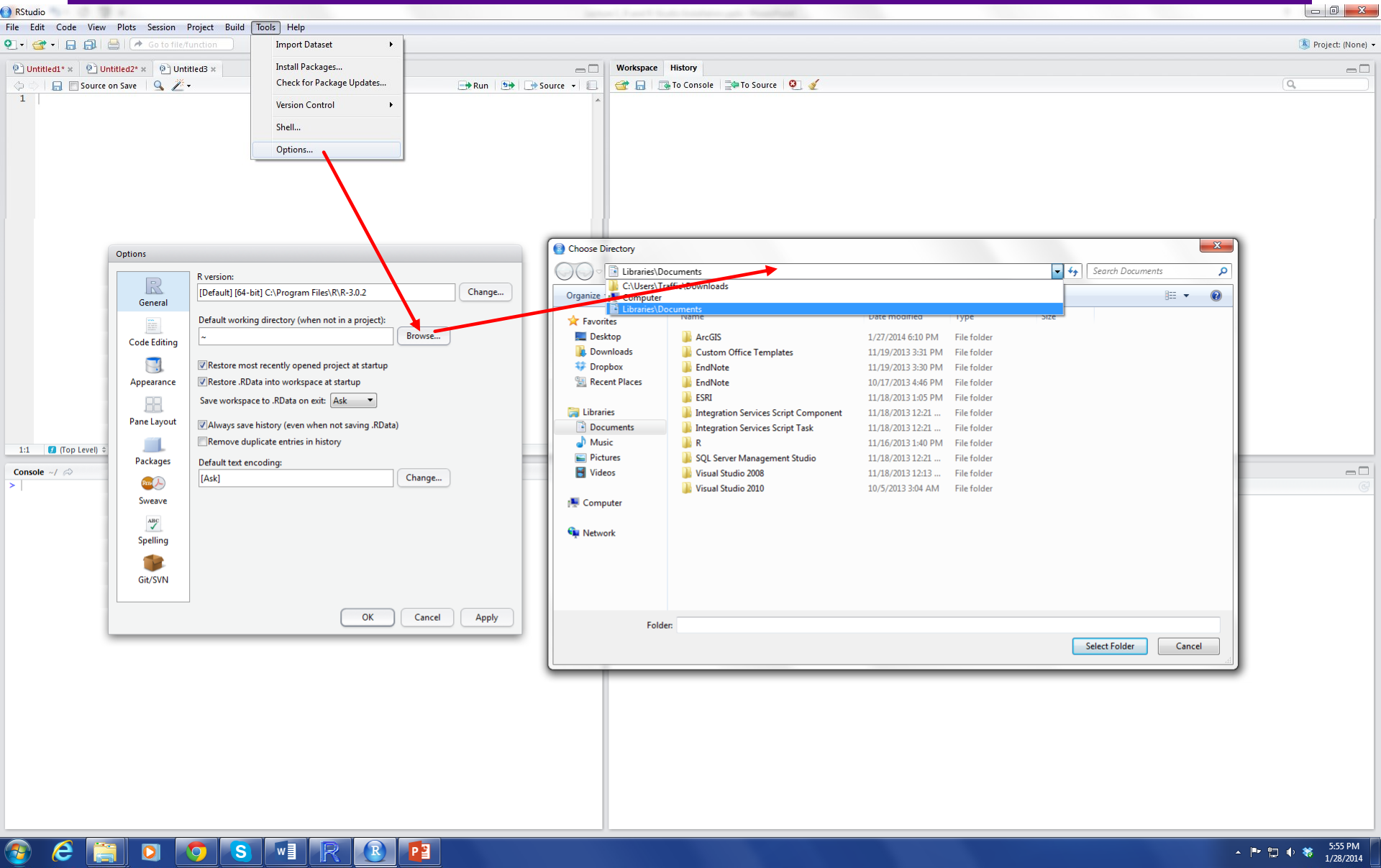
Change Working Directory



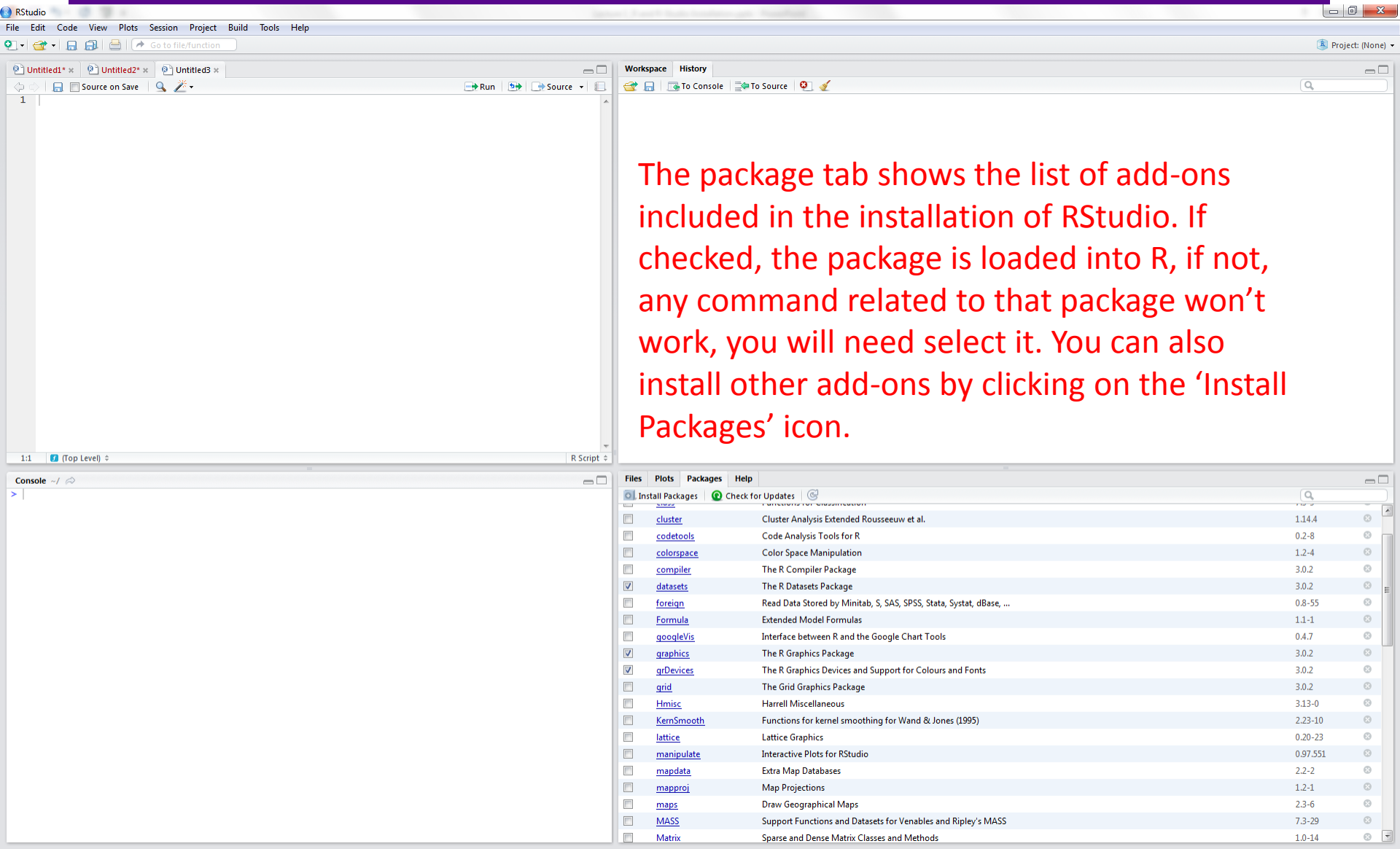
If you have different projects you can change the working directory for that session, see above. Or you can type:

```
# Shows the working directory (wd)
  getwd()
# Changes the wd
  setwd("C:/myfolder/data")
```

Setup a Default Working Directory



Installing and Using Packages



The package tab shows the list of add-ons included in the installation of RStudio. If checked, the package is loaded into R, if not, any command related to that package won't work, you will need select it. You can also install other add-ons by clicking on the 'Install Packages' icon.

