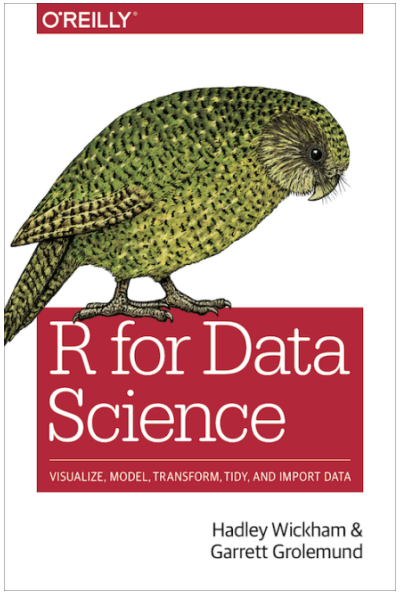
# Introduction to data science with R and the tidyverse

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# The “Excel view” of data, a.k.a. “wide” format

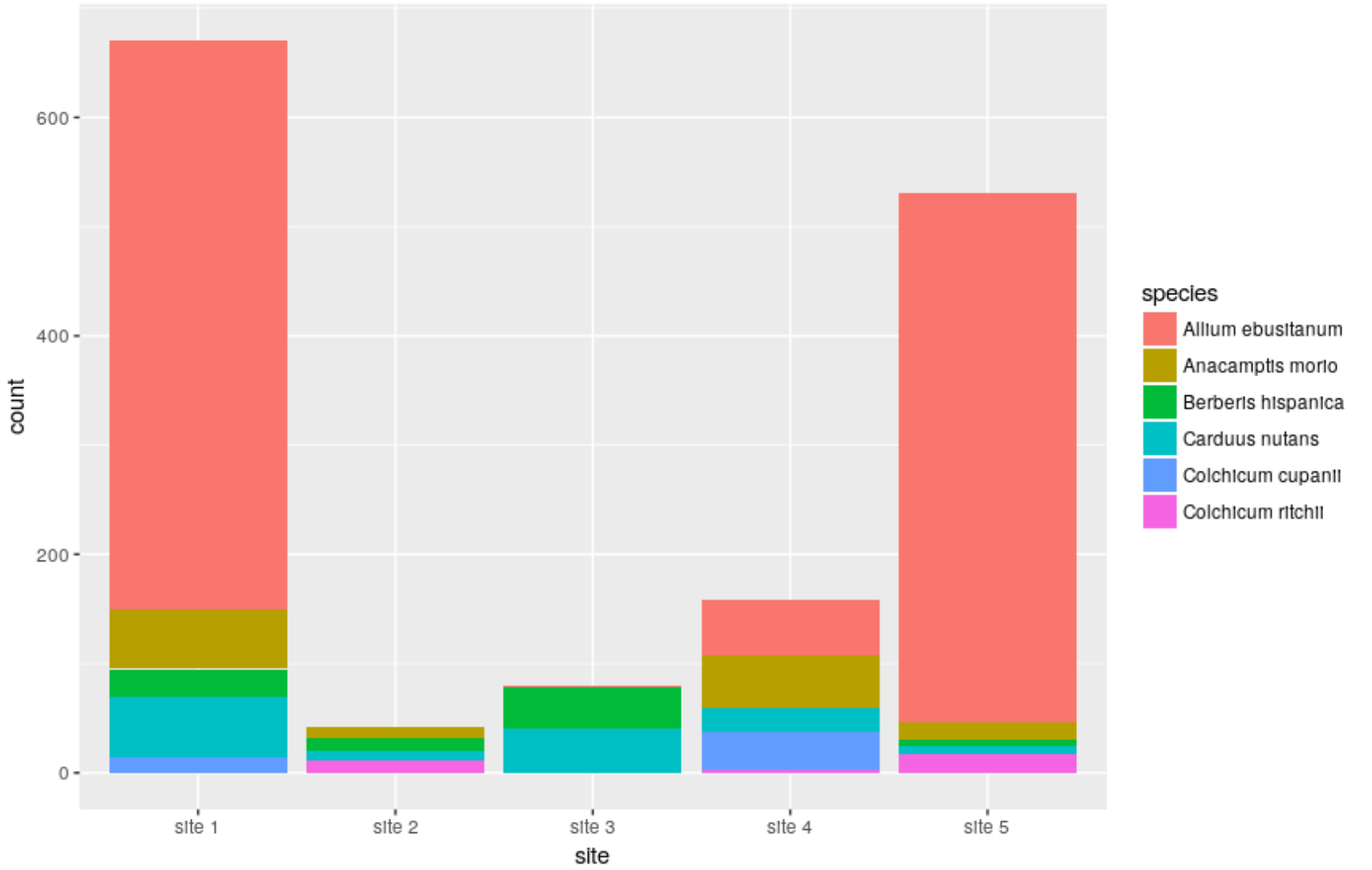
| species | order | site 1 | site 2 | site 3 | site 4 | site 5 |
|---|---|---|---|---|---|---|
| *Berberis hispanica* | *Ranunculales* | 26 | 12 | 37 | 0 | 5 |
| *Allium ebusitanum* | *Asparagales* | 521 | 0 | 2 | 51 | 485 |
| *Anacamptis morio* | *Asparagales* | 54 | 10 | 0 | 48 | 16 |
| *Carduus nutans* | *Asterales* | 55 | 8 | 41 | 23 | 8 |
| *Colchicum cupanii* | *Liliales* | 14 | 0 | 0 | 34 | 0 |
| *Colchicum ritchii* | *Liliales* | 0 | 12 | 0 | 3 | 17 |



