

```
library(dplyr)  
  
rladies_global %>%  
  filter(city == 'Amsterdam')
```

Wifi: Uva Open Wifi



Please make sure you downloaded

- 1) R & RStudio
- 2) **Workshop materials:**

https://github.com/rjladiesamsterdam/workshop_may_2018

Introduction to R (for Data Science)

May 24th, 2018



Welcome!

You are in the right
place!

Whether you are an R novice or R expert, this
group is for you!



Ok if we take pictures?



Otherwise, let us know!

Code of conduct



Everyone participating must agree on the code of conduct.

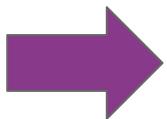
Excerpt:

R-Ladies is dedicated to providing a harassment-free experience for everyone. We do not tolerate harassment of participants in any form.



Read the full version here:

<https://rladies.org/code-of-conduct/>



Ensures that environment of meetups stay **safe** and **friendly!**

Schedule

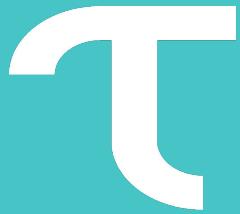


- | | |
|---------------------|--|
| 19.00- 19.10 | <ul style="list-style-type: none">• Tiqets by Uri Shimron |
| 19.10- 19.15 | <ul style="list-style-type: none">• R- Ladies Amsterdam by Janine Khuc |
| 19.15- 19.20 | <ul style="list-style-type: none">• Introduction to R by Janine Khuc |
| 19.15- 20.30 | <ul style="list-style-type: none">• Basics of R & hands- on R by Ilse Pit |
| 20.30- 20.40 | <ul style="list-style-type: none">• Break |
| 20.40- 21.15 |  && Lightning Talks |



Thanks to Tiqets for sponsoring food
& drinks for today's workshop!





Data @ Tiqets

Uri Shimron

R-Ladies meetup 2018-05-24



Tiqets

www.tiqets.com

Tiqets sells tickets to over a thousand museums and attractions worldwide

- Started in 2014, we are one of the fastest growing start-ups in **Europe**.
- Started in the city of Amsterdam, we are now present in all the major European and American cities. Expanding in Asia.



Our goals



Book on the go



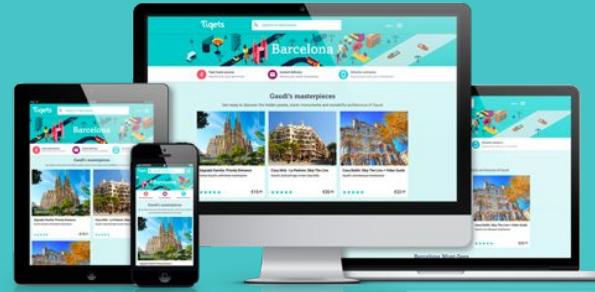
Instant delivery



Mobile entrance

Tiqets is polyglot and multi-card payment

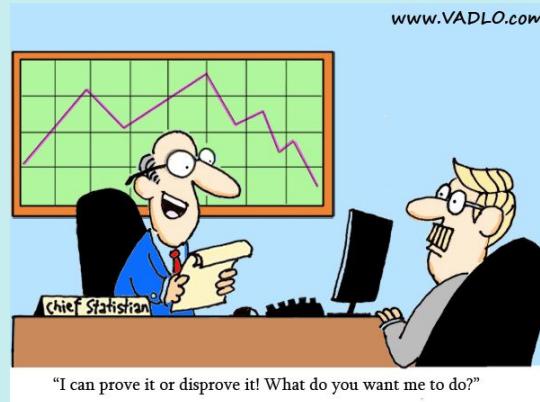
- Our website is translated in **7 languages** that enables us to sell in every market and country where the language is spoken
- Translated in: **English, Dutch, French, Spanish, Italian, German, Portuguese**
- We also accept **payment in multiple cards** to adapt to every country:
 - Visa
 - Mastercard
 - Maestro
 - Paypal
 - Giropay
 - iDeal
 - Bancontact
 - Carte Bancaire
 - American Express
 - Unionpay
 - Aliplay
 - Sofortbanking



What do we do with data? A lot

and we want to do more

- Predict number of orders next month
 - Does this depend on the weather?
- Make data & visualisations available throughout the company
- Ongoing: recommendations & personalisation on our website
- Help management decide: is this a good venue? How many tickets are we going to sell?
- Analyse payments: fraud
- Marketing
- A/B testing

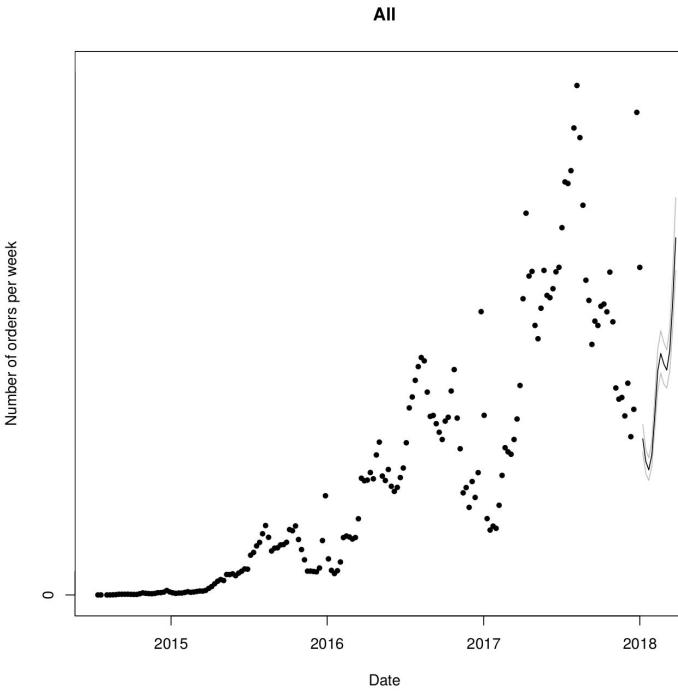


Predicting number of orders next couple of weeks

Library used: Prophet.

Both R & Python available. Recommended.

<https://facebook.github.io/prophet/>



Predicting number of orders next couple of weeks

We want to also provide explanations

Next week is going to be a holiday in France, so we expect this to have this impact on French venues and this impact on venues that French go to

and

The holiday is over in Italy. Therefore we expect less Italians in Barcelona, which means that we will need to pay more per lead in Barcelona, because the English adverts are more expensive than the Italian ones.

You want to know what's
normal

(can be ignored or improved)

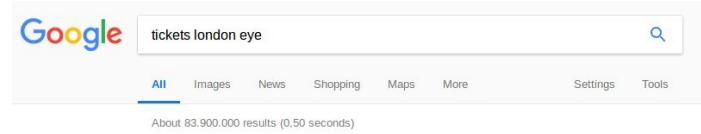
and what's
weird

(should be investigated and improved)

Marketing (Search Engine Advertising)

They can turn many knobs

- How much to bid
- When to show
- What to show
- To whom?
- When?
-
-



Personalised recommendations

So it's much more than →

Because that's not personalised, in the cartoon every shopper sees same recommendation



Source = <https://twitter.com/marketbuildr/status/915208399012483072>

Clock is ticking, so here is a bit of why I like



- `dplyr` package makes the following really easy:
 - Filtering data
 - Combining different data source
 - Aggregating data (e.g. computing total sales per day per product)
- `ggplot2` package makes creating wonderful plots easy
 - *Note that learning its syntax can take a bit of time. It's certainly worth doing this!*
- You want something, someone has probably already created a relevant library that does it
- Quite often, you don't have data for a specific date. In R it's built in (`NA` = not available)

Clock is ticking, so here are some tips

- Ensure that you know a bit about a lot things, and a lot about a few things
 - “Knowing data” is too broad.
Eventually you need to specialise.
- Don’t start with the data, start with the question. What do you want to know?
How will this help the company?
- Don’t panic!
- Apply at Tiqets when you want a new job
(just send us a mail even if there’s no vacancy)



Clock is ticking, so here are some tips

- Ensure that you know a bit about a lot things, and a lot about a few things
 - “Knowing data” is too broad.
Eventually you need to specialise.
- Don’t start with the data, start with the question. What do you want to know?
How will this help the company?
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(just ser
vacancy

THATS
SO
RANDOM

That's so Random
A playground for data analysis and R programming.

