9 Φεβρουαρίου 2019

Data Science Workshop

GOLDEN GATE PRO
CODING ACADEMY

Golden Gate Pro

Λίγα λόγια

Hello!

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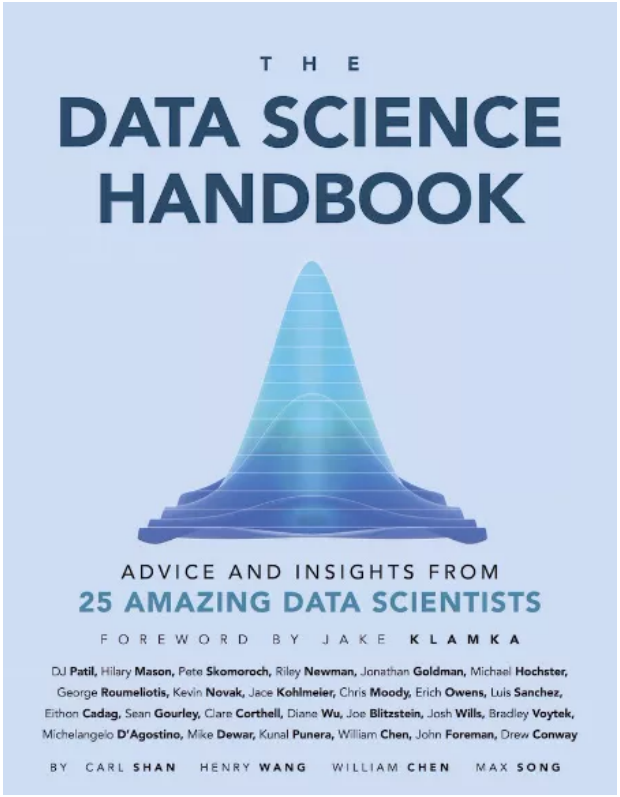
Game Designer @
Hattrick Ltd

You can find me at:

@tasosventouris Tasos Ventouris

The Data Science Handbook



http://www.thedatasciencehandbook.com/get-the-book

Day 1

Εισαγωγή 😄

Θα μιλήσουμε για...

- Τι είναι η Data Science;
- Η ιστορία της
- Το μονοπάτι ενός Data Scientist
- Toolbox
- Εισαγωγή σε Στατιστική
- Εισαγωγή σε Python

1.
Data Science

Ή αλλιώς, η Επιστήμη των Δεδομένων. Τι είναι και αν αξίζει να επενδύσω σε αυτήν;

https://hbr.org/2012/10/data-scientist-the-sexiest-job-of-the-21st-century

MENU

Harvard Business Review

DATA

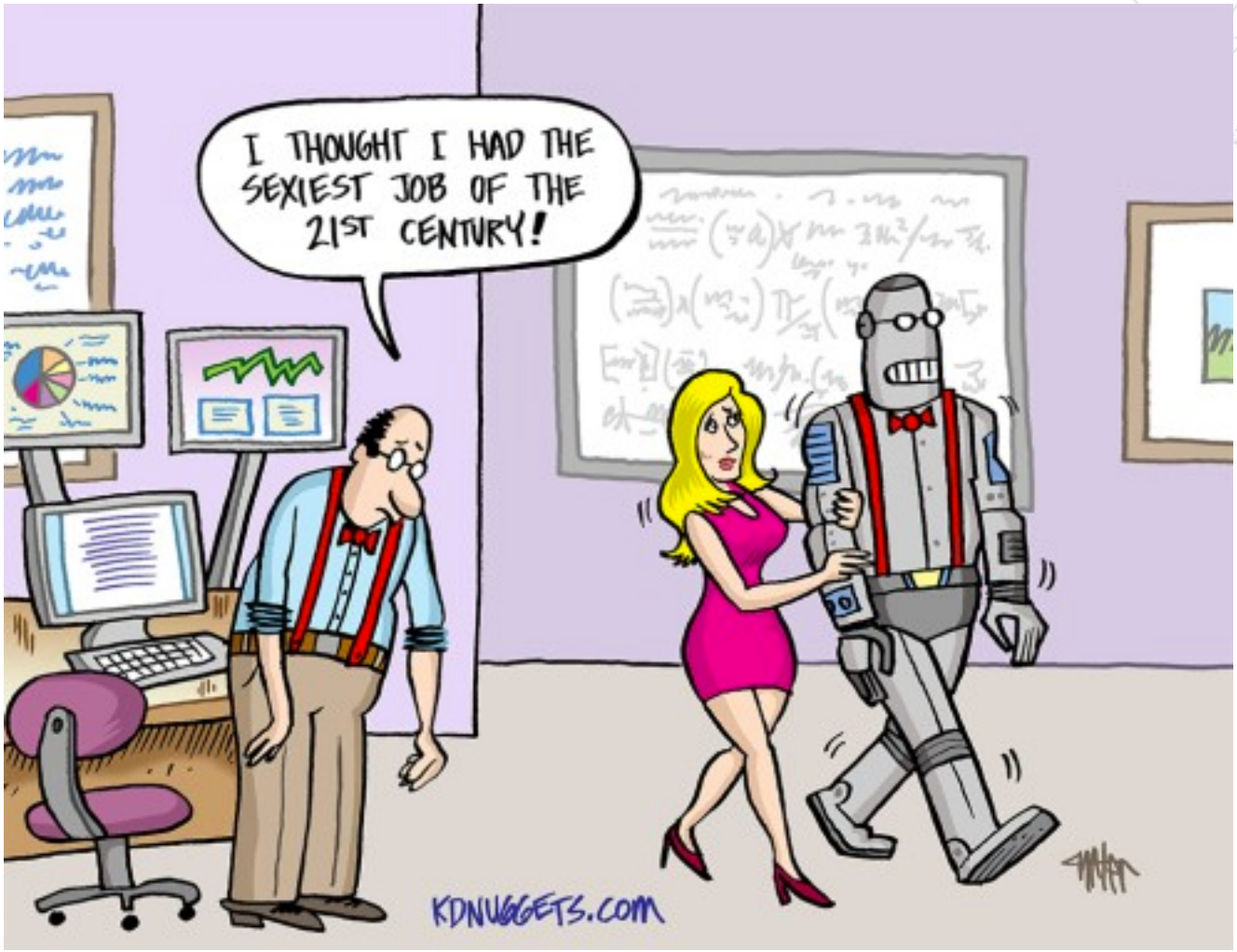
Data Scientist: The Sexiest Job of the 21st Century

by Thomas H. Davenport and D.J. Patil

FROM THE OCTOBER 2012 ISSUE

SUMMARY | SAVE | SHARE | COMMENT 4 | TEXT SIZE | PRINT | $8.95 BUY COPIES

When Jonathan Goldman arrived for work in June 2006 at LinkedIn, the business networking site, the place still felt like a start-up. The company had just under 8 million accounts, and the number was growing quickly as existing members invited their friends and colleagues to join.