Installing and Using Packages

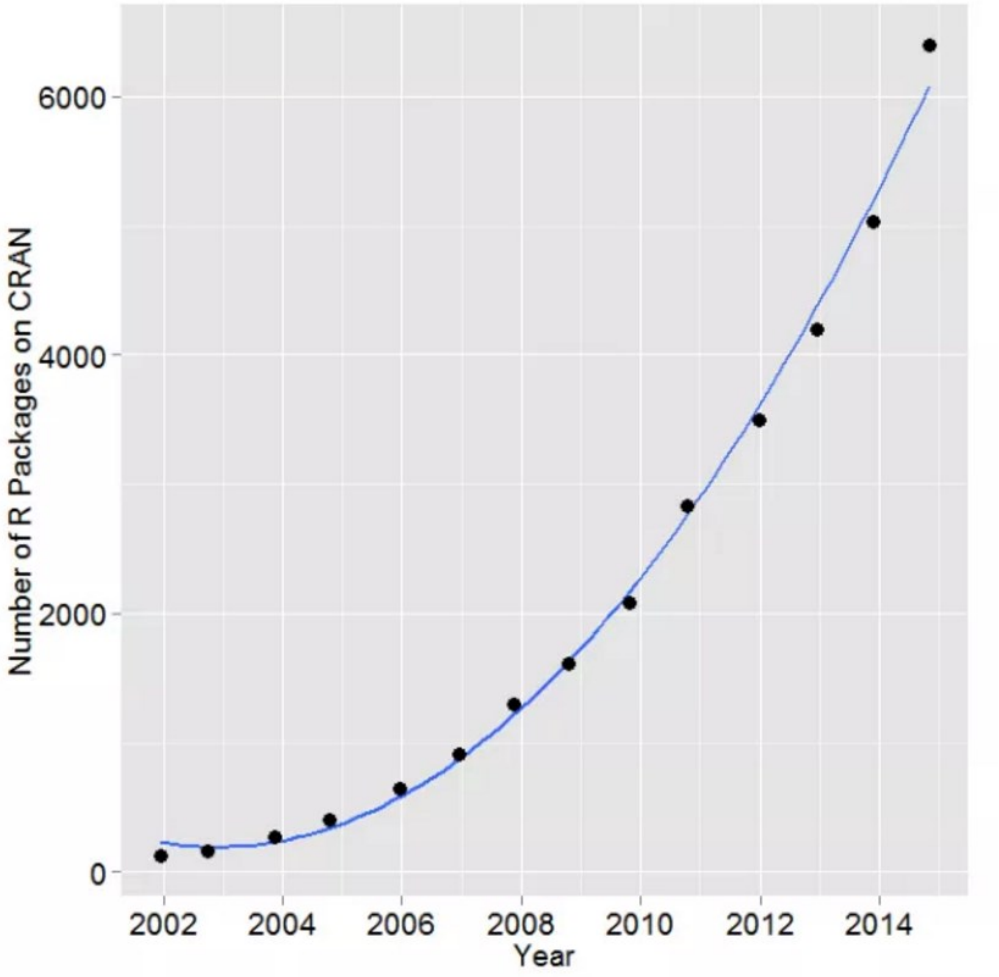
This is how to do it from the command line: i.e.,

```
install.packages('googleVis')
```

In each new R session where you use the package, you will have to load it:

```
library('googleVis')
```

R's Growth Continues to Accelerate



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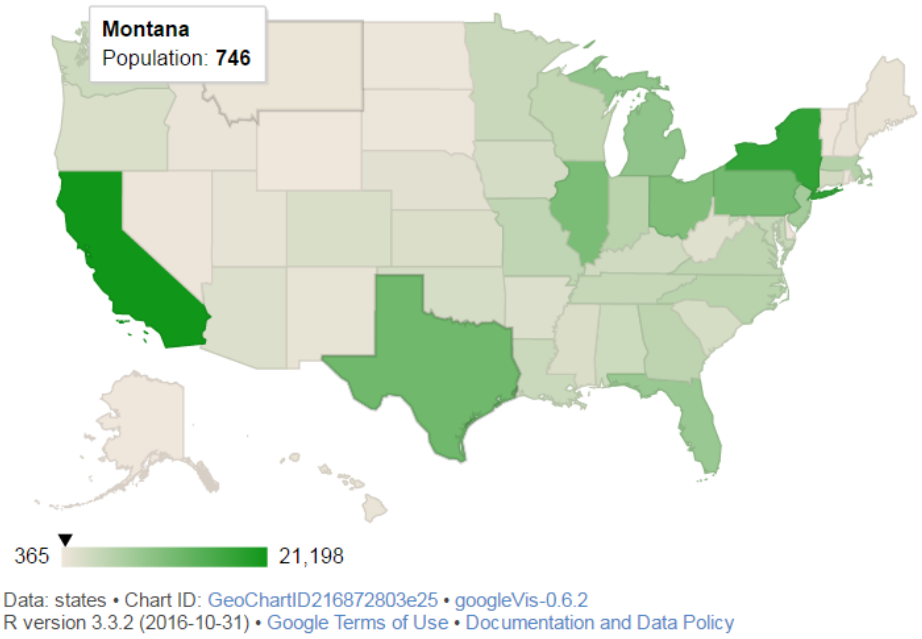
Example 1: Showing US Data by State