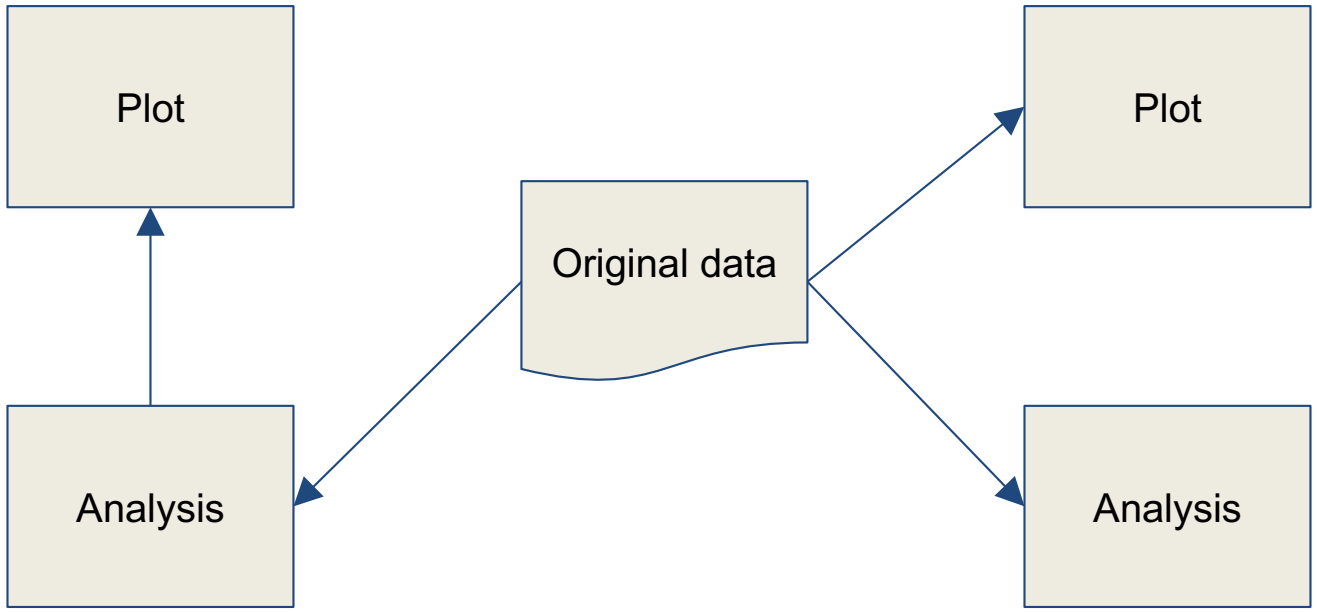
# The “data view” of data, a.k.a. “long” format