META-LEARNING • IMPOSTER SYNDROME • DATA SCIENCE

*Curb your imposterism, start
meta-learning*



<https://edwinth.github.io/meta-learning/>

Caitlin Hudon @beeonaposy - Jan 29
Data scientists: what is the most underrated / undervalued skill for a new data scientist?
156 116 313

David Robinson @drob
Replying to @beeonaposy
Underrated tech: SQL
Underrated model: extensions to linear (glm, gam, LASSO, etc)
Underrated skill: writing/communication
11:44 AM - 29 Jan 2018
86 Retweets 378 Likes

Caitlin Hudon @beeonaposy - Jan 29
Replying to @drob
+1 to all of these, especially communication. Thanks!
8 86 378

<https://twitter.com/drob/status/958063319956336640>

Recruitment Business Partner

Amsterdam, Netherlands

Human Resources

HR Advisor

Amsterdam, Netherlands

Human Resources

Content Editor - Japanese

Amsterdam, Netherlands

Content

Customer Service Agent (ES, NL, IT)

Amsterdam, Netherlands

Customer Service

Junior Account manager - Native German speaker

Amsterdam, Netherlands

Business Development

Facebook PPC Specialist

Amsterdam, Netherlands

Marketing

SEA Marketeer

Amsterdam, Netherlands

Marketing

Apply at <https://tiqets.recruitee.com/>



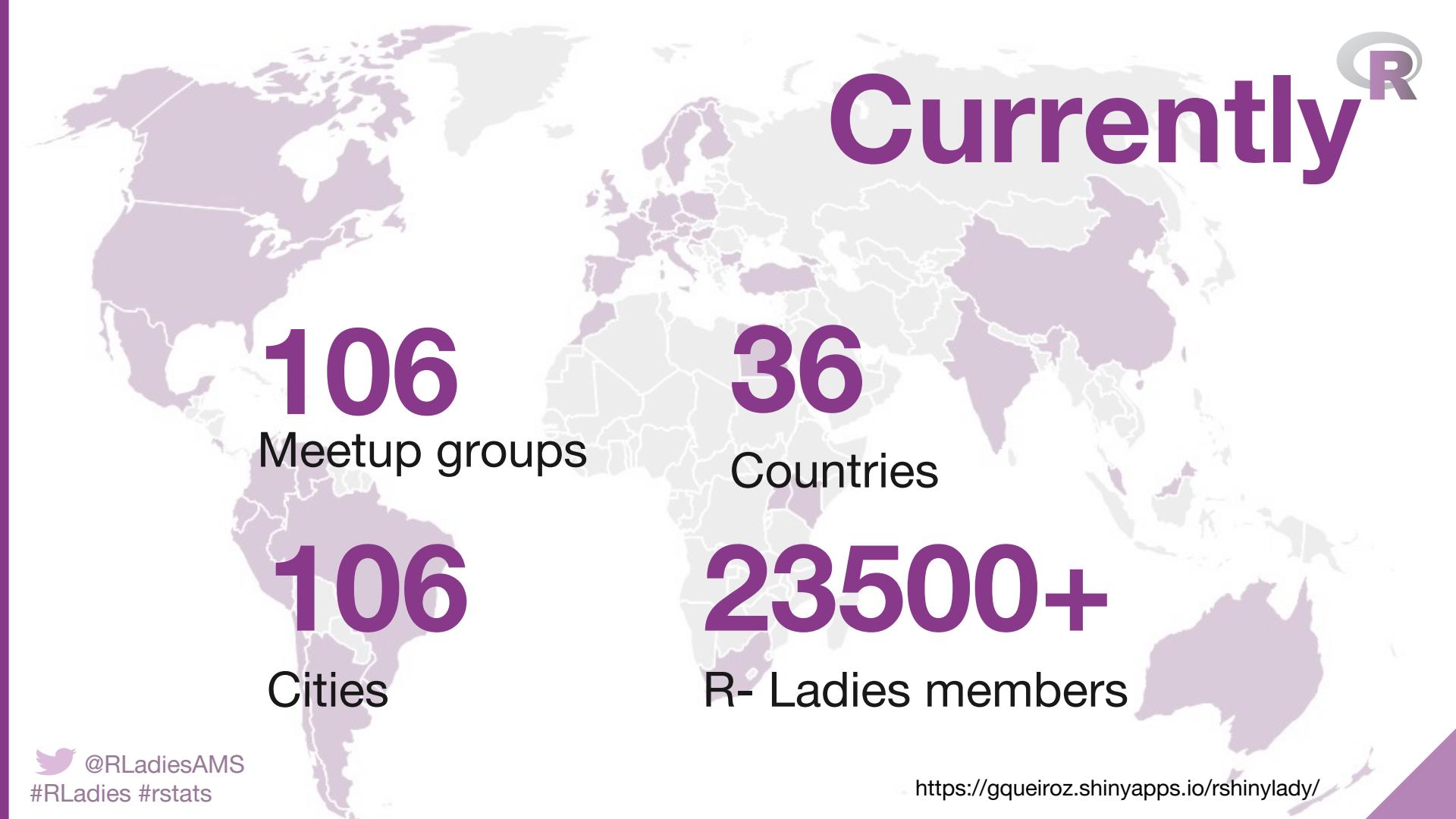


What is R- Ladies?



Worldwide organization
... that promotes **gender diversity** in the R-community
... via **meetups** and **mentorship**
... in a **friendly** and **safe** environment

Currently^R



106

Meetup groups

106

Cities

36

Countries

23500+

R- Ladies members



Our Mission

Promote gender diversity in the R- community!

Why?

Underrepresentation of women in the R-community

Where?

Lack of female **leaders**, package **developers**, conference **speakers**, conference **participants**, **teachers** and **users**!

Please note all references to women/ female in this presentation are usefully inclusively w.r.t. Trans women, genderqueer women and non-binary people who are significantly female identified



Our Mission

Promote gender diversity in the R- community!

Goal?

Achieve proportionate representation by
Encouraging, Inspiring, Empowering current minorities!

How?

Support R enthusiasts to achieve their programming potential.
Building a **local and global collaborative network** of R leaders, mentors, learners and developers to facilitate individual and collective progress!



Goals R- Ladies Amsterdam

- Build local **community** to **support** one another and share experiences
- **Teach, learn and learn to teach** R
- **Safe** and **friendly** environment for women to sharpen their R programming skills
- Expand professional **network**
- Get involved in the wider R- community



R- Ladies
Netherlands

Plans of R- Ladies Amsterdam & R- Ladies Netherlands)

We aim to:

- Host meetups that you would like!
- Plan for now: monthly
- Varying R proficiency levels
- Promote exchange and networking within and outside the community



What you can do!



Get Involved!

Add yourself to the R- Ladies directory

<https://rladies.org/directory>

Be a speaker/ give a tutorial!

- 5 min lightning talk
- 30 min - 60 min talks
- 2 hrs tutorial

Tell your company to sponsor us!