I THOUGHT I HAD THE SEXIEST JOB OF THE 21ST CENTURY!
KDNUGGETS.com

Η επιστήμη των Δεδομένων είναι ένα **διεπιστημονικό** πεδίο του οποίου αντικείμενο είναι η εξαγωγή της γνώσης από αδόμητα ή δομημένα δεδομένα.

--Wikipedia

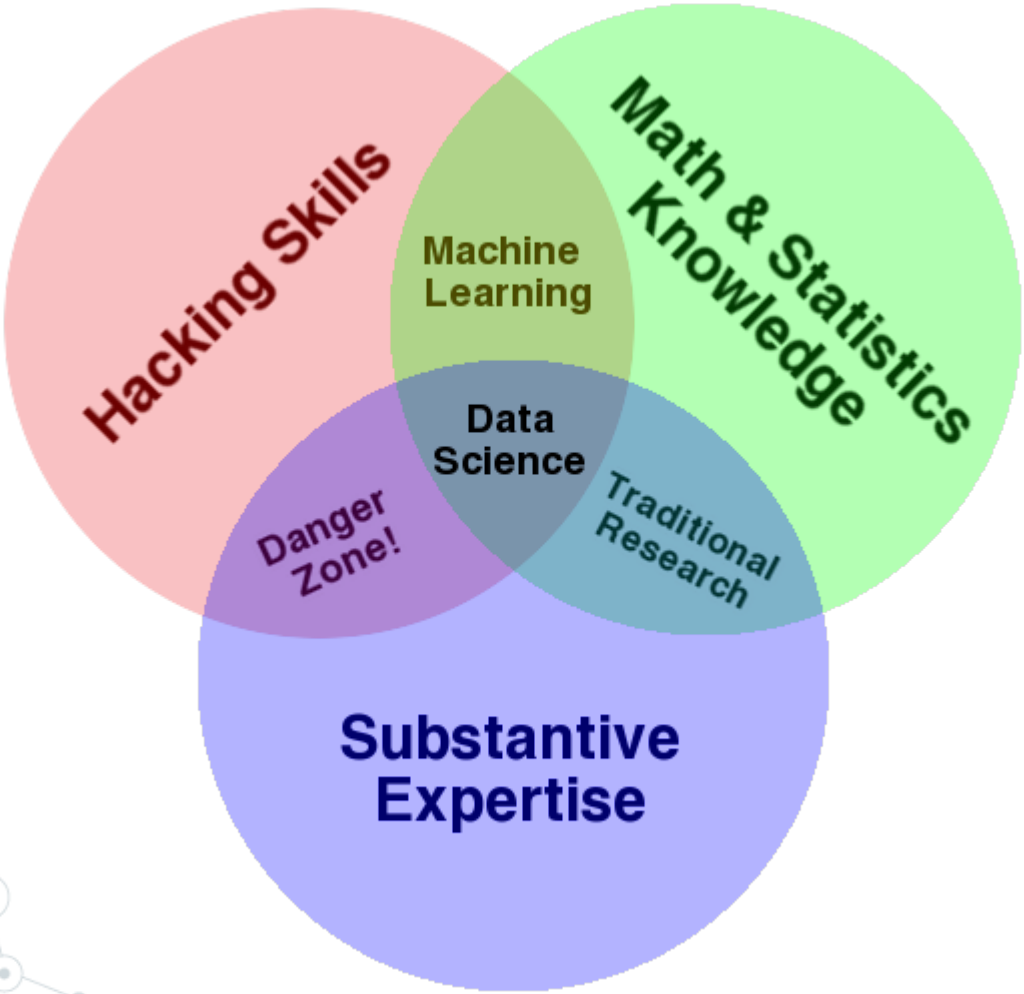
A field of Big Data which seeks to provide meaningful information from large amounts of complex data. Data Science combines ***different fields of work*** *in statistics and computation in order to interpret data for the purpose of decision making.*

--investopedia.com

The creation of data products

*Data product = Ένα εργαλείο που δημιουργήθηκε με τη χρήση δεδομένων και βοηθάει στη λήψη αποφάσεων.

My favourite



Data Scientist

Ποιος λοιπόν μπορεί να έχει τον τίτλο του Data Scientist;

Josh Wills
@josh_wills

Follow

Data Scientist (n.): Person who is better at statistics than any software engineer and better at software engineering than any statistician.

