

Geographic Data Science - Lecture I

Introduction

Dani Arribas-Bel

Today

- This course
- The (geo-)data revolution
- (Geo-)Data Science

This course

Quiz

- Have you ever heard the terms "Big Data" and "Data Science"?
- Have you ever written a line of computer code?
- How would you define in one sentence "Data Science"?
- Do you think "Geographic Data Science" is closer to GIS or Statistics?

More stats than a GIS course, more GIS than a stats course...

...but in a fun way!

Structure

11 weeks of:

- Prep. materials: videos, podcasts, articles... 1h. approx. (most recommended!)
- 1h. Lecture: concepts, methods, examples
- 2h. Computer practical: hands-on, application of concepts, Python (highly employable)
- Further readings: how to go beyond the minimum

IMPORTANT: Week 7 has no class! [Labs are booked so I recommend you spend the lab time working on your first assignment]

Website

<http://darribas.org/gds15>

The screenshot shows a website header with the text "gds15" on the left and a menu icon (three horizontal lines) on the right. Below the header, a large red box contains the text "ENVS363/563". The main title "Geographic Data Science" is displayed in a large, dark font. A descriptive paragraph follows, stating: "This is the course website for Geographic Data Science, taught by Dani Arribas-Bel in the Autumn of 2015 at the University of Liverpool." Below this, a section titled "Timetable" is introduced with the text: "The timetable for the course is:" followed by a bulleted list of class times.

ENVS363/563

Geographic Data Science

This is the course website for Geographic Data Science, taught by Dani Arribas-Bel in the Autumn of 2015 at the University of Liverpool.

The timetable for the course is:

- **Lectures:** Thursdays - 12:30/13:30, MATH-029 .
- **Computer Labs:** Thursdays - 15:00/17:00, CTL-6-PCTC-Blue (with the exception of

Philosophy

- (Lots of) methods and techniques
 - General overview
 - Intuition
 - Very little math
- Emphasis on the application
- Close connection to "real world" applications
- FUN

Assignments

- Mark based on two assignments, due:
 1. Week 8 (50%)
 2. Week 13 (50%)
- Coursework
- Equivalent to 2,500: report with code, figures (e.g. maps), and text

The (geo-)data revolution

The (geo-)data revolution

Exciting times to be a:

- Geographer
- Map fan
- Data fan

The world is being "datafied"...

"Datafication"

Quantification of phenomena through the systematic recording of data

“taking all aspects of life and turning them into data”

Cukier & (Mayer-Schoenberg)

Examples: credit transactions, public transit, tweets, facebook likes, spotify songs, etc.

"Datafication"

Many implications:

- Opportunities for optimization of systems (Industrial IoT, planning systems...)
- Window into human behaviour (this course)
- Issues with intentionality and privacy
- ...

Why now?