- Location
- food/drinks



Schedule



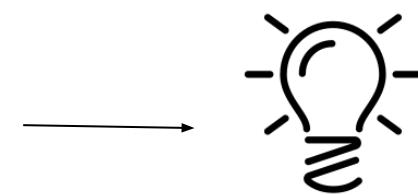
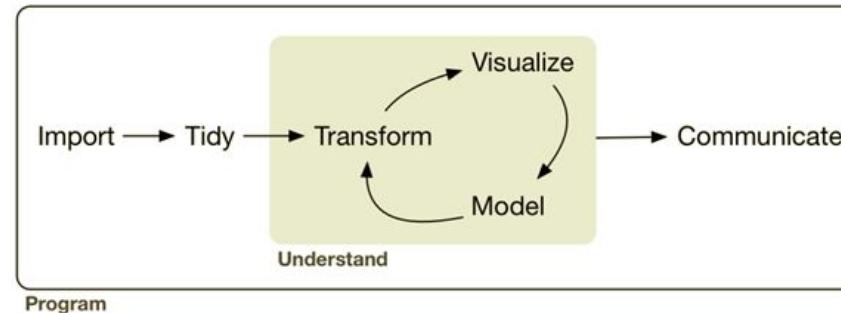
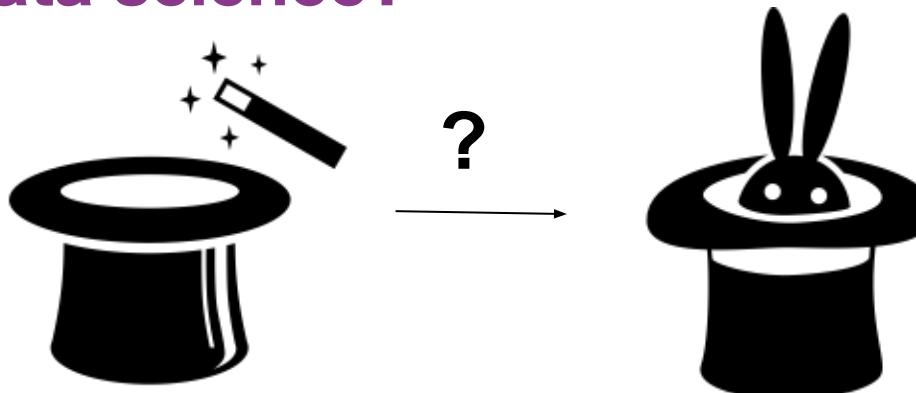
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Introduction to R (for Data Science)



What is data science?





What is R?

- **Statistical computing & graphics programming language and environment**
- Leading tool for machine learning, statistics & data analysis
- **Free open source** alternative to Matlab, SAS, Excel & SPSS
- Maintained and developed by a community of developers



Why learn R?

- **Rapid growing community**
- **Most comprehensive statistical package**- newest ideas come up in R first
- More than 10K topic specific packages (from education, finance to time series)
- **Best tools for visualization, reporting and interactivity**
- capable of executing code written in other languages such as C++ or Java, so resources coded in those languages can be made available.
- can easily be ported between Unix, Windows or Mac environments.
- **Free & open source** (anyone can examine source code and see what's going on)
- **Collaborate with others & track computations**
- **Great community support**- support via the canonical R mailing lists, R- users groups and, more importantly, with StackOverflow, RStudio Community & Twitter



@RLadiesAMS

#RLadies #rstats



Intro to R using R studio

Use R Studio to open the file ‘tutorial1_RLadiesMay2018.R’ from
rladiesamsterdam/workshop_may_2018/tutorial/

R studio



The screenshot shows the RStudio interface with four highlighted sections:

- 1- Code Editor**: The top-left pane where R code is written. The code shown is for creating a scatter plot of diamond price vs. carat weight, using the ggplot2 package and the diamonds dataset.
- 2- R Console**: The bottom-left pane showing the results of R commands. It includes summary statistics for the diamonds dataset (e.g., Min, Q1, Median, Mean, Max) and the creation of a plot object 'p'.
- 3- Workspace and History**: The top-right pane showing the workspace environment. It lists the 'diamonds' dataset (53940 observations) and a variable 'avesize' (0.7979).
- 4 - Plots and files**: The bottom-right pane displaying a scatter plot titled 'Diamond Pricing'. The x-axis is 'Carat' and the y-axis is 'Price'. The plot is colored by 'clarity' (VS2, VS1, VVS2, VVS1, IF).





R studio

Some useful tips to start

shortcut for running a line of code :

ctrl + enter

shortcut for running the entire script:

ctrl + shift + enter

shortcut for '<-':

alt + -(minus sign)

(for mac, use cmnd instead of ctrl)

?help function

google is your friend!

more Rstudio shortcuts: <https://support.rstudio.com/hc/en-us/articles/200711853-Keyboard-Shortcuts>





R as a calculator

Arithmetic operators

# addition:	+
# subtraction:	-
# multiplication:	*
# division:	/
# exponentiation:	^ or **
# modulus:	%%

Logical operators

# less than:	<
# less than or equal to:	<=
# greater than:	>
# greater than or equal to:	>=
# exactly equal to:	==
# not equal to:	!=
# OR:	
# AND:	&



Variables

```
# assign values to variables using either <- or =
# variable names are case sensitive! My_Variable != my_variable
# valid variable names include only letters, numbers, _ and .
# valid variable names start with letters or .
# be careful not to use names of existing functions in R to avoid
# confusion
# be careful overwriting information you want to keep
```



Types of data

numeric & integer: quantitative information
E.g. 5.78 ; 6

character: strings with any type of data
E.g. "Hello, world!" ; 'five' ; "5"

logical: either True or False
E.g. T; TRUE; FALSE

you can use the function *class()* to find out what type of data you are working with.



Vectors

```
# A vector is a sequence of data elements of the same basic type  
# any_vector = c()
```

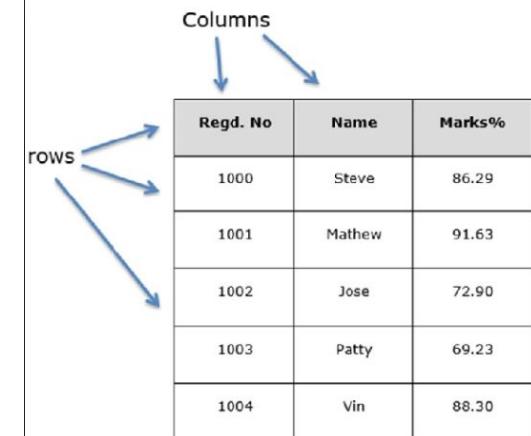
```
# indexing  
any_vector[index]
```

```
# note: many programming languages start counting at 0, but R starts counting at 1
```



Data Frames

```
# create dataframes: my_df = data.frame()  
  
# Access column/ row names: rownames() ; colnames()  
# Access number of columns/ rows: nrow(); ncol()  
  
# Index values in data frames: my_df[row,column]  
# rows and columns can be referred to either by name or number  
  
# View(my_df)
```



Regd. No	Name	Marks%
1000	Steve	86.29
1001	Mathew	91.63
1002	Jose	72.90
1003	Patty	69.23
1004	Vin	88.30



Plotting

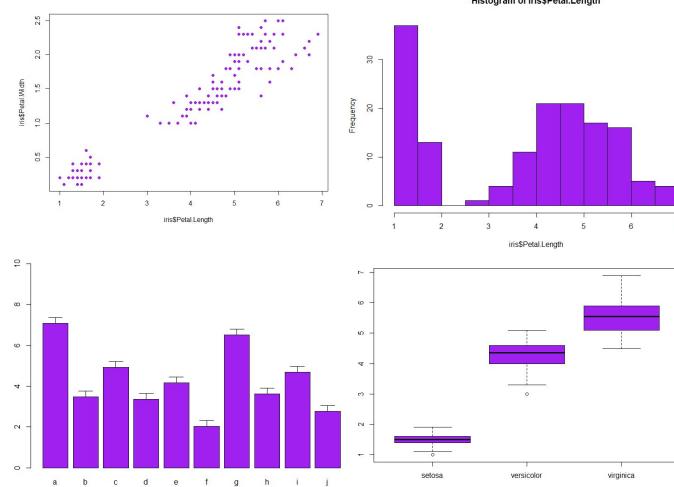
For quick plotting, you can use R's base functions, e.g.

```
# plot(numeric_x, numeric_y)
```

```
# barplot(numeric_x)
```

```
# hist(factor_x)
```

```
# boxplot(numeric_x ~ factor_y)
```



For more advanced plotting, you could use the ggplot2 library



Saving things

to save a data frame as csv:

write.csv()
write.table()

save your script as a .R file

to save a workspace:

see lightning talk ;)



Titanic assignment

Open the file ‘tutorial2.r’ from [rladiesamsterdam/workshop_may_2018/assignment](#)

Form groups of 2-3 to work on through the script together.