*A Data Scientist is a **statistician** who lives in San Francisco* 😋

Πικρή Αλήθεια #1

My favourite

A Data Scientist is a person who is able to…

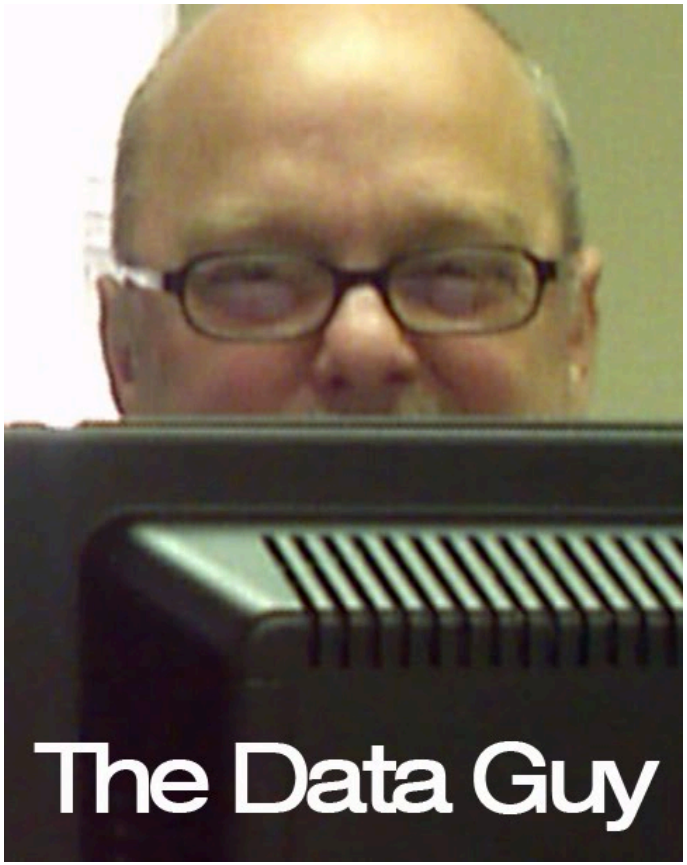
run a regression, write a sql query, scrape a web site, design an experiment, factor matrices, use a data frame, pretend to understand deep learning, steal from the d3 gallery, argue r versus python, think in mapreduce, update a prior, build a dashboard, clean up messy data, test a hypothesis, talk to a business person, script a shell, code on a whiteboard, hack a p-value, machine-learn a model

Πικρή Αλήθεια #2

For the rest...

you are just THE “data-guy”

(or THE “math-guy”)



2.
Η ιστορία

Πως ξεκίνησαν όλα;

Χρονοδιάγραμμα

- 1960 - Computer Science = Data Science από Peter Naur
- 1974 - Πρώτη φορά σε δημοσίευση από Peter Naur
- 1996 - Συνέδριο με τίτλο “Data Science, classification, and related methods”
- 1997 - Ομιλία του Jeff Wu με τίτλο “Statistics = Data Science?”
- 2001 - William S. Cleveland χρησιμοποίησε τη Data Science ως ανεξάρτητο όρο σε άρθρο της “International Statistical Review”
- 2002 - Committee on Data for Science & Technology. Νέο περιοδικό με τίτλο Data Science Journal
- 2003 - The Journal of Data Science από Columbia University
- 2008 - DJ Patil & Jeff Hammerbacher χρησιμοποίησαν τον τίτλο Data Scientist
- 2012 - Άρθρο από Harvard Business Review με τίτλο “Data Scientist: The Sexiest Job of the 21st Century”