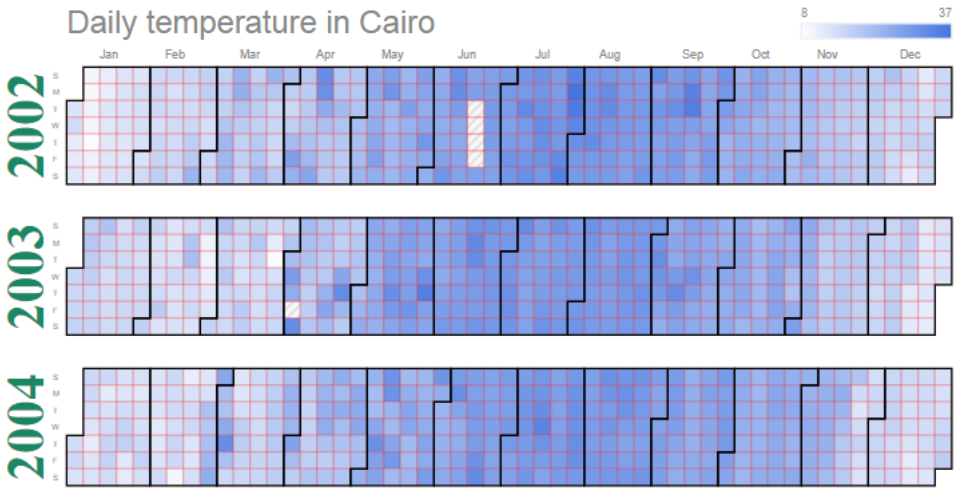
```
install.packages('googleVis')
library(googleVis)
library(datasets)
states <- data.frame(state.name, state.x77)
GeoStates <- gvisGeoChart(states, "state.name",
"Population",
                options=list(region="US",
                        displayMode="regions",
                        resolution="provinces",
                        width=600, height=400))
plot(GeoStates)
```



Source: googleVis package

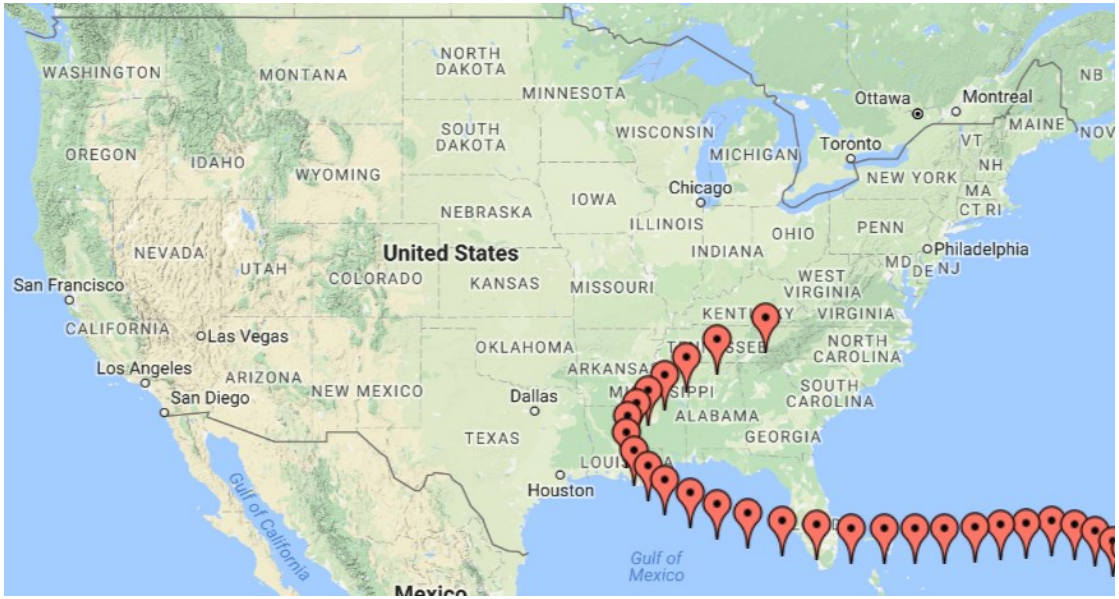
Example 2: Daily Temperature in Cairo

```
Cal <- gvisCalendar(Cairo,
                    datevar="Date",
                    numvar="Temp",
                    options=list(
                        title="Daily temperature in
Cairo",
                        height=320,
                        calendar="{yearLabel: {
fontName: 'Times-Roman',
                        fontSize: 32, color: '#1A8763',
bold: true},
                        cellSize: 10,
                        cellColor: { stroke: 'red',
strokeOpacity: 0.2 },
                        focusedCellColor:
{stroke:'red'}}"))
plot(Cal)
```