Additional resources

Packages:

You can install a lot of additional packages/libraries with a lot of functions that are written and shared by people all over the world

RStudio cheatsheet:

<https://www.rstudio.com/wp-content/uploads/2016/01/rstudio-IDE-cheatsheet.pdf>

Google everything!

Post on **Stackoverflow** (always include a reproducible example of your problem)

RLadies Slack channel

MOOCs



Additional Resources 2

Interactive

Datacamp: <https://www.datacamp.com>

Coursera: <https://www.coursera.org/specializations/jhu-data-science>

Udacity: <https://eu.udacity.com/course/data-analysis-with-r--ud651>

Lynda: <https://www.lynda.com/R-training-tutorials/1570-0.html>

Books

Hadley Wickham's- Data Science in

R: <http://r4ds.had.co.nz/>

Norman Matloff- The art of programming in R:

<http://diytranscriptomics.com/Reading/files/The%20Art%20of%20R%20Programming.pdf>

Video Lectures:

RStudio video lectures &

webinars: <https://www.rstudio.com/resources/webinars/>

LearnR: <https://www.youtube.com/user/TheLearnR/featured>

Google Developers:

<https://www.youtube.com/playlist?list=PLOU2XLYxmsIK9qQfztXeybpHvru-TrqAP>

MarinStatsLectures:

<https://www.youtube.com/user/marinstatlectures>

Blogs for latest news/ tutorials:

<https://www.r-bloggers.com/>

<http://flowingdata.com/>

<https://www.rweekly.org/>

<https://www.r4stats.com/>

<https://www.r-exercises.com/>

<https://www.blog.rstudio.com/>



Get ready to be inspired !



Sarah Stolle

&&



8.40- 8.46 pm



| Using R projects in | Rstudio for Research

24th of May 2018 | Ingrid Szilagyi

8.46- 8.52 pm



Ingrid

Organizer R-Ladies Rotterdam

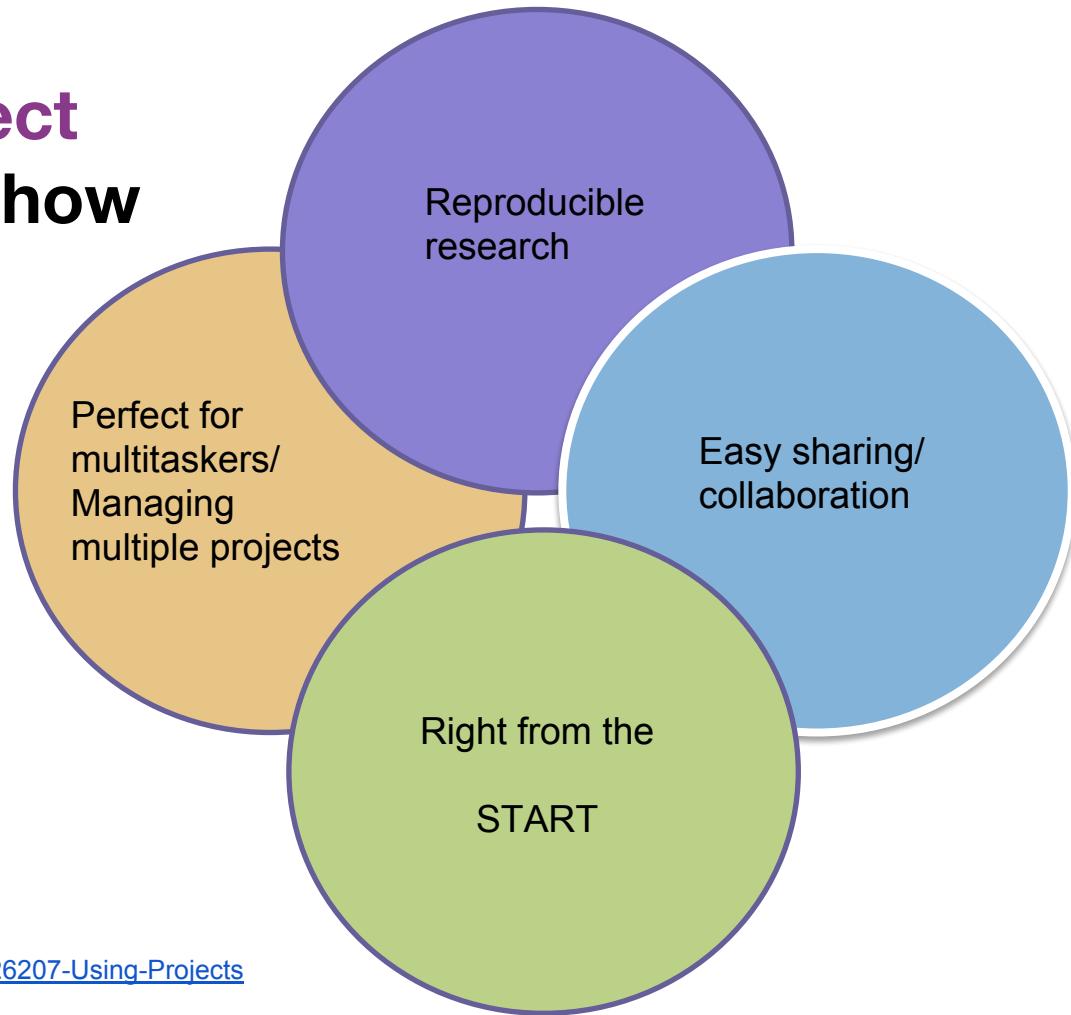
PhD student at General Practice & Internal Medicine Department



ingrid@rladies.org



Using R project why, when & how



Setting up a WORKFLOW

Name
code
data
doc
figures
results
eBird_trends.pdf
eBird_trends.Rmd
eBird_trends.Rproj

“divide work up into multiple contexts, each with their own working directory, workspace, history, and source documents”



File Edit Code View Plots Session Build Debug Profile Tools Help

+ - Go to file/function Addins

Untitled1 x

Source on Save | Run | Source |

1

1:1 (Top Level) R Script

Console Terminal

~/

```
R version 3.4.4 (2018-03-15) -- "Someone to Lean On"
Copyright (C) 2018 The R Foundation for Statistical Computing
Platform: x86_64-w64-mingw32/x64 (64-bit)

R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
Type 'license()' or 'licence()' for distribution details.

R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.
```

Environment History Connections

Import Dataset

Global Environment

Environment

New Project...

Open Project...

Open Project in New Session...

Close Project

OA_project

research_project

EP16_Multiple_Imputation_inR

RepeatedMeasurements_nihes

Repeated_Measurements_CE08

exam_GEE

Clear Project List

Project Options...

Files Plots Packages Help Viewer

Zoom Export



File Edit Code View Plots Session Build Debug Profile Tools Help



Go to file/function

Addins ▾

Project: (None) ▾



Environment History Connections

Import Dataset

Global Environment



Environment is empty

New Project

Create Project



New Directory

Start a project in a brand new working directory



Existing Directory

Associate a project with an existing working directory



Version Control

Checkout a project from a version control repository



Cancel

1:1 (Top Level) ▾

Console Terminal



R version 3.4.4 (2018-03-15)
Copyright (c) 2018 The R Foundation
Platform: x86_64-w64-mingw32/

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'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

> |



RStudio

File Edit Code View Plots Session Build Debug Profile Tools Help

Untitled1 x Source on Save Run Source

Environment History Connections

Import Dataset Global Environment

New Project

Back Project Type

New Project R Package Shiny Web Application

R Package using Rcpp R Package using RcppArmadillo R Package using RcppEigen R Package using devtools

Create a new project in an empty directory

Cancel

1:1 (Top Level) Console Terminal

R version 3.4.4 (2018-03-15) Copyright (c) 2018 The R Foundation Platform: x86_64-w64-mingw32/