Data Science ≠ Big Data

Apollo XI, 1969

64Kb

SkyDive Stratos, 2012

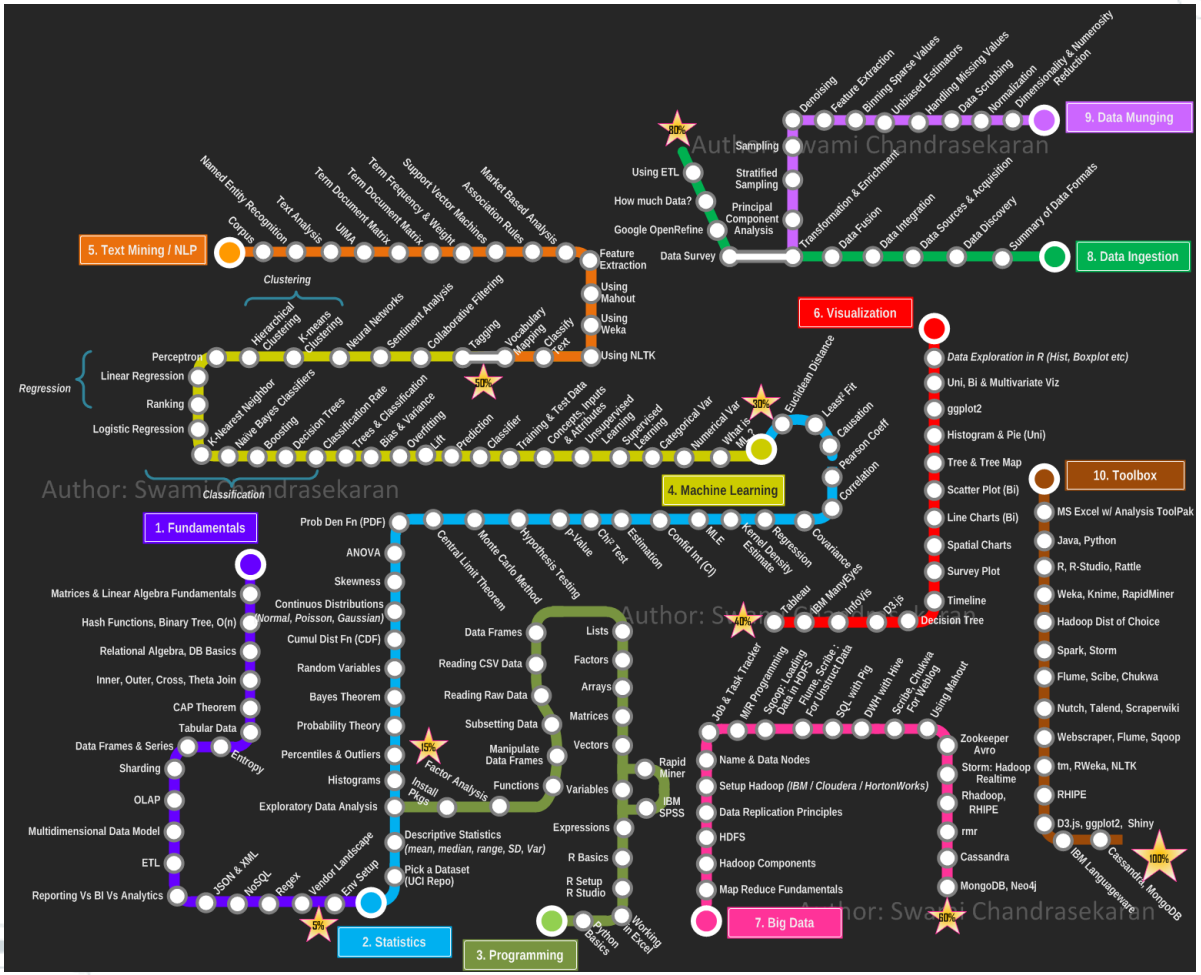
Δεκάδες Gigabytes

3.
Το μονοπάτι ενός Data Scientist

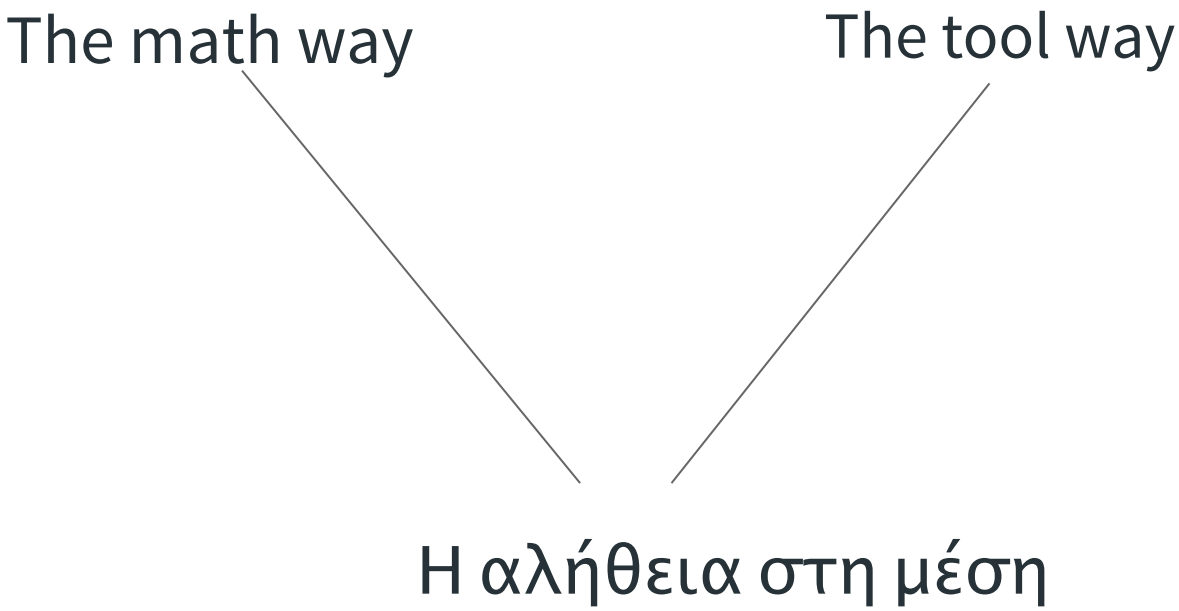
Yeah! I had a skill up...

Πικρή Αλήθεια #3

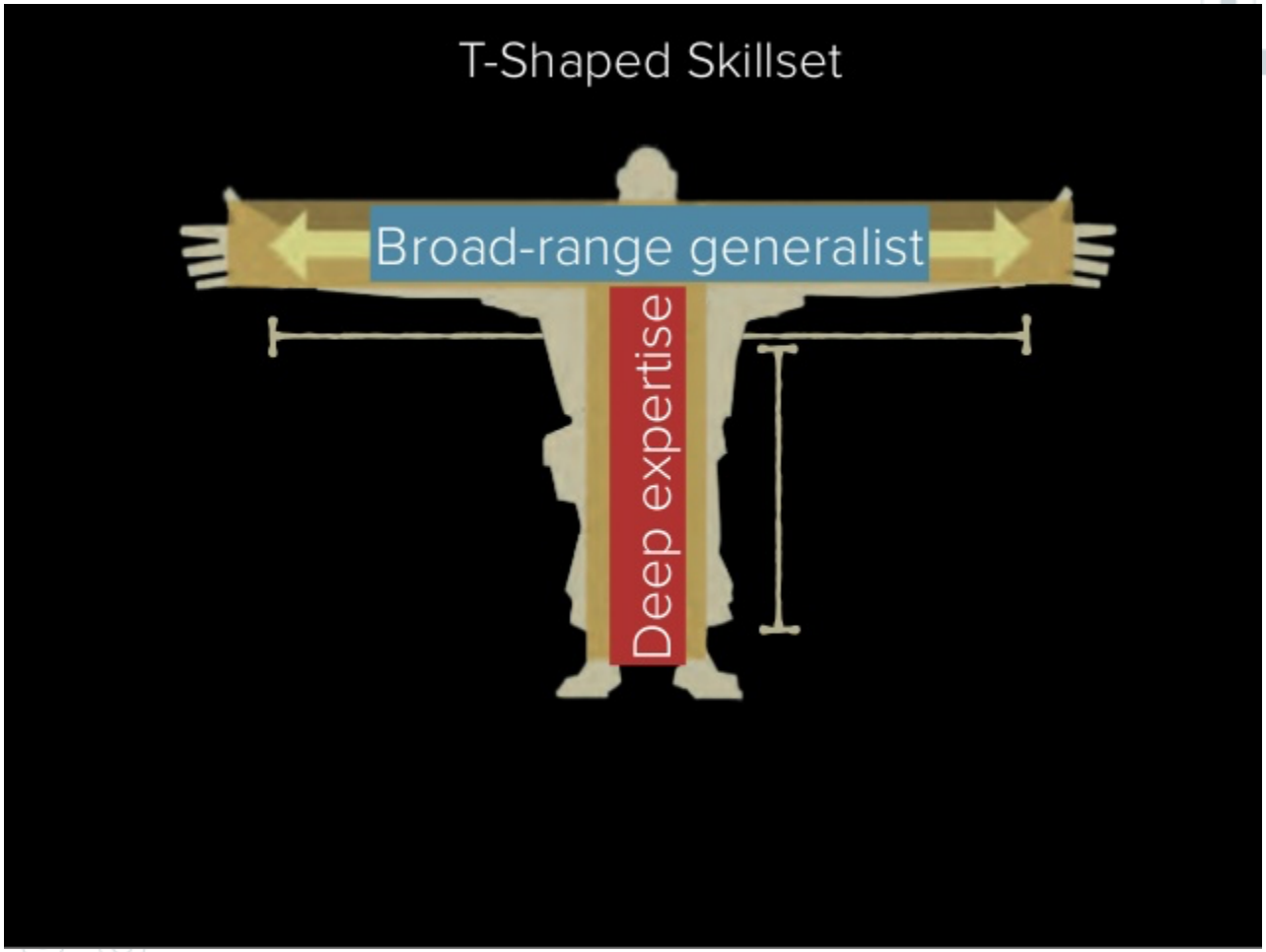
Το μονοπάτι του Data Scientist



Focus on….