Source: googleVis package

Example 3: Show Storm track with Markers




```
AndrewMap <- gvisMap(Andrew, "LatLong" , "Tip",
                     options=list(showTip=TRUE,
                                  showLine=TRUE,
                                  enableScrollWheel=TRUE,
                                  mapType='terrain',
                                  useMapTypeControl=TRUE))
plot(AndrewMap)
```

Source: googleVis package

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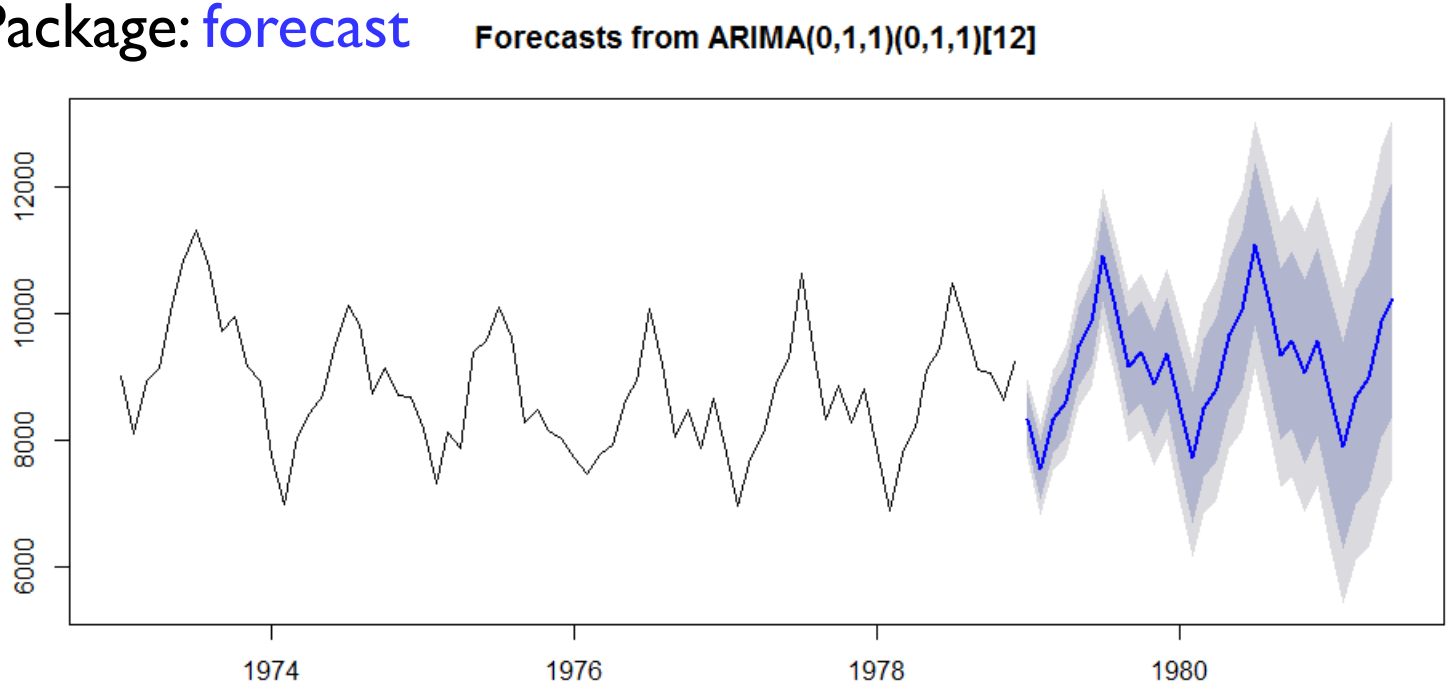
Example 4: Modeling US Accident Deaths