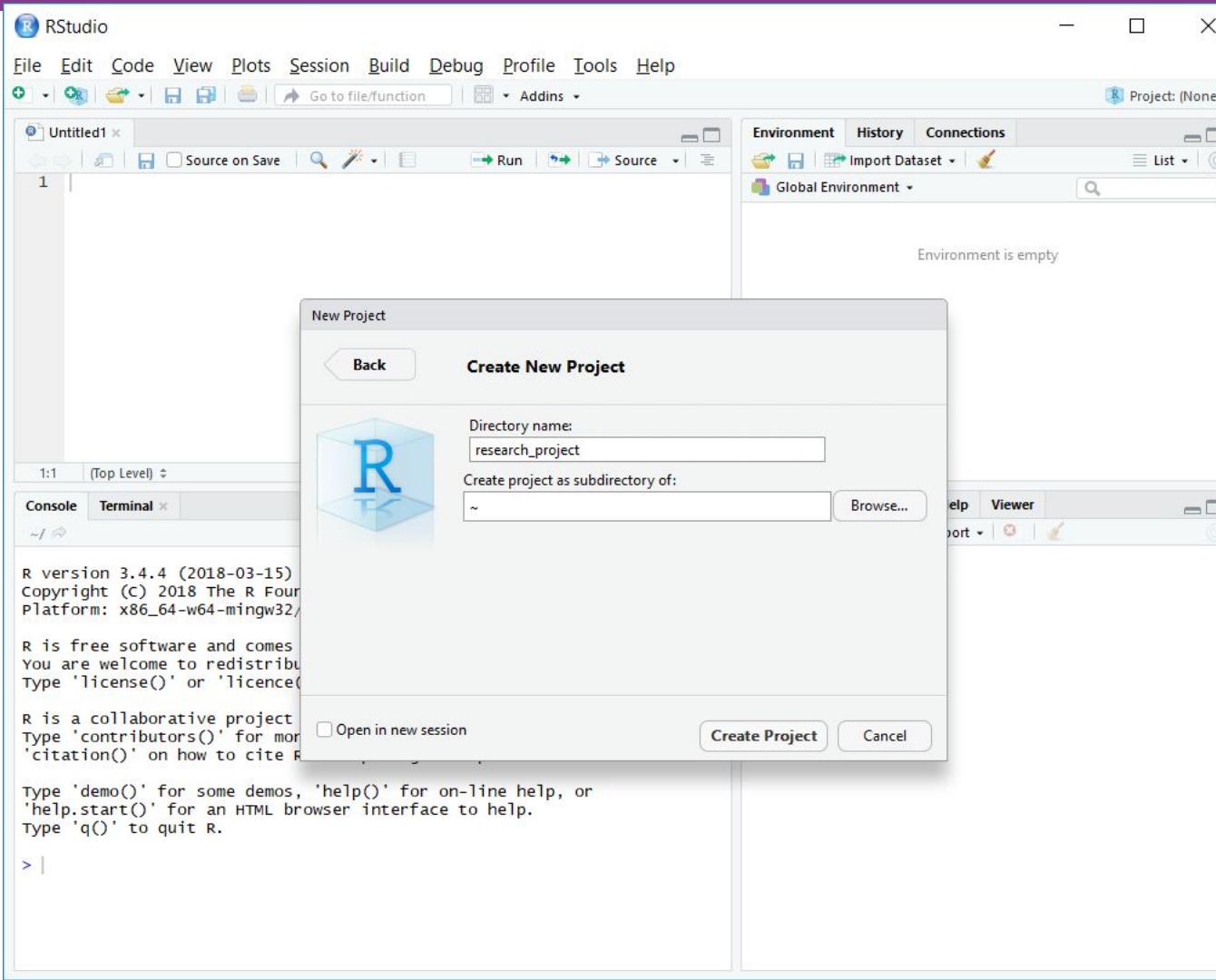
R is free software and comes You are welcome to redistribute Type 'license()' or 'licence()

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Type 'demo()' for some demos, 'help()' for on-line help, or 'help.start()' for an HTML browser interface to help. Type 'q()' to quit R.

> |





R ~research_project - RStudio

File Edit Code View Plots Session Build Debug Profile Tools Help

+ Go to file/function Addins

Console Terminal ~research_project/

R version 3.4.4 (2018-03-15) -- "Someone to Lean On"
copyright (c) 2018 The R Foundation for Statistical computing
Platform: x86_64-w64-mingw32/x64 (64-bit)

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'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

> |

Environment History Connections Import Dataset Global Environment Environment is empty

Files Plots Packages Help Viewer

New Folder Delete Rename More

Home > research_project

	Name	Size	Modified
	..		
	research_project.Rproj	218 B	May 22, 2018, 11:03 PM



~/research_project - RStudio

File Edit Code View Plots Session Build Debug Profile Tools Help

Untitled1 x Source on Save Run Source

Environment History Connections New Project... Import Dataset...

Project Options

Use (Default) to inherit the global default setting

Restore .RData into workspace at startup (Default)

Save workspace to .RData on exit (Default)

Always save history (even if not saving .RData) (Default)

General

Code Editing

Sweave

Version Control

Console Terminal

~/research_project/

Copyright (c) 2018 The R Foundation for statistical computing
Platform: x86_64-w64-mingw32/x64 (64-bit)

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'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