Στην πράξη….



4.
Toolbox

Καθημερινά εργαλεία…

Θα χρειαστείς...

- Git
- Virtual Machines
- Excel!!!!
- Python/R
- SQL

Extra:

- Dataiku
- Azure ML

Συμβουλή #1

Μυαλό = Επεξεργασία & Αποφάσεις
Μυαλό ≠ Αποθήκευση

5.
Στατιστική

Μια μικρή επανάληψη…

Έννοιες και η σημασία τους...

- Τυχαίο δείγμα
- Μεταβλητές
  - Κατηγορικές - Ποιοτικές
    - Ονομαστική (χρώμα ματιών, τόπος γέννησης, φύλο)
    - Διάταξης (μορφωτικό επίπεδο, κλάσεις ηλικιών)
  - Ποσοτικές
    - Διακριτή (πόσες σοκολάτες τρώω κάθε μέρα)
    - Συνεχής (το ύψος ανθρώπων)

Συμβουλή #2

Δεκαδικός αριθμός

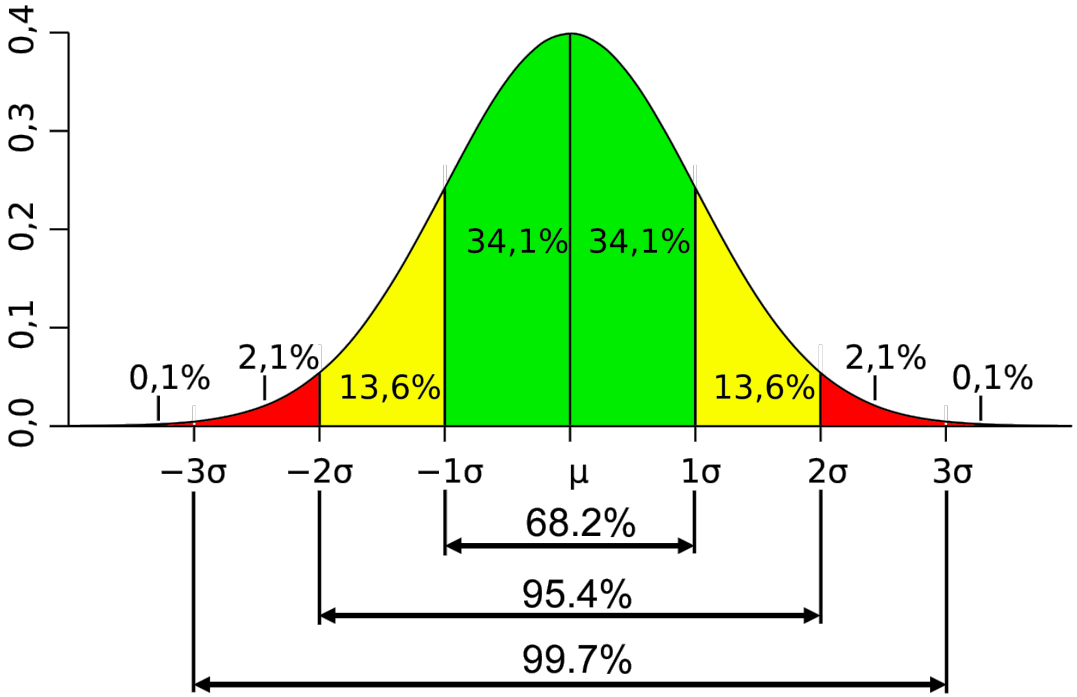
≠

Κατηγορική μεταβλητή

Μέτρα Θέσης

- Μέση τιμή (x)
- Διάμεσος (δ)
- Εύρος (R)
- Διακύμανση (s^2)
- Τυπική Απόκλιση (s)
- Συντελεστής Μεταβολής (s/x)

Normal Distribution

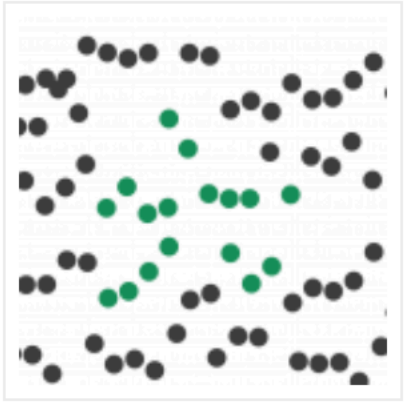


Statistical Bias

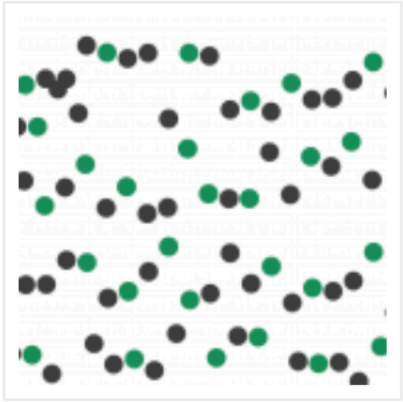
Τα 8 θανάσιμα αμαρτήματα

Statistical bias #1: Selection bias

Selection bias occurs, when you are selecting your sample or your data wrong. Usually this means accidentally working with a specific subset of your audience instead of the whole, hence your sample is not representative of the whole population. There are many underlying reasons, but by far the most typical I see: collect and work only with data that is *easy to access*.