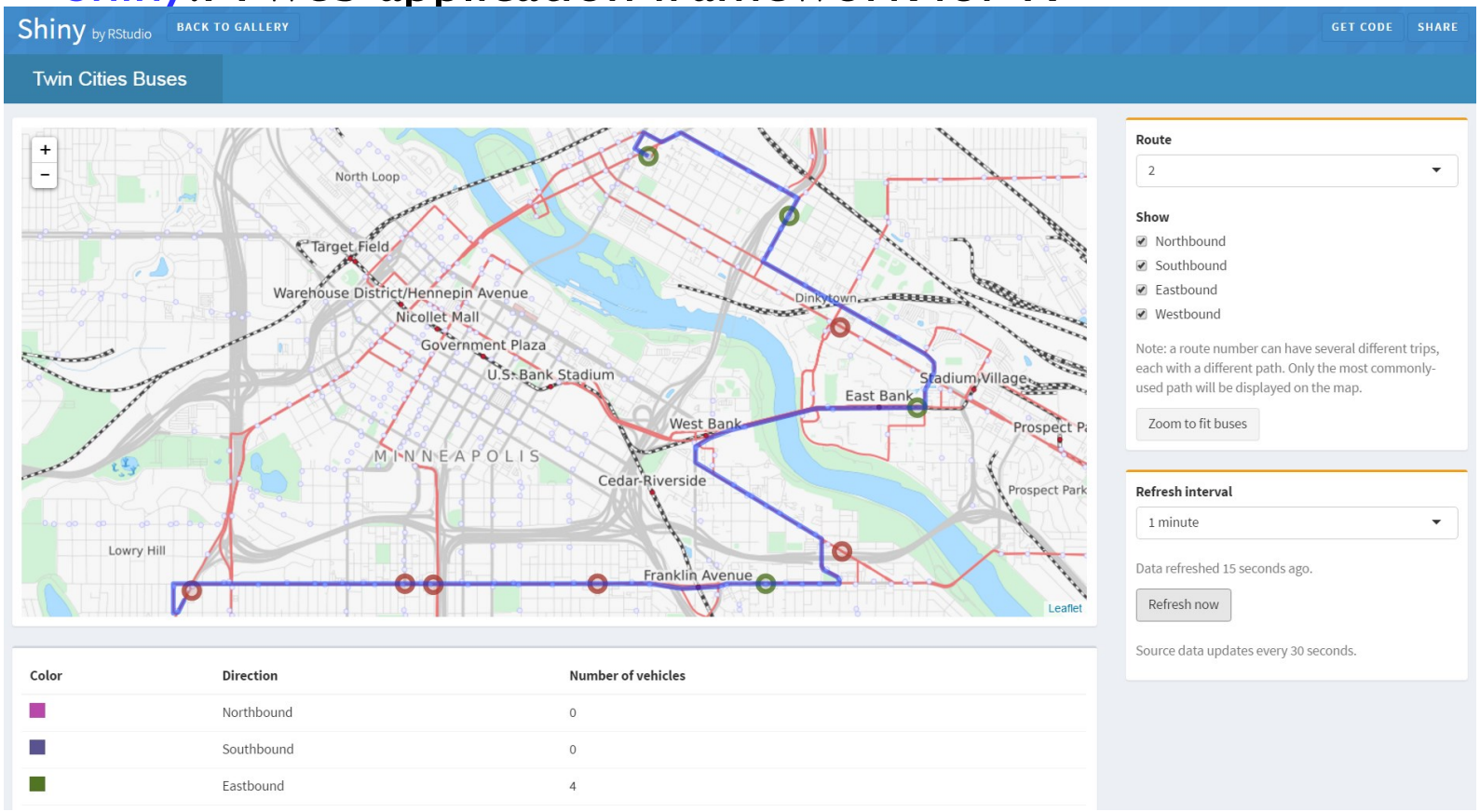
- Package: forecast




```
install.packages("forecast")
library("forecast")
fit <- auto.arima(USAccDeaths)
plot(forecast(fit,h=30))
```

Example 5: Bus Dashboard

- Shiny: A web application framework for R



Reference: https://shiny.rstudio.com/gallery/bus-dashboard.html

References

- **Cookbook for R:** http://www.cookbook-r.com/
- **An Introduction to R:** http://cran.r-project.org/doc/manuals/R-intro.pdf
- **Google's R Style Guide:** https://google.github.io/styleguide/Rguide.xml

Homework

- Install R and RStudio in your own laptops before the next class

Thank You!

http://engineering.nyu.edu/citysmart/

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