OK Cancel

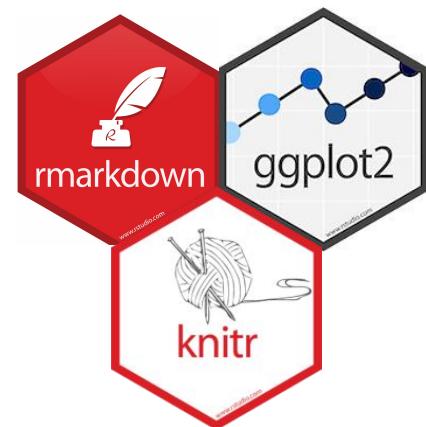


thank you



Martine Jansen &&

8.52- 8.58 pm



Understanding DNA big data

TGATCGTAGCTGATCGATGCATGT

ACGTGATCGTGATCG

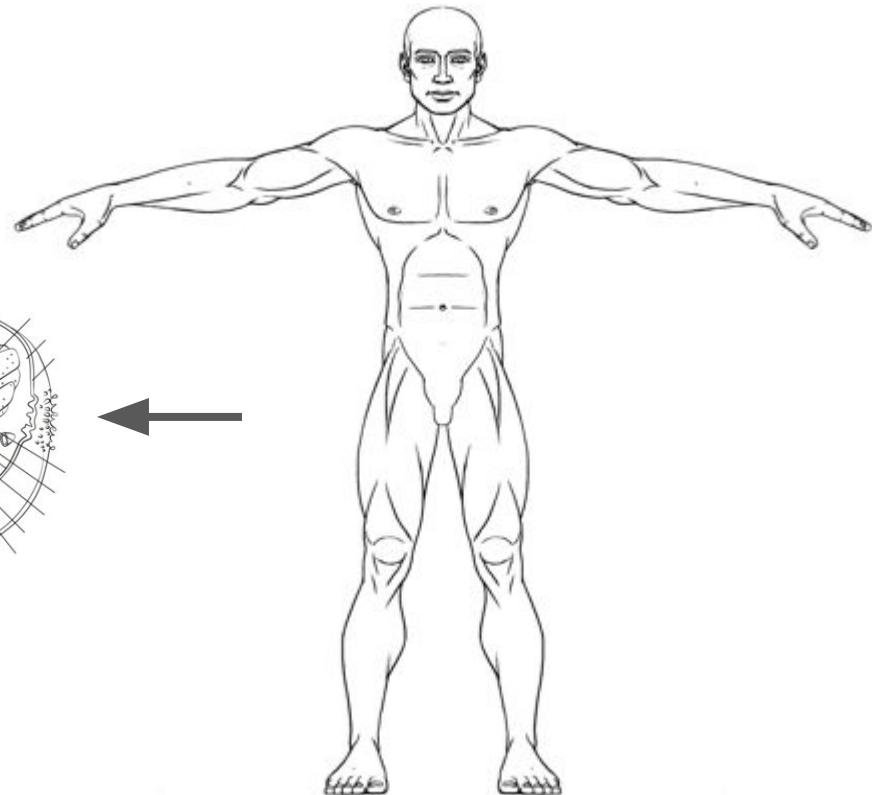
ACGTGATCGTGATCGTAGCTGA

Tess Korthout

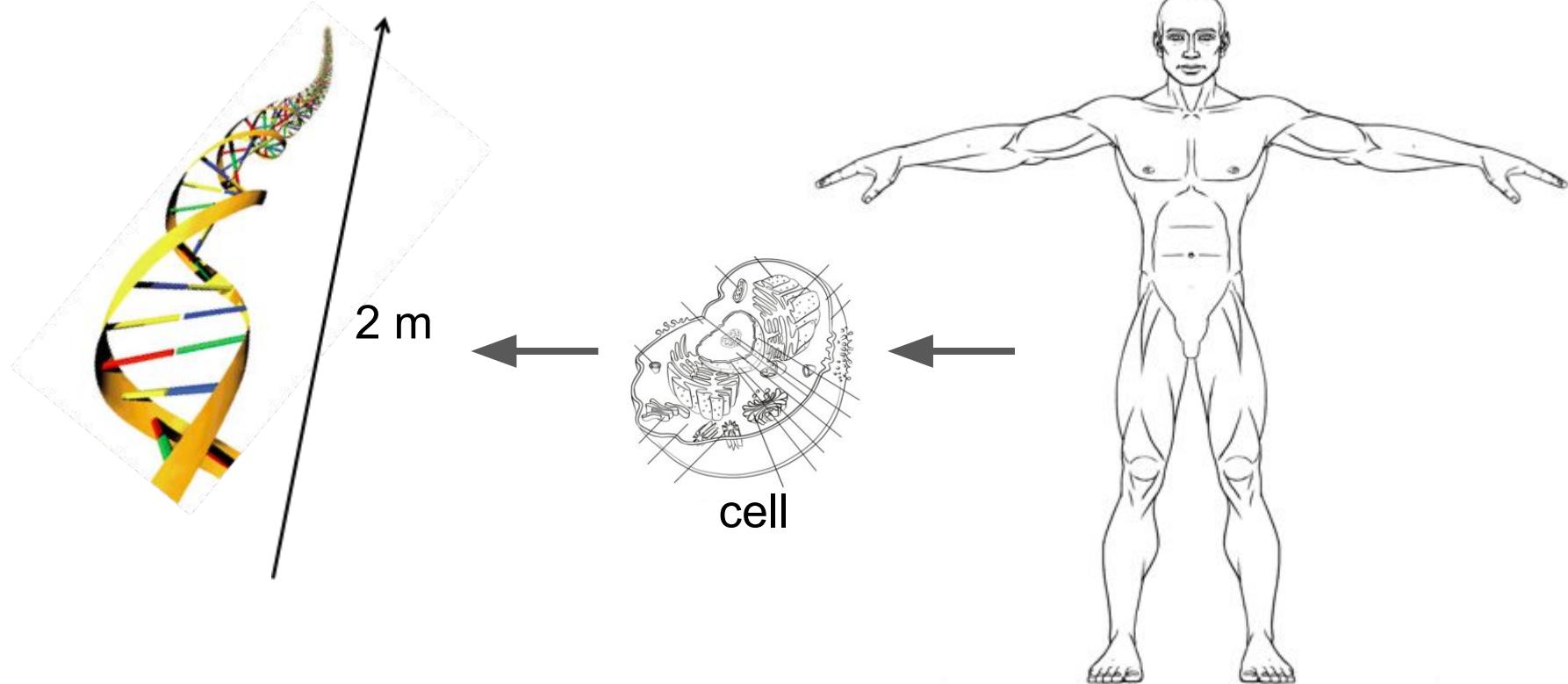
PhD student bioinformatics

Netherlands Cancer Institute

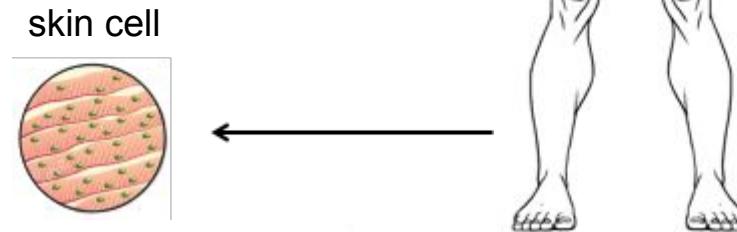
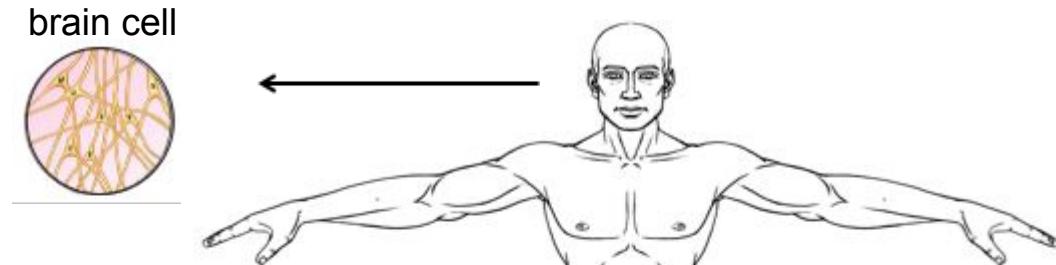
Human cells contain DNA



2 meter of DNA in a small nucleus!



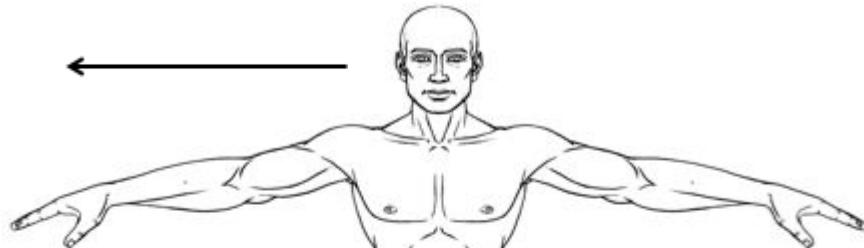
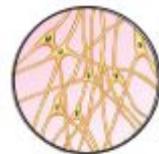
Many different types of cells



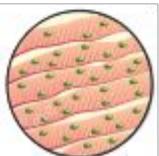
Many different types of cells - same DNA!



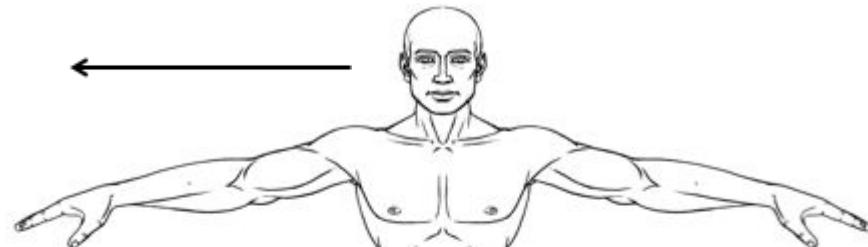
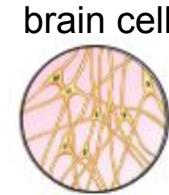
brain cell