selection bias

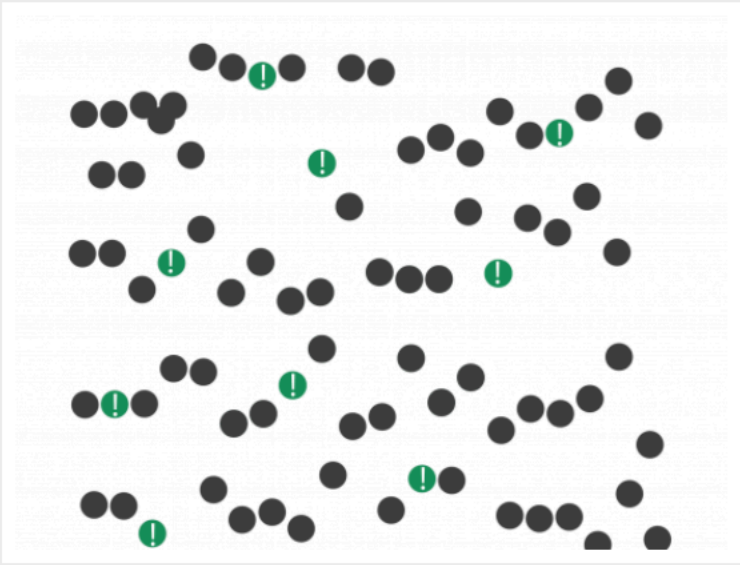


proper random sampling

Source: https://data36.com/statistical-bias-types-explained/

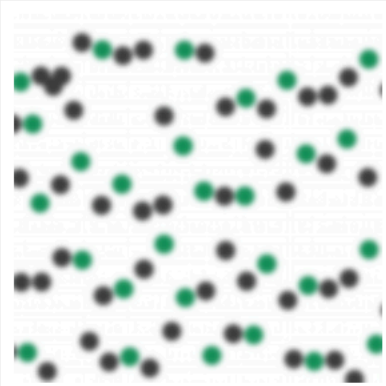
Statistical bias #2: Self-Selection bias

Self-selection bias is a subcategory of selection bias. If you let the subjects of your analyses/researches select themselves, that means that less proactive people will be excluded. The bigger issue is that self-selection is a specific behaviour – that implies other specific behaviours – thus this sample does not represent the entire population.



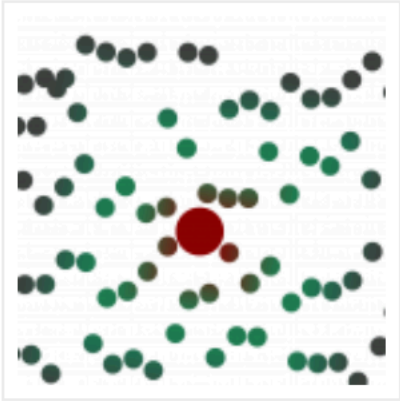
Statistical bias #3: Recall bias

Recall bias is another common error of interview/survey situations, when the respondent doesn't remember correctly for things. It's not bad or good memory – humans have selective memory by default. After a few years certain things stay, others fade. It's normal, but it makes researches much more difficult.



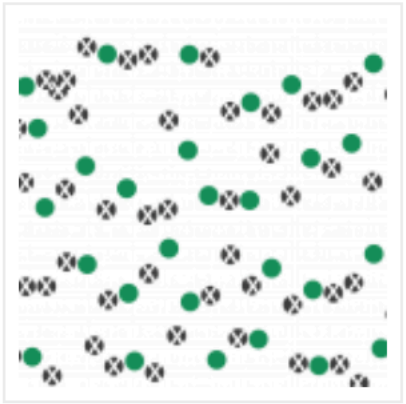
Statistical bias #4: Observer bias

Observer bias is happening, when the researcher subconsciously projects his/her expectations to the research. It can come in many forms. Eg. (unintentionally) influencing the participants (only at interviews and surveys) or doing some serious cherry picking (focusing rather on the statistics that support our hypothesis, than to the statistics, that doesn't.)



Statistical bias #5: Survivorship bias

Survivorship bias is a statistical bias type, where the researcher is focusing only to that part of the data set, that already went through some kind of pre-selection process – and missing those data-points, that fell off during this process (because they are not visible anymore).