| species | order | site | count |
|---|---|---|---|
| Berberis hispanica | Ranunculales | site 1 | 26 |
| Allium ebusitanum | Asparagales | site 1 | 521 |
| Anacamptis morio | Asparagales | site 1 | 54 |
| Carduus nutans | Asterales | site 1 | 55 |
| Colchicum cupanii | Liliales | site 1 | 14 |
| Colchicum ritchii | Liliales | site 1 | 0 |
| Berberis hispanica | Ranunculales | site 2 | 12 |
| Allium ebusitanum | Asparagales | site 2 | 0 |
| Anacamptis morio | Asparagales | site 2 | 10 |
| Carduus nutans | Asterales | site 2 | 8 |
| Colchicum cupanii | Liliales | site 2 | 0 |
| Colchicum ritchii | Liliales | site 2 | 12 |
| Berberis hispanica | Ranunculales | site 3 | 37 |
| Allium ebusitanum | Asparagales | site 3 | 2 |

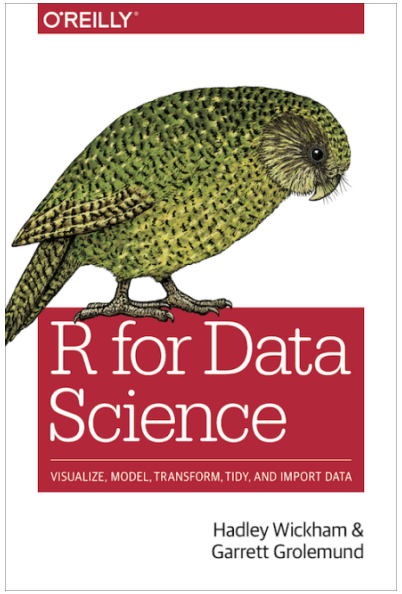



600
400
200
0
count
site 1
site 2
site 3
site 4
site 5
site
species
Allium ebusitanum
Anacamptis morio
Berberis hispanica
Carduus nutans
Colchicum cupanii
Colchicum ritchii

# You need to be good at format conversion...




# Tidyverse




http://r4ds.had.co.nz/

```
> install.packages('tidyverse')
> library(tidyverse)
```