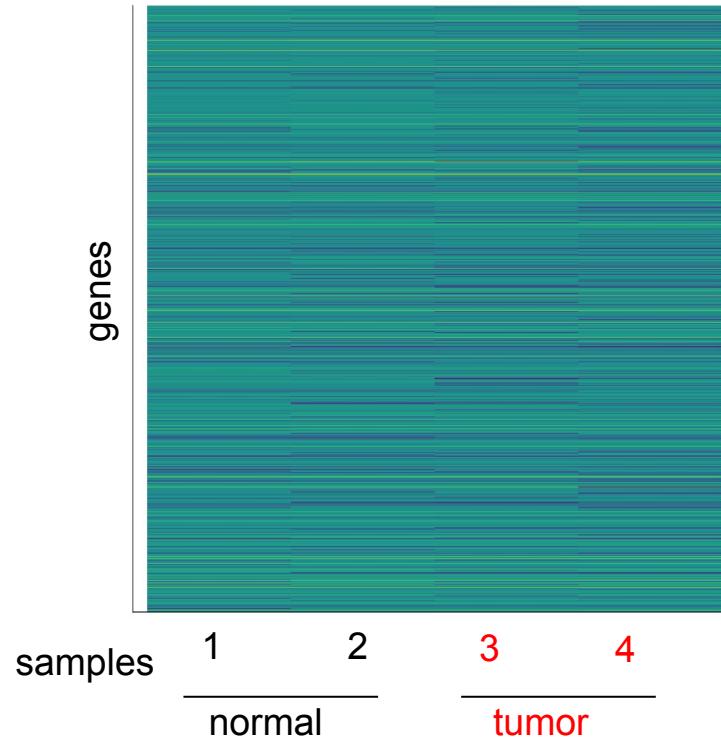
skin cell



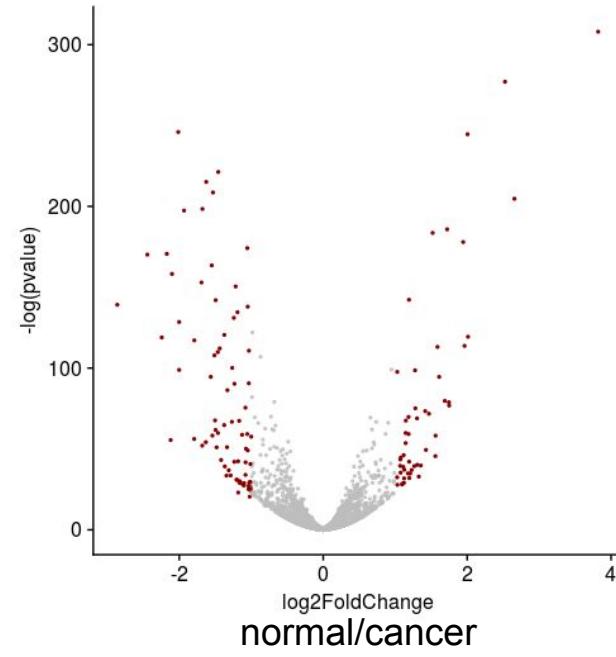
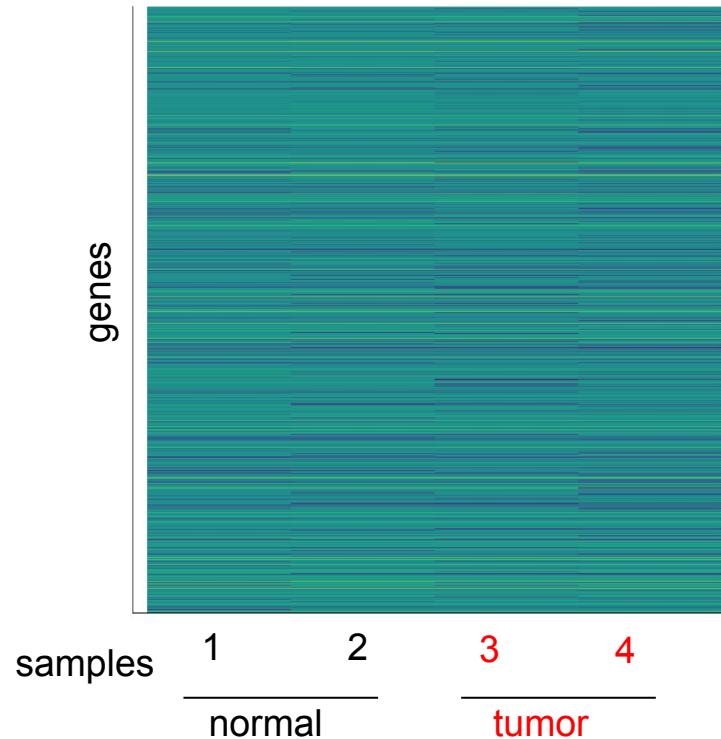
Cell type determined by gene transcription



Measuring 20,000 genes!



Identifying significant changes with linear modeling



Epigenome-wide association study (EWAS) using R

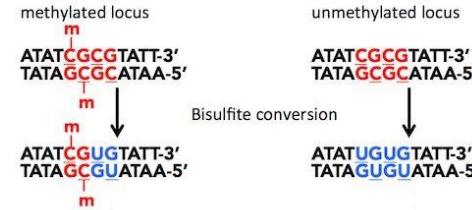
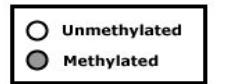
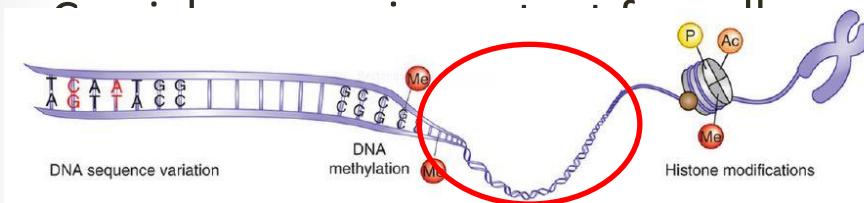
Irma Karabegovic

9.04-9.10 pm

Epigenetics (DNA methylation)

- Heritable or reversible chemical changes on the DNA (without change in DNA sequence) resulting in alteration of gene expression.

methylation plays a key role in gene regulation, development, and differentiation.



Using chemistry to obtain numbers from biology

- Microarrays → fluorescence → scanning = level of methylation (ratio of fluorescent signal coming from unmethylated probe compared to methylated)
- Beta value (β) = ratio of intensities between methylated and unmethylated
- β lies between 0 and 1 (continuous variable)

$$\beta = \frac{M}{M + U + 100}$$

Equation “explaining” the biology

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \epsilon$$

methylated β values = smoking phenotype + Sex + Age + blood count + technical covariates

Multiple linear regression:

Y = methylated β values

β_0 = constant

β_1, \dots, n = slope of the independent variable

X_1, \dots, n = independent variable explaining the change in Y (age & sex most crucial)

Common covariates considered in EWAS study:

-technical covariates (WBC)- white blood cell percentages

require(dyplr)

-batch covariates (e.g. array number, position on array)

require(psych)

-cohort specific covariates (e.g. case-control, population ancestries, etc.)

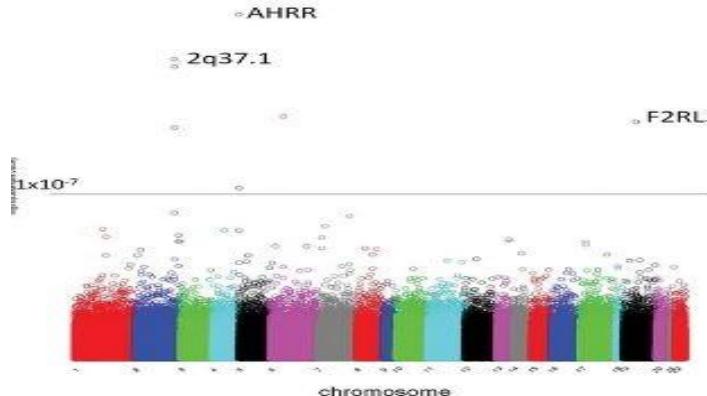
require(data.table)

require(parallel)

require(lme4)

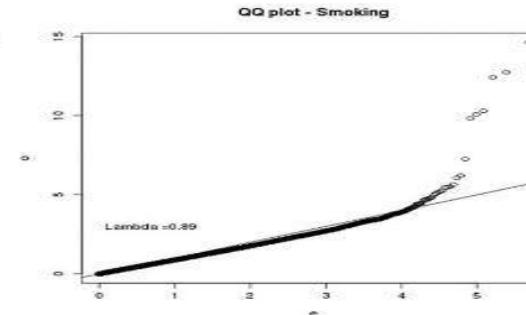
require(robust)