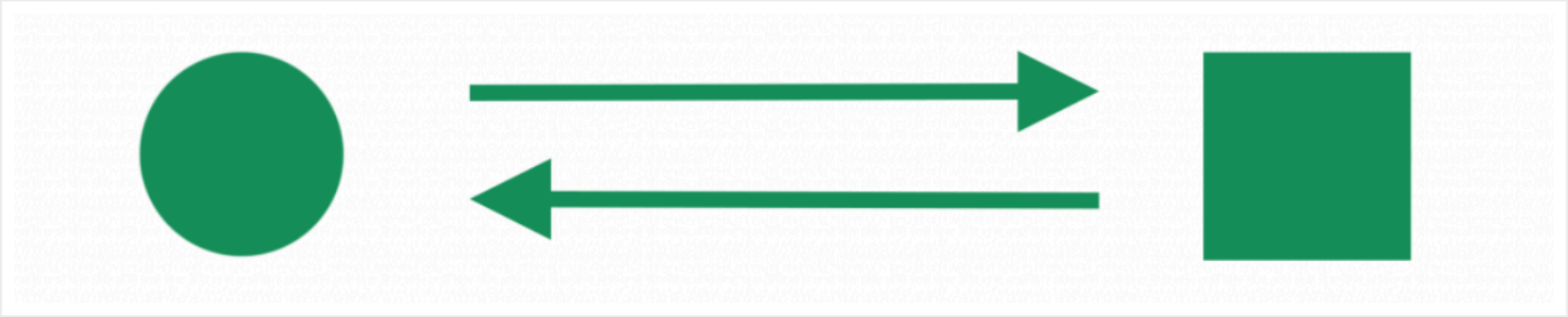


Statistical Bias #6: Omitted Variable Bias

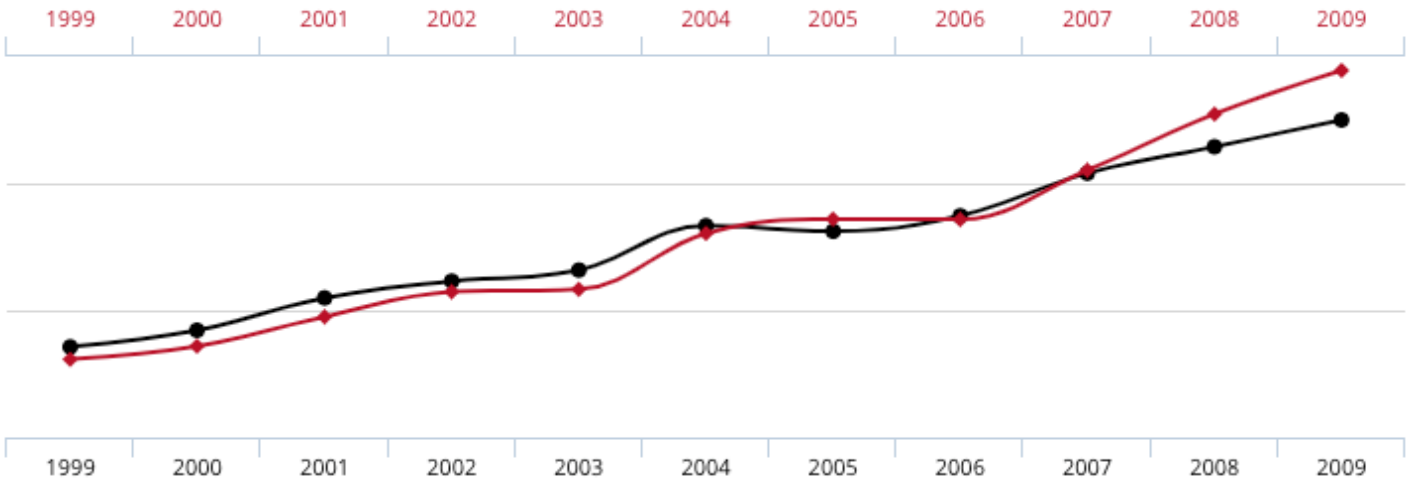
Omitted Variable Bias occurs, when you are leaving out one or more important variables from your model. This issue comes up especially often regarding Predictive Analytics.

Statistical Bias #7: Cause-effect Bias

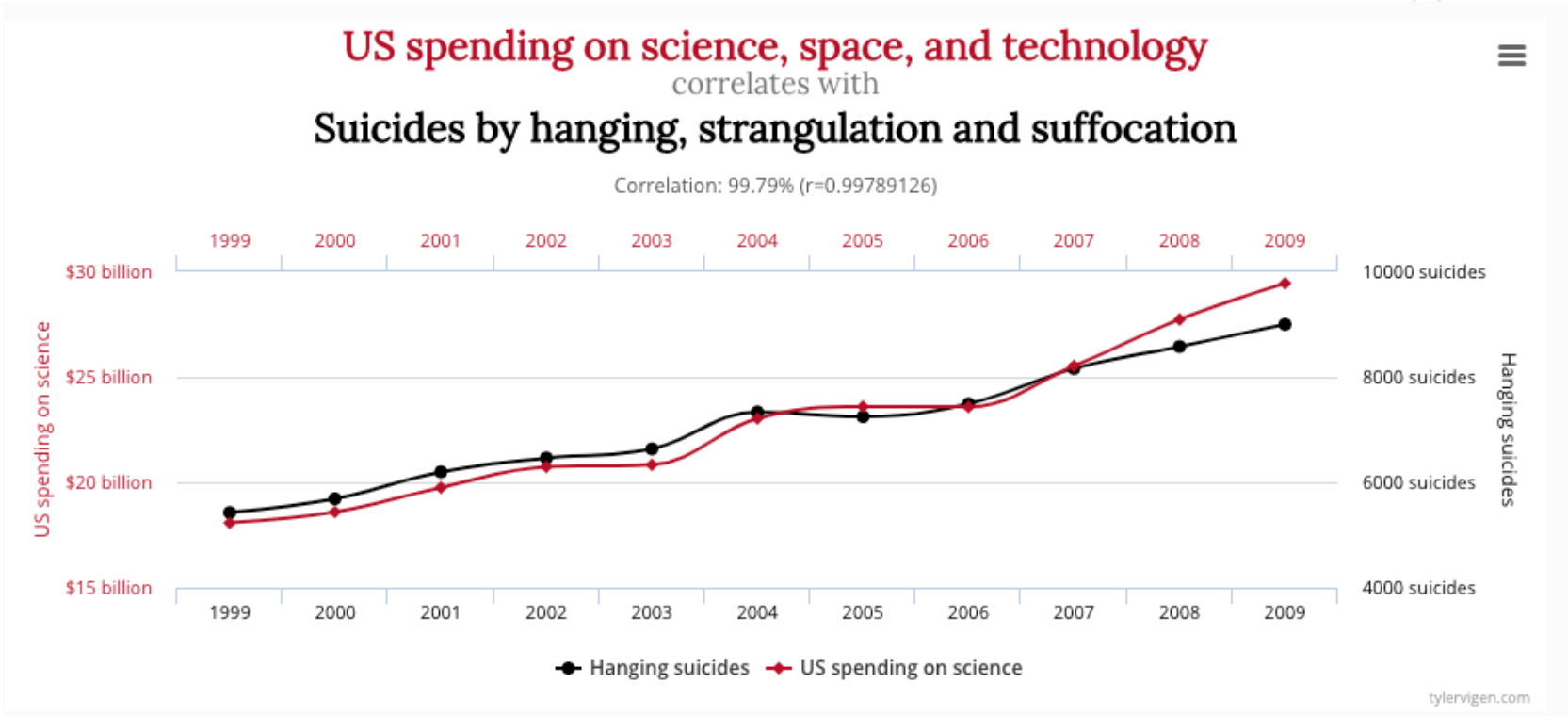
Our brain is wired to see causation everywhere, where correlation shows up. Cause-effect bias is usually not mentioned as a classy statistical bias, but I wanted to include it on this list as many decision makers (business/marketing managers) are not aware of that. Even those (me too), who are aware of it, have to remind themselves from time to time: correlation does not imply causation.