https://www.tidyverse.org/

# RStudio

https://www.rstudio.com/

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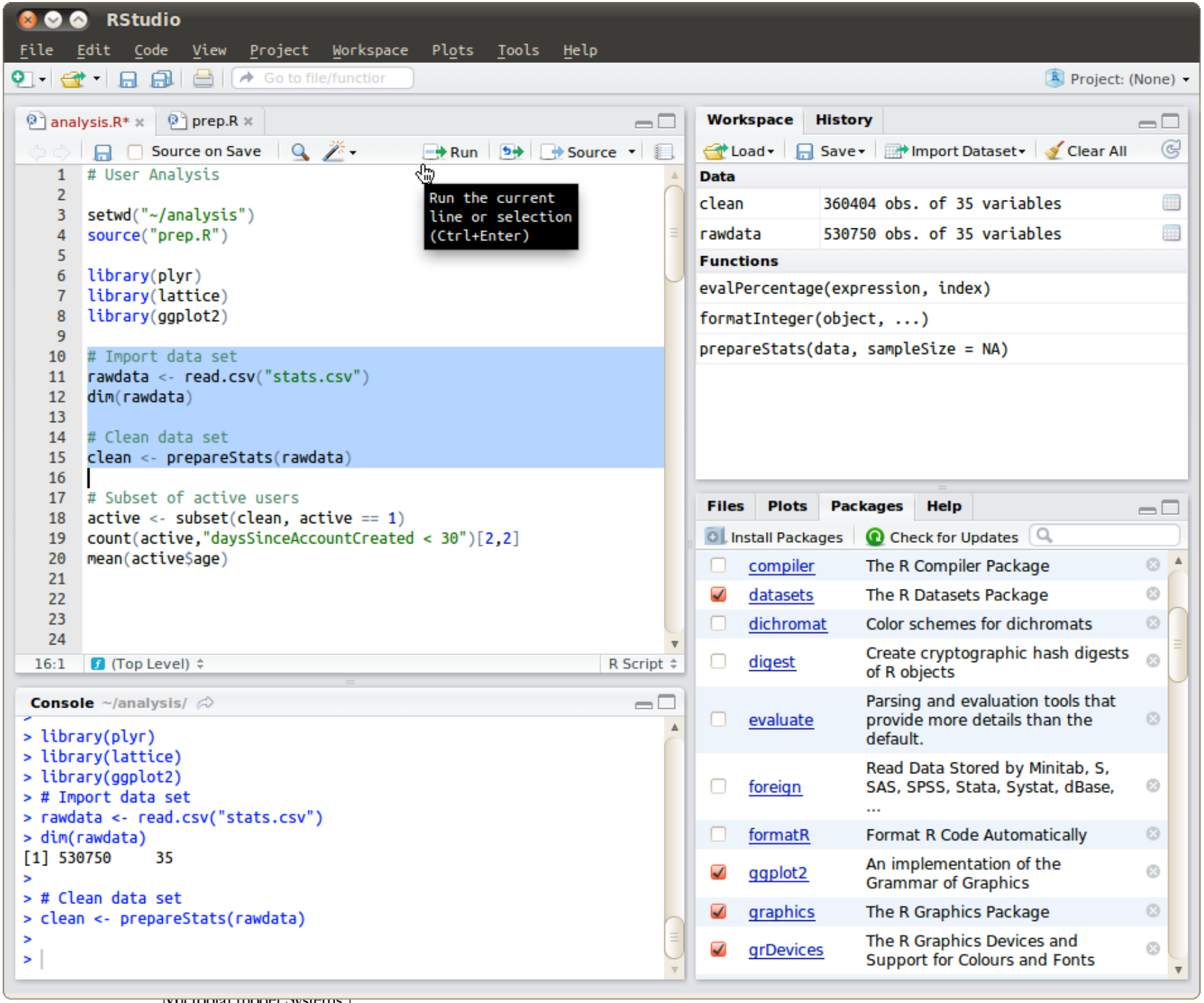
RStudio
File Edit Code View Project Workspace Plots Tools Help
Go to file/function
Project: (None)
analysis.R*
prep.R
Source on Save
Run
Source
Run the current line or selection (Ctrl+Enter)
1 # User Analysis
2
3 setwd("~/analysis")
4 source("prep.R")
5
6 library(plyr)
7 library(lattice)
8 library(ggplot2)
9
10 # Import data set
11 rawdata <- read.csv("stats.csv")
12 dim(rawdata)
13
14 # Clean data set
15 clean <- prepareStats(rawdata)
16
17 # Subset of active users
18 active <- subset(clean, active == 1)
19 count(active,"daysSinceAccountCreated < 30")[2,2]
20 mean(active$age)
21
22
23
24
16:1 (Top Level) R Script
Workspace History
Load Save Import Dataset Clear All
Data
clean 360404 obs. of 35 variables
rawdata 530750 obs. of 35 variables
Functions
evalPercentage(expression, index)
formatInteger(object, ...)
prepareStats(data, sampleSize = NA)
Files Plots Packages Help
Install Packages Check for Updates
compiler The R Compiler Package
datasets The R Datasets Package
dichromat Color schemes for dichromats
digest Create cryptographic hash digests of R objects
evaluate Parsing and evaluation tools that provide more details than the default.
foreign Read Data Stored by Minitab, S, SAS, SPSS, Stata, Systat, dBase, ...
formatR Format R Code Automatically
ggplot2 An implementation of the Grammar of Graphics
graphics The R Graphics Package
grDevices The R Graphics Devices and Support for Colours and Fonts
Console ~/analysis/
> library(plyr)
> library(lattice)
> library(ggplot2)
> # Import data set
> rawdata <- read.csv("stats.csv")
> dim(rawdata)
[1] 530750 35
>
> # Clean data set
> clean <- prepareStats(rawdata)
>
>

# What I expect from you

1. No knowledge of R
2. Knowledge of “base” R
3. Knowledge of tidyverse R
4. You prefer Python, Perl, Ruby, ...

“Daniel, I’m not following!”



# What to show (notes to myself)

- `readr:  read_tsv()/write_tsv()`
- `tidyr:  gather()/spread()`
- `tidyr:  separate()/unite()`
- `dplyr:  filter()/select()`
- `dplyr:  group_by() and summarise()`
- `dplyr:  union()/inner_join()` *et al.*
- `ggplot2: ggplot(): geom_col(), geom_point(), facet_wrap()`