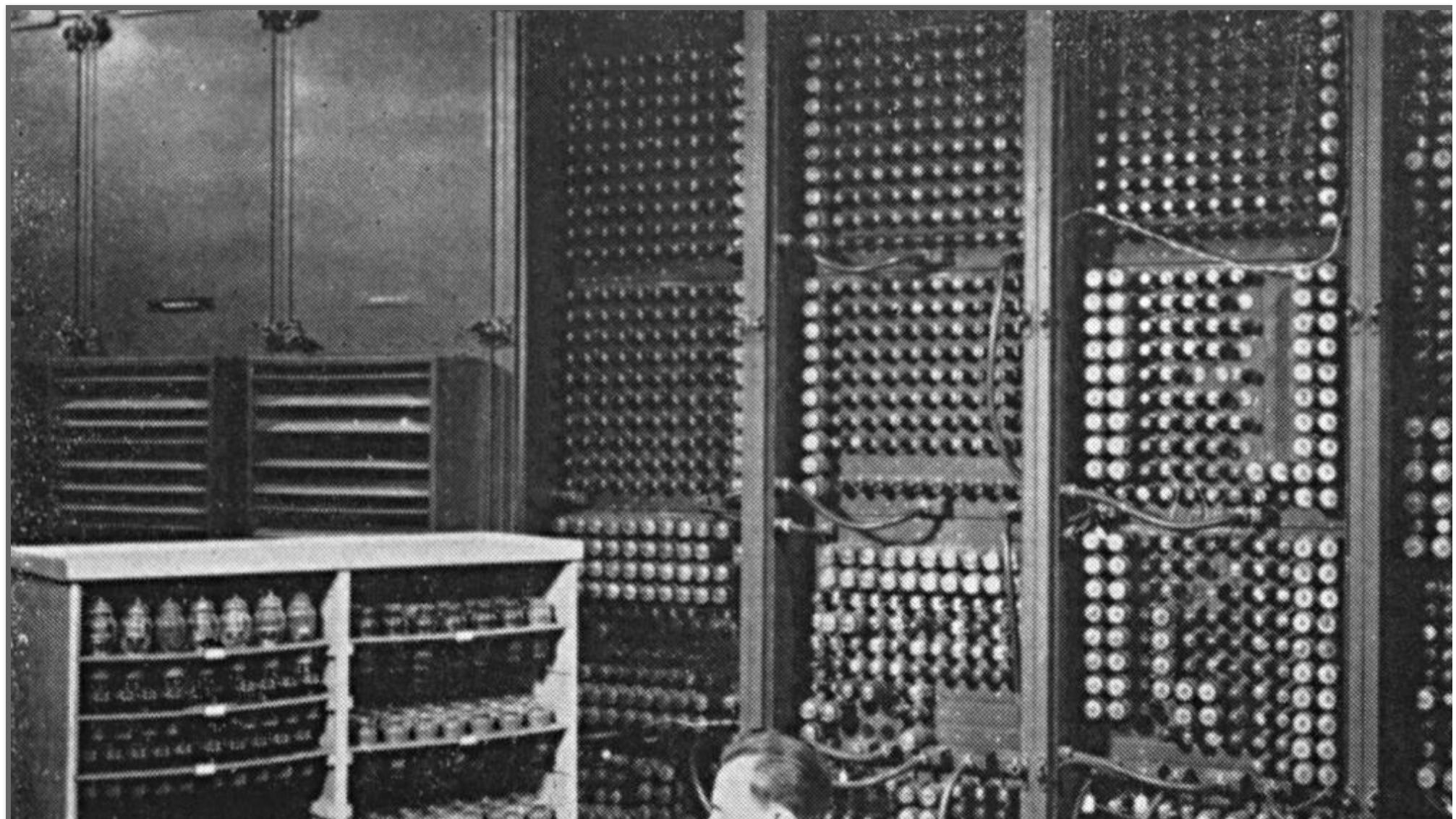
Why now?

Advances in:

- Computing power
- Communication
- Geospatial technology

Why now? --> Computing power

Source





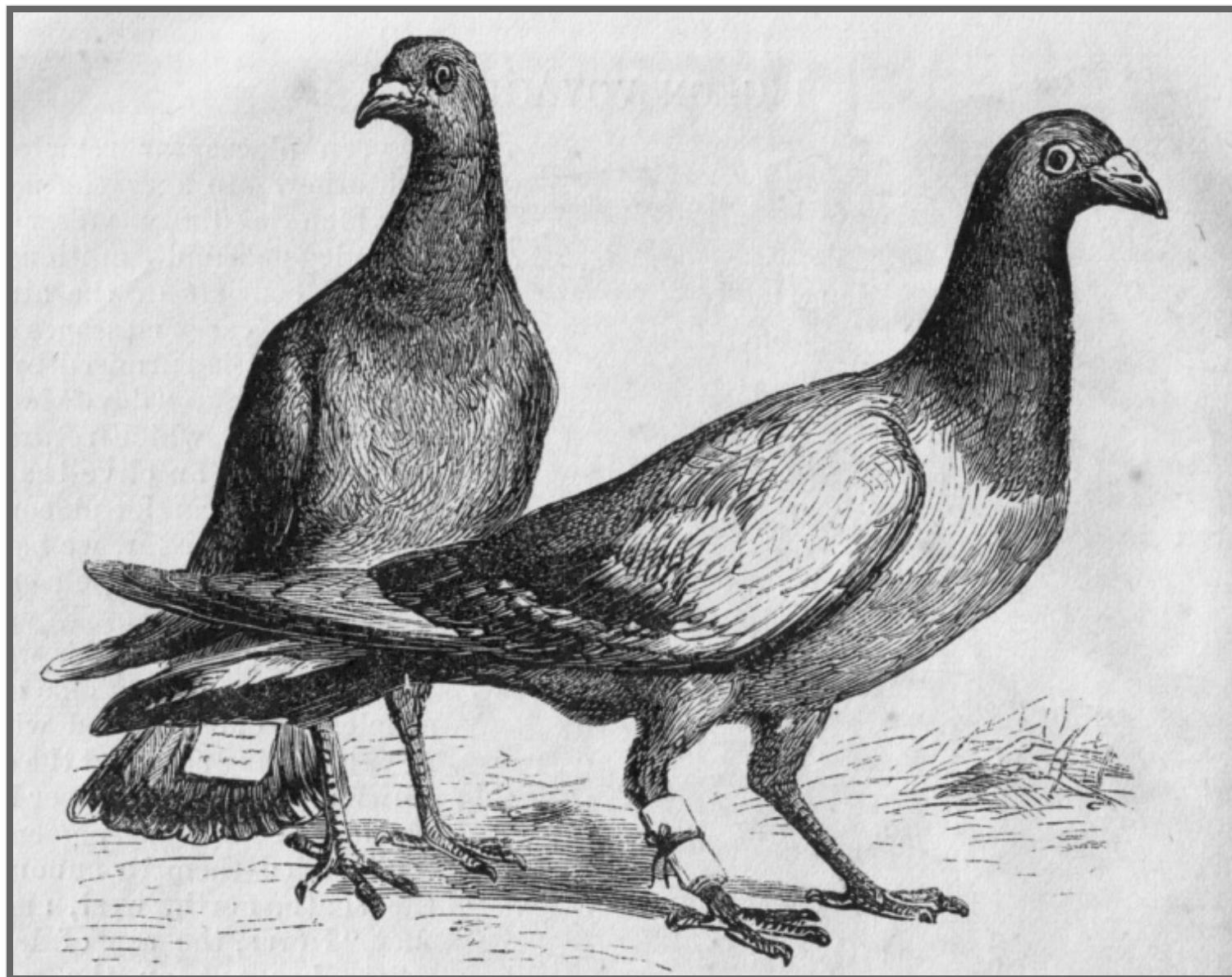
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Why now? --> Communication

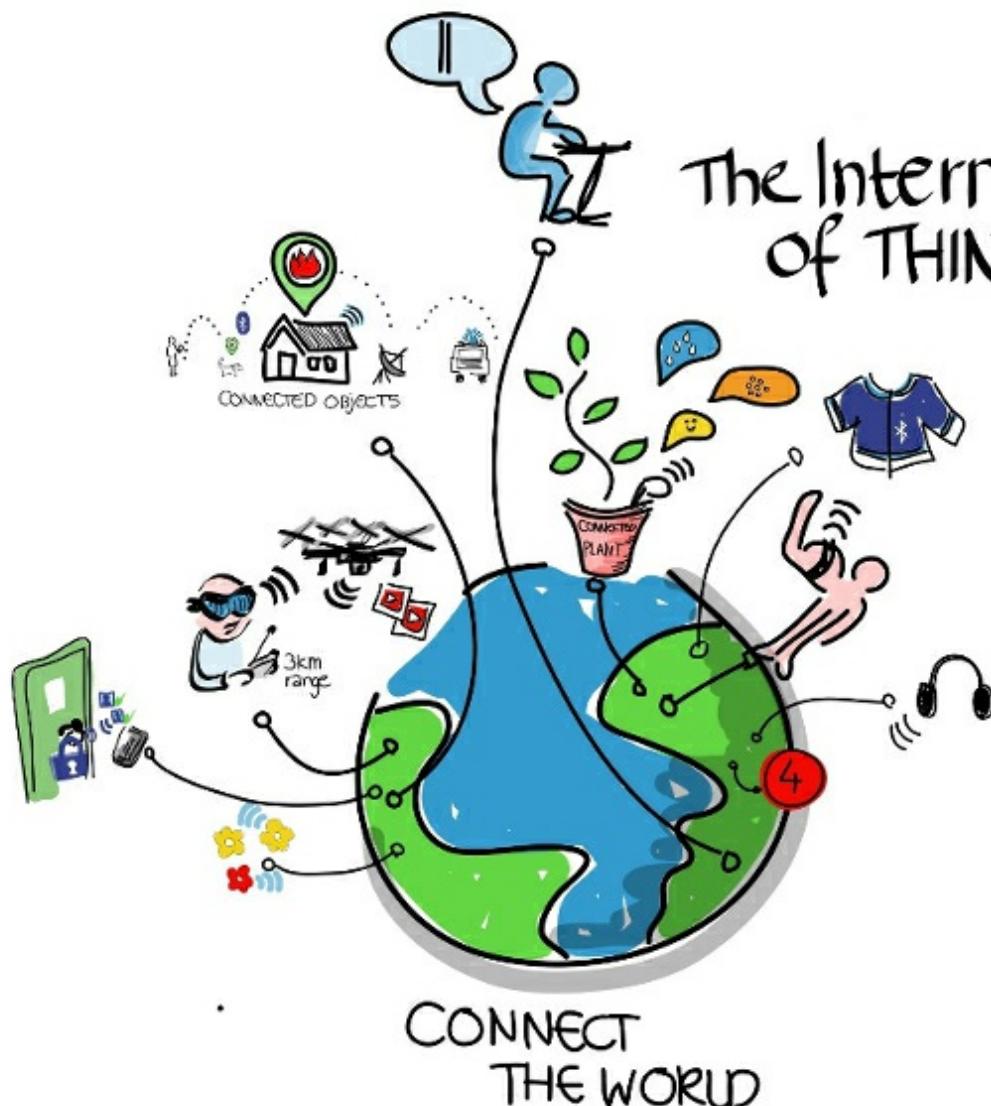
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Why now? --> Communication

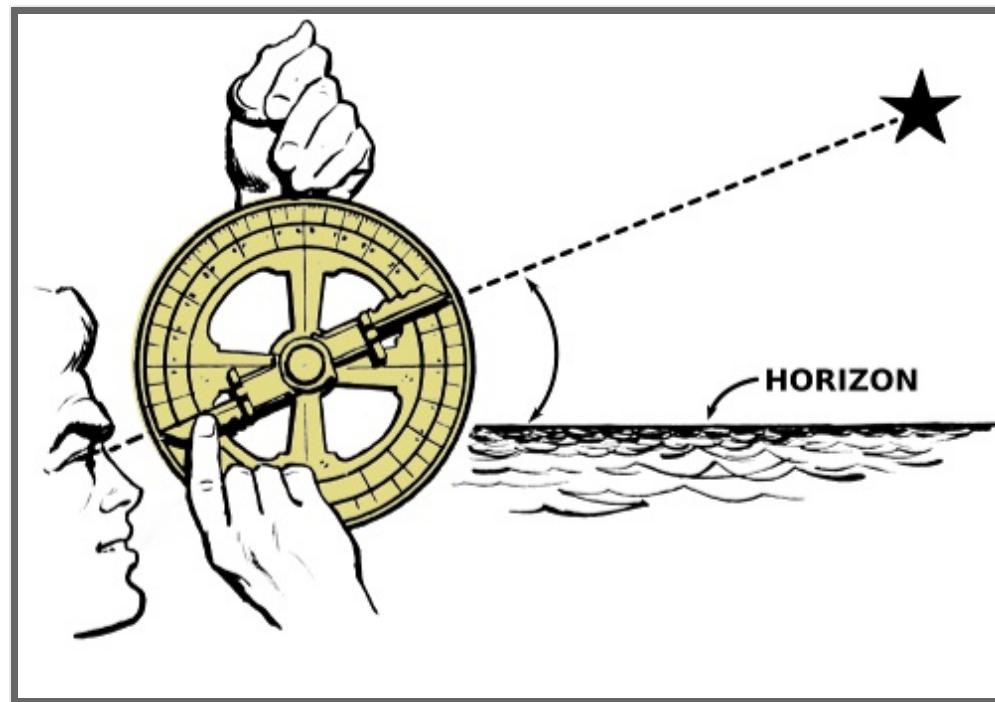
Source

The Internet of THINGS



Why now? --> Geospatial technology

Source



Why now? --> Geospatial technology

Source



The (geo-)data revolution

The confluence of the three (computing, communication and geospatial) is creating large amounts of data.

Now, data in itself is not very valuable:

- Data --> Information --> Knowledge --> Action

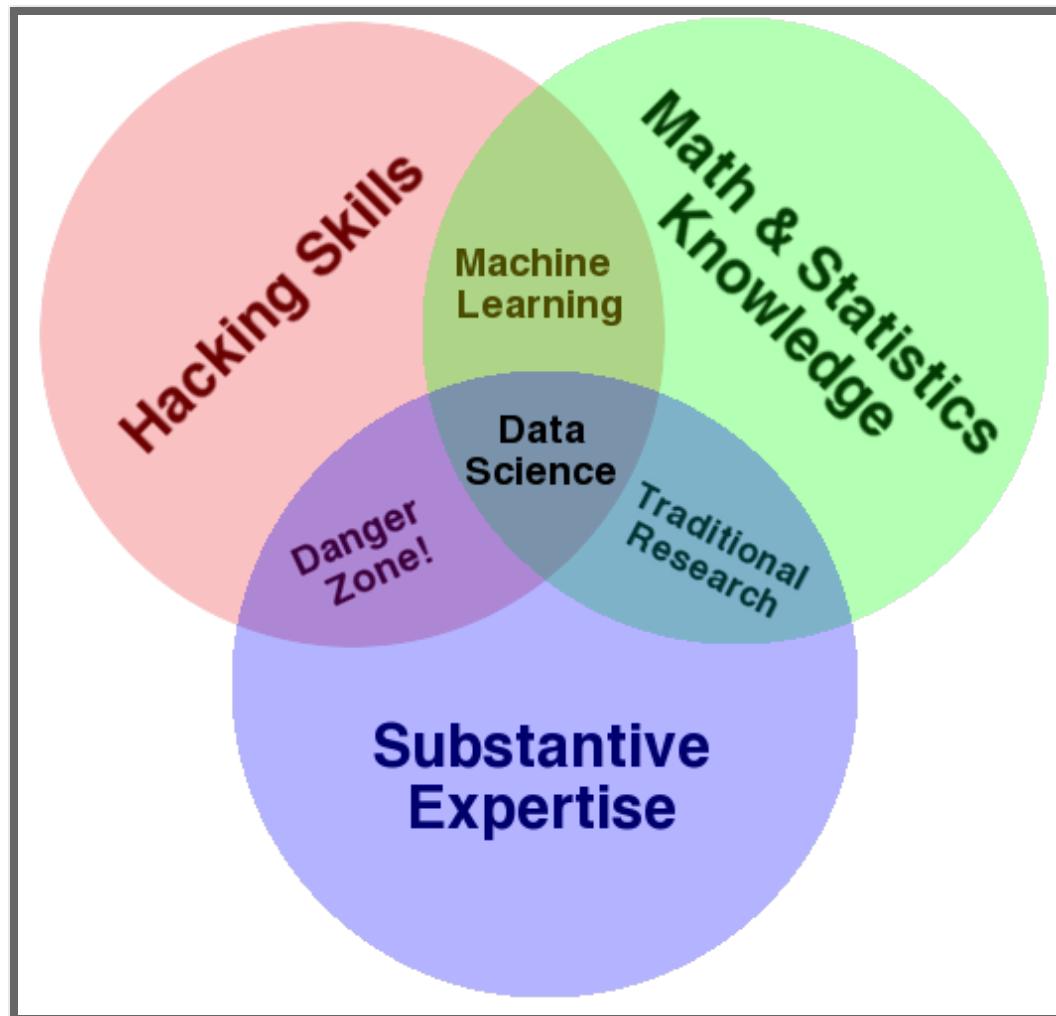
Data Science

Methods, tools and techniques to turn data into actionable knowledge

But wait, isn't statistics just that?
Not only...

Data Science

Source: Drew Conway



Data Science

Statistics is a very important part of DS...

... but not the only one:

- Computational tools --> Programming (hence this course's tutorials!)
- Communication skills --> "Story telling" (hence this course's assignments)
- Domain expertise --> Theories about why the data are the way they are (hence the rest of your degree)

Data Science

- Not all new (standing on the shoulders of giants)
 - "The data becomes key part in the product"
 - Focus on actionability and solving particular problems
- Some examples...



Total price: £32.97

Add all three to Basket

i These items are dispatched from and sold by different sellers. [Show details](#)

- This item:** Green and Black's Organic Dark Chocolate 85 Percent Cocoa 100 g (Pack of 5) £11.62 (£2.32 / 100 g)
- [Green and Black's Organic Ginger Dark 100 g \(Pack of 5\) £10.40 \(£2.08 / 100 g\)](#)
- [Green and Black's Organic Dark Chocolate Maya Gold 100 g \(Pack of 5\) £10.95 \(£2.19 / 100 g\)](#)

Amazon

Customers Who Bought This Item Also Bought



Green and Black's Organic
Ginger Dark 100 g (Pack of



Green and Black's Organic
Dark Chocolate Maya Gold



Green and Black's Organic
Dark Chocolate 100 g



Vivani Organic Dark
Chocolate with 85% Coco



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Hemel Hempstead
Princes Risborough
Great Missenden
Chesham
Amersham
High Wycombe
Beaconsfield
Hambleden
Maidenhead
Slough
Windsor
Binfield
Bracknell
Camberley
Frimley
Farnborough
Fleet
Cobham
Epsom
Leatherhead
East Horsley
Dorking
Redhill
Caterham
Oxted
Sevenoaks
Kings Hill
Maidstone
Loose
Hildenborough
Hadlow

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London



FARE ESTIMATE





Geo-Data Science

Geo-Data Science

- A (very) large portion of all these new data are inherently geographic or can be traced back to some location over space.
- Spatial is special.
- Some of the methods require an explicitly spatial treatment
--> (Geo-)Data Science

Some examples...



Where are you going?

Browse

Sign Up Log In Help List Your Space

Cities > London

Saved Neighbourhoods 0

Find a Neighbourhood in London

What kind of neighbourhood are you looking for?

Dining X

Artsy 7

Nightlife 9

Shopping 15

Loved by Londoners 11

Touristy 14

Great Transit 13

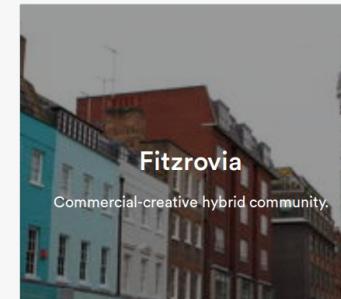
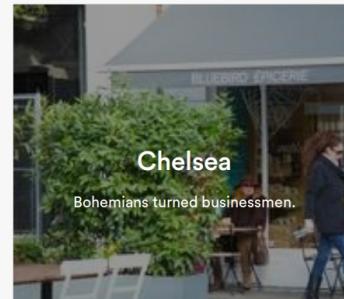
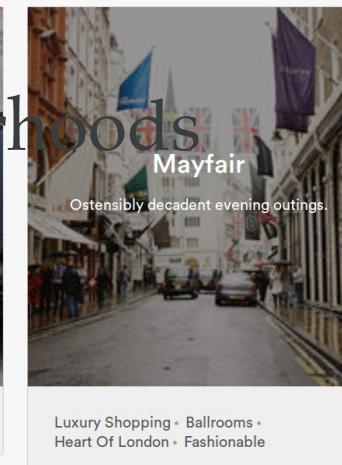
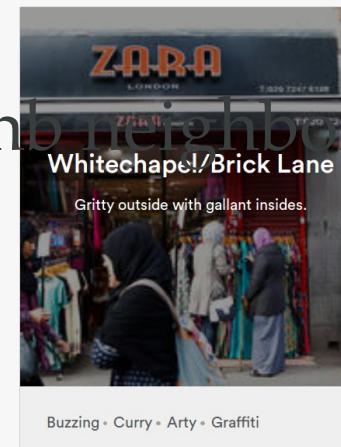
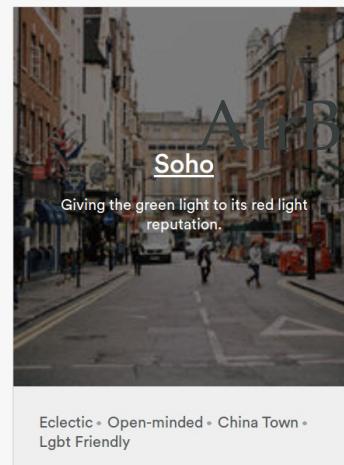
Museums & the Arts 10

Peace & Quiet 7

Along the River Thames 5

West End 7

23 neighbourhoods match Dining. [See all listings](#)



Penny Ln, Live... +

<https://www.google.co.uk/maps/dir/Penny+Ln,+Liverpool+L18+1DE,+UK/University+of+Liverpool,+Liverpool/@53.3974201,-2.9788596,13z>

Walking directions Print X

行人 via A562 49 min
Show terrain 2.4 miles

Use caution - may involve errors or sections not suited for walking

Penny Ln
Liverpool L18 1DE, UK

↑ Head southwest on Penny Ln toward Russell Rd
79 ft

↗ Turn right onto Russell Rd
0.2 mi

↖ Turn left onto Smithdown Rd/A562
1.3 mi

↖ Slight right to stay on Smithdown Rd/A562
① Continue to follow A562
364 ft

↗ Turn right toward Smithdown Ln
325 ft

↑ Continue onto Smithdown Ln
0.2 mi

↖ Turn left to stay on Smithdown Ln
0.5 mi

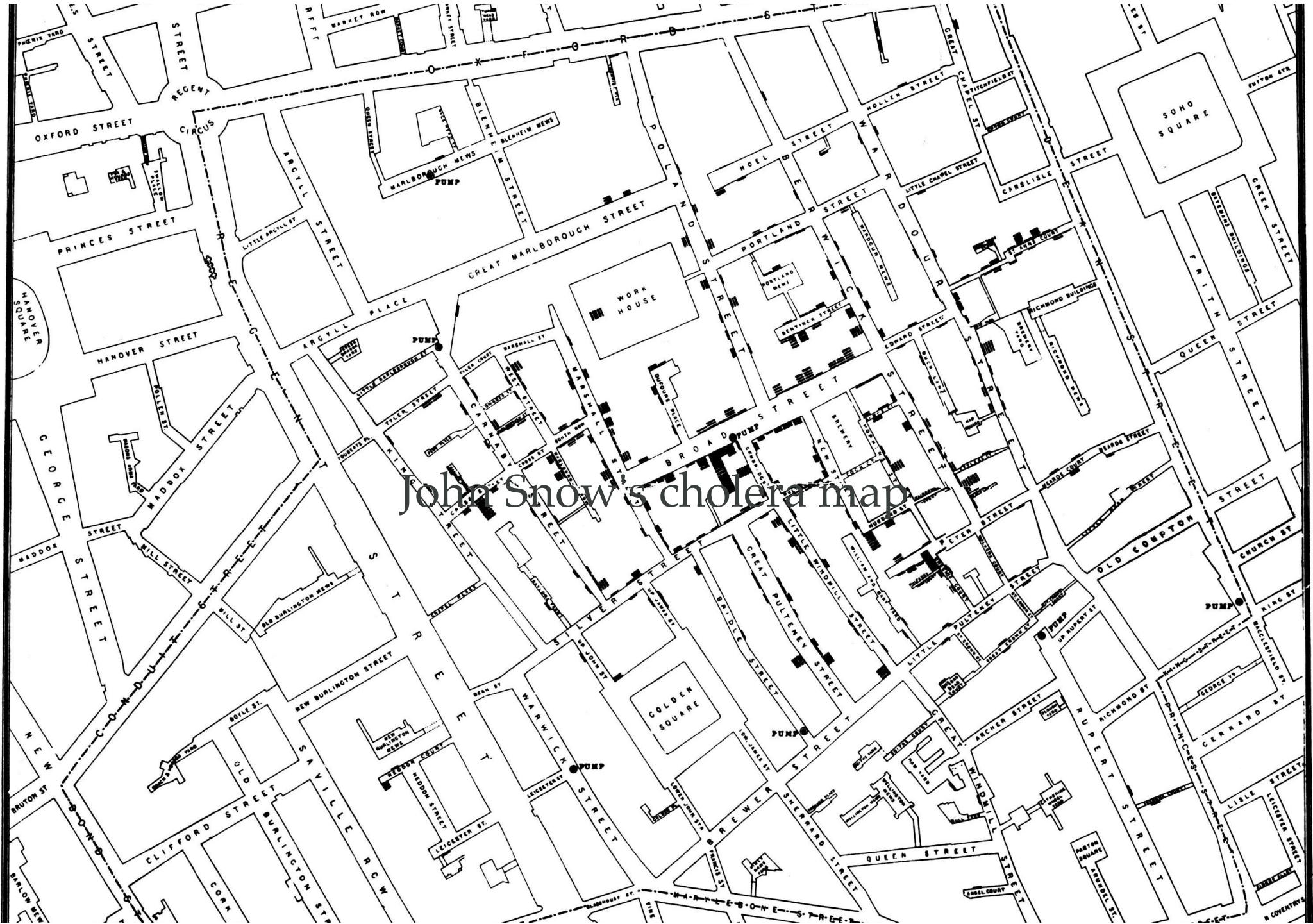
↑ Continue straight onto Brownlow Hill/A5048
① Continue to follow Brownlow Hill

57 min
2.8 miles

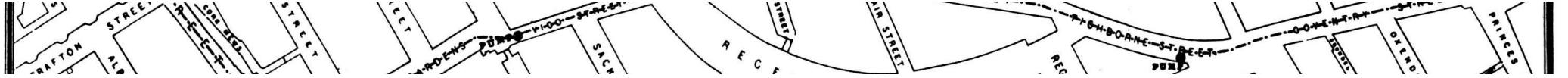
50 min
2.5 miles

49 min
2.4 miles

Google Maps routing



John Snow's cholera map



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