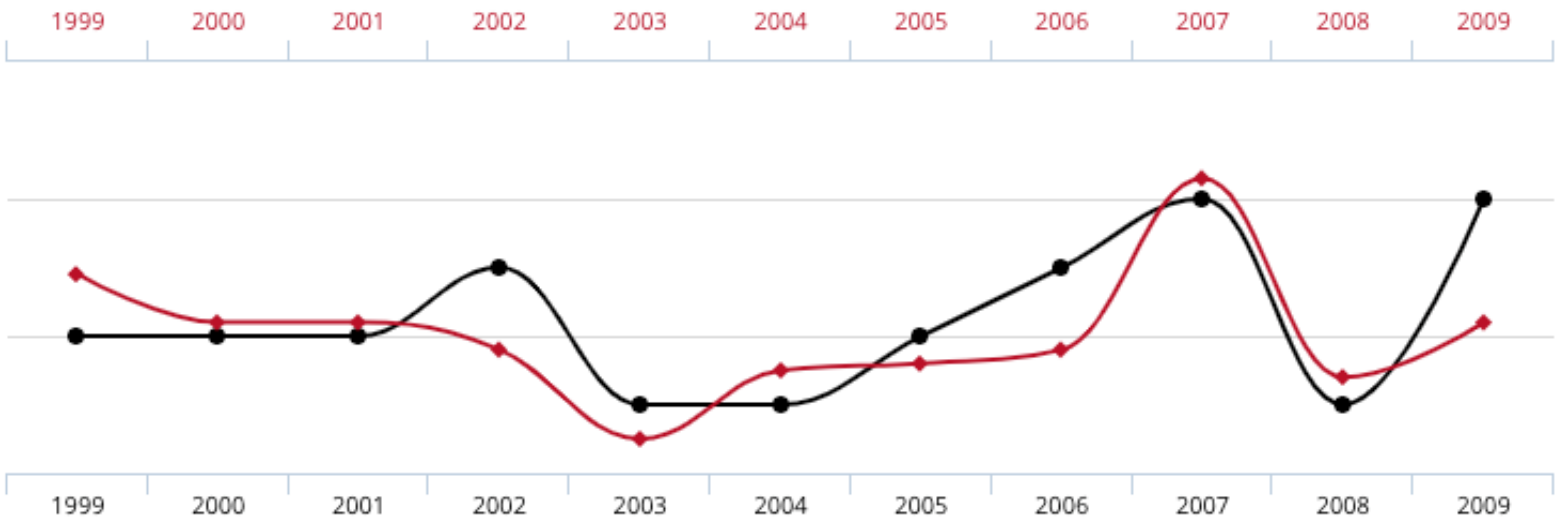
Correlation does not imply causation



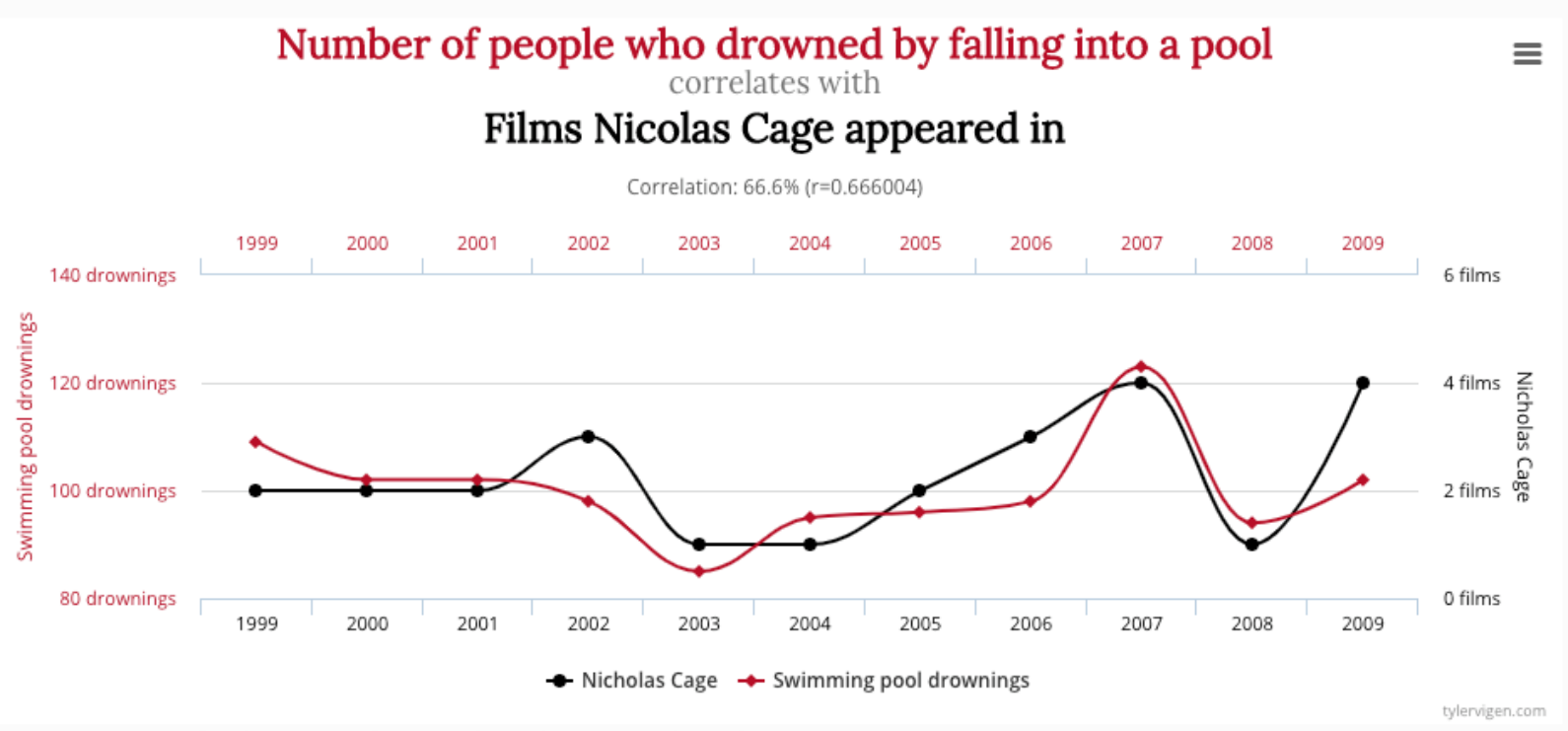
Correlation does not imply causation



Correlation does not imply causation



Correlation does not imply causation



More fun on..

http://tylervigen.com/spurious-correlations

Statistical Bias #8: Funding Bias

I briefly mentioned Funding Bias (sometimes called sponsorship bias) already in Statistical Bias Types part 1. We are talking about it, when the results of a scientific study is biased in a way, that it supports the financial sponsor of the research.

5.
Python

Get our hands dirty!

Η επόμενη μέρα

- Git
- Data file types & Copyrights
- More Python (😍)
- Working on a Data Science Project
- Intro to Machine Learning

Thanks!

Any questions?