Result from previous EWAS on smoking



Manhattan plot

```
require(ggplot2)  
require(bacon)
```



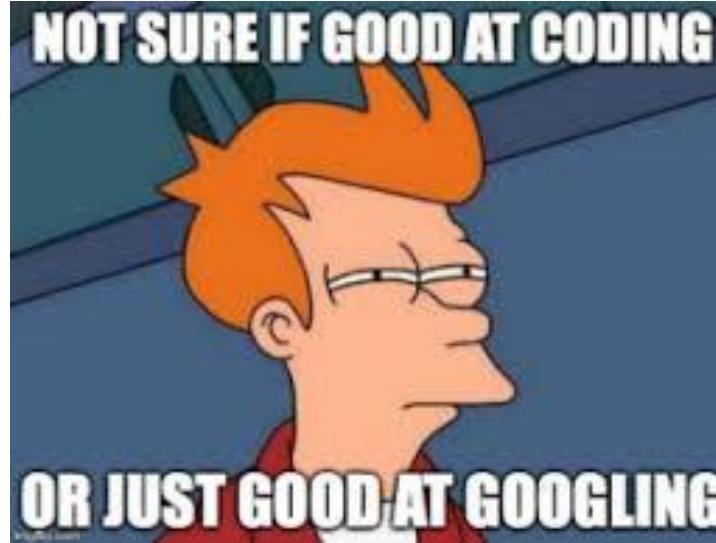
QQ plot

AHRR-repressor of the aryl hydrocarbon receptor, a key regulator between the cell and the external environment, including the effects of stressors (e.g. dioxins and polycyclic aromatic hydrocarbons-contained in tobacco smoke).

Questions?

Try with:

- Google
- Coursera
- Stack Overflow



Thank you for your attention



Lilly Wiggers

9.10- 9.16 pm





PEACETECH LAB



Data for Development: GroundTruth Global

A presentation for R-ladies Amsterdam, May 24 2018
Lilly Wiggers, PeaceTech Lab NL

"Data is an absolute game changer"

"A lot of us are inventing our own wheel while probably the wheels have already been invented"

"When you become more data driven and informed, you are going to make better decisions and you will learn better."

"Data literacy is a bit of an issue."

"I hope it will allow us to provide more response and more feedback to our beneficiaries and also help us to assess their needs"

"It requires such a big part of capacity building."



Global Colombia

GROUNDTUTH •
What's happening on the ground-right now?

- Disruptions Jan 1st - Present
- Media Activity
- Disruption Drivers

ON THE RADAR •
Early warnings & projections of upcoming events

- **Projections** Dec 5th, 2017 - May 9th, 2018

GT INDEX
Track Risk Drivers & Explore Context

Projections

Labor

Nov 17th, 2016 - Dec 5th, 2017

Colombia, Colombia

Maria del Carmen, a long-term business career-growing partnership between 26...

Reference 1 | Reference 2

Public sentiment

Nov 27th - Dec 6th

Colombia, Colombia

Residents of Cárdenas give a hero's welcome to the arrival of the body of Col...

Reference 1

Planned Protest

Dec 3rd

Cúcuta, Colombia

Violence Not Anticipated

Reason: Government Policies

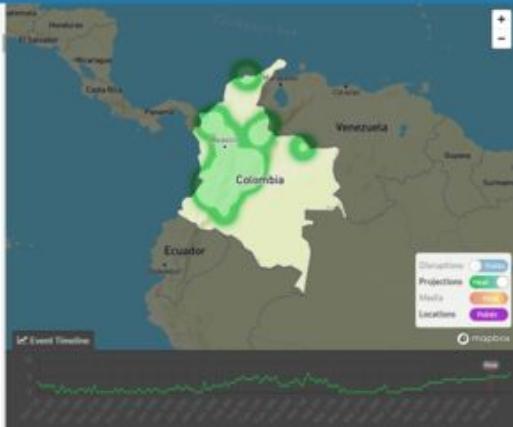
Arrest

Dec 5th

El Peñón, Colombia

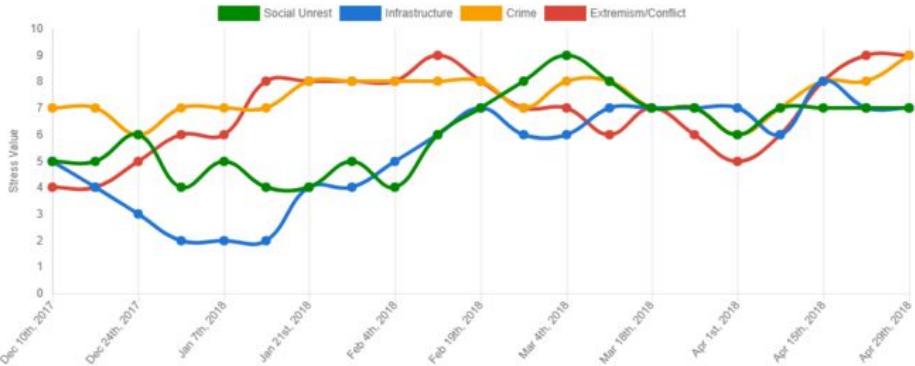
Colombian drug lord Juan José Velásquez was arrested by Colombian police a...

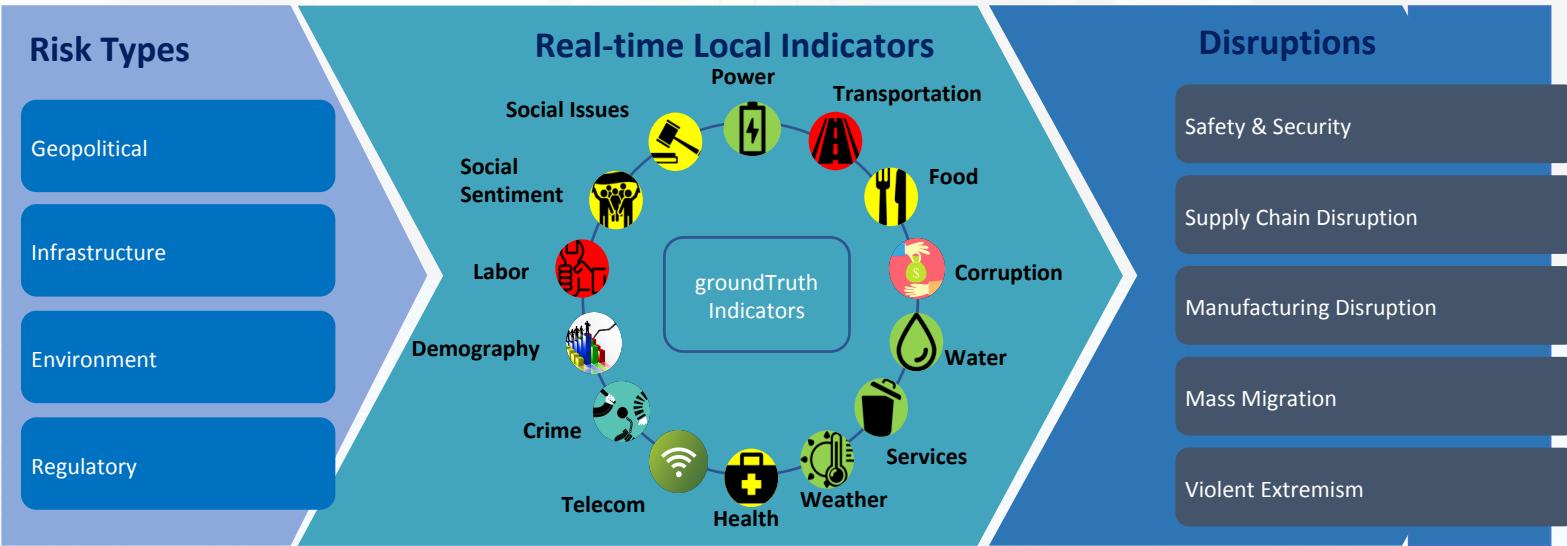
Reference 1 | Reference 2 | Reference 3



Dec 5th, 2017 - Today

groundTruth Index





Thank You!

Find us here:

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peacetechlabnl.org

Linkedin: PeaceTech Lab NL

Twitter: @PeaceTechLab_NL



Thank you!

Stayed tuned,

June event is coming!



Tidy Text Mining
with Laury van Bedaf,
Data Scientist at